

SmartWare Spreadsheet

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Table of Contents

Table of Contents	i
Chapter 1: Introduction to ANGOSS Spreadsheet	1 - 1
What Is a Spreadsheet?	1 - 1
Spreadsheet Applications	1 - 2
Using ANGOSS Documentation	1 - 4
Comments, Notes, and Importants	1 - 4
Practice Sessions	1 - 4
Chapter 2: Getting Started	2 - 1
Running ANGOSS Spreadsheet	2 - 1
Key Strokes Under Unix	2 - 2
Key Help	2 - 3
Learning ANGOSS Spreadsheet	2 - 3
Using Example Files	2 - 4
ANGOSS Help	2 - 4
Using The Mouse	2 - 5
The Display Screen	2 - 5
The Worksheet Window	2 - 6
The Control Area	2 - 7
The Status Line	2 - 8

Table of Contents

The Autohelp Line	2 - 9
Operating Modes	2 - 9
Data Entry Mode	2 - 10
Command Mode	2 - 11
Definition Menus	2 - 12
Operating System Access	2 - 14
File Extensions	2 - 15
Automatic File Backup	2 - 16
Exiting	2 - 17
Practice Session	2 - 17
Chapter 3: Creating a Worksheet	3 - 1
Entering Data	3 - 1
Text, Values, and Formulas	3 - 2
Basic Worksheet Formatting	3 - 7
Formatting Numeric Values	3 - 7
Formatting a New Worksheet	3 - 9
Working with Fonts	3 - 10
Saving and Unloading Worksheets	3 - 13
Unloading Worksheets	3 - 14
Practice Session	3 - 15

Chapter 4: Editing a Worksheet	4 - 1
Loading a Worksheet	4 - 2
Editing the Contents of a Cell	4 - 2
The Cell Editor	4 - 3
The Formula Editor	4 - 5
Manipulating Worksheet Data	4 - 6
Absolute Cell References	4 - 7
Relative Cell References	4 - 7
Combination Cell References	4 - 8
Named Blocks	4 - 9
External Worksheet References	4 - 10
Blockmarking in Commands	4 - 11
Row and Column Marking	4 - 12
Moving Data	4 - 13
Copying Data	4 - 13
Deleting Data vs. Blanking Data	4 - 14
Inserting Blocks, Columns, and Rows	4 - 18
Filling Worksheet Areas	4 - 18
Generating a Series of Numbers	4 - 18
Filling a Cell	4 - 19
Sorting Data	4 - 19
Reformatting Worksheets	4 - 22
Reformatting Text Entries	4 - 22
Reformatting Value Entries	4 - 22

Tracking Worksheet Data	4 - 23
Searching Worksheets	4 - 23
Debugging Worksheets	4 - 25
Auditing Worksheets	4 - 25
Painting Cell Types	4 - 26
Practice Session	4 - 27

Chapter 5: Managing Worksheets 5 - 1

Multiple Windows, Multiple Worksheets	5 - 1
Splitting the Worksheet Window	5 - 1
Splitting a Window Horizontally	5 - 2
Splitting a Window Vertically	5 - 2
Moving to a Different Window	5 - 2
Using Multiple Worksheets	5 - 3
Enlarging Split Windows	5 - 3
Closing Windows	5 - 5
Fixing Titles	5 - 5
Linking and Unlinking Windows	5 - 5
Combining Worksheets	5 - 6
Creating Protected Worksheets	5 - 8
File Password Protection	5 - 9
Locking and Unlocking Worksheet Cells	5 - 9
Hiding Worksheet Data	5 - 11

Listing Files	5 - 11
Using ANGOSS Tools	5 - 12
Advanced Worksheet Tools	5 - 12
Using ANGOSS Functions	5 - 13
Using Circular References	5 - 15
Matrix Mathematics	5 - 15
Sheet Matrix Parallel	5 - 16
Sheet Matrix Transpose	5 - 16
Sheet Matrix N-Solve	5 - 17
Sheet Matrix Regression	5 - 19
Practice Session	5 - 23

Chapter 6: Printing Worksheets and Reports 6 - 1

Before You Print	6 - 1
Print Options	6 - 2
Characters per inch in draft mode	6 - 2
Paper Profile	6 - 3
Printing Worksheets	6 - 7
Landscape Printing	6 - 8
Resizing Worksheet Cells	6 - 8
Printing with Compressed Fonts	6 - 10
Using Sideways Fonts	6 - 10

Table of Contents

Producing Reports	6 - 11
Creating Report Definitions	6 - 11
Print Groups	6 - 12
Specifying print groups	6 - 13
Using Multiple Block References	6 - 14
Adding Print Groups	6 - 18
Deleting Print Groups	6 - 20
Report Headings and Footings	6 - 20
Headings and Footings	6 - 20
Date Style	6 - 23
Page Number Style	6 - 24
Lines to Enclose Report	6 - 24
Start Page Number	6 - 24
Spacing	6 - 24
Lines Per Inch	6 - 24
Draft mode	6 - 24
Paper Profile	6 - 25
Orientation	6 - 25
Print on Both Sides of the Form	6 - 25
Use Secondary Borders	6 - 25
Page Borders	6 - 25
Executing Reports	6 - 26
Modifying Report Definitions	6 - 27
Removing Report Definitions	6 - 27
Printing Formulas	6 - 27
Printing a Map of Your Worksheet	6 - 28
Practice Session	6 - 29

Chapter 7: Using ANGOSS Graphics	7 - 1
Graph Terminology	7 - 1
Selecting a Graph Type	7 - 11
Bar Graphs	7 - 12
Line Graphs	7 - 16
Area Graphs	7 - 16
Step Graphs	7 - 16
Combination Graphs	7 - 16
Pie Graphs	7 - 17
High-Low Graphs	7 - 17
Xy Graphs	7 - 17
Polar Graphs	7 - 17
Contour, Surface, and Wireframe Graphs	7 - 18
Text Graphs	7 - 18
Composite Graphs	7 - 18
Components of a Graph	7 - 18
Plot Area	7 - 19
Legend Area	7 - 20
Title Area	7 - 20
Footnote Area	7 - 21
Background Area	7 - 21
Common Definition Items	7 - 21
Worksheet References	7 - 22
Colors	7 - 22
Line and Fill Patterns	7 - 23
Border Types	7 - 24
Symbols	7 - 25
Fonts	7 - 26
Character and Line Sizes	7 - 28
Text Control Characters	7 - 30
Defining Graphs	7 - 31
Creating Quick Graphs	7 - 32

Table of Contents

- Making Entries on a Graph Definition Menu 7 - 38
- Entering the Filename and Graph Type 7 - 43
- Defining Areas 7 - 44
- Defining the Plot 7 - 45
- Defining the Legend 7 - 61
- Defining Titles and Footnotes 7 - 61
- Defining the Background 7 - 63
- Defining Text Graphs 7 - 63
- Defining Composite Graphs 7 - 64

- Generating Metafiles 7 - 66

- Viewing, Printing, and Plotting Graphs 7 - 67

- Erasing Graphs and Metafiles 7 - 67

- Setting Graph Defaults 7 - 67

Chapter 8: ANGOSS Integration 8 - 1

- Integration With Other ANGOSS Modules 8 - 1
 - Sheet Send 8 - 2
 - File Import 8 - 4
 - File Export 8 - 4

- Integration with Other Software Formats 8 - 4
 - File Import 8 - 4
 - File Export 8 - 4

Chapter 9: ANGOSS Spreadsheet Command Reference 9 - 1

- Basic Concepts 9 - 1
 - Marking Blocks 9 - 5
 - Marking Rows and Columns 9 - 5

Definition Menus9 - 6

Prompter Listings9 - 6

Classifying Commands by Function9 - 7

 Getting Help9 - 7

 Moving Between Cells, Worksheets, or Windows9 - 7

 Creating and Modifying Worksheet Data9 - 7

 Formatting Worksheet Data9 - 8

 Auditing Worksheet Data9 - 8

 Controlling Recalculation9 - 9

 Using Fonts9 - 9

 Using Matrix Mathematics9 - 9

 Protecting Worksheets9 - 9

 Creating Graphs9 - 10

 Printing9 - 10

 Transferring Data9 - 11

 Controlling Worksheet Window Display9 - 12

 Performing File Operations9 - 12

 Building and Using Project Files9 - 13

Sheet Commands 9 - 15

Sheet Audit9 - 16

Sheet Calc-Mode9 - 17

Sheet Find9 - 19

Sheet Goto9 - 21

Sheet Lock9 - 23

Sheet Matrix9 - 25

 Matrix Overview9 - 25

 Sheet Matrix Aux9 - 26

 Sheet Matrix Diagonal9 - 27

 Sheet Matrix Invert9 - 28

Table of Contents

Sheet Matrix Multiply	9 - 28
Sheet Matrix N-Solve	9 - 29
Sheet Matrix Parallel	9 - 29
Sheet Matrix Regression	9 - 30
Sheet Matrix Sweep	9 - 31
Sheet Matrix Transpose	9 - 32
Sheet Matrix Upper	9 - 33
Sheet Name	9 - 33
Sheet Send	9 - 34
Sheet Send Communications	9 - 35
Sheet Send Database	9 - 35
Sheet Send Wordprocessor	9 - 35
Sheet Unlock	9 - 36

Edit Commands 9 - 39

Edit Blank	9 - 40
Edit Copy	9 - 40
Edit Copy Down	9 - 41
Edit Copy Right	9 - 41
Edit Copy From	9 - 41
Edit Delete	9 - 42
Edit Edit-Cell	9 - 43
Formula Editor	9 - 44
Edit Fill	9 - 46
Edit Hide	9 - 47
Edit Unhide	9 - 47
Edit Insert	9 - 48

Edit Move 9 - 49

Edit Sort 9 - 49

Edit Value-Copy 9 - 50

 Edit Value-Copy Down 9 - 51

 Edit Value-Copy Right 9 - 51

 Edit Value-Copy From 9 - 51

File Commands 9 - 53

File Load 9 - 54

File Save 9 - 54

File Unload 9 - 55

File Activate 9 - 56

File Newname 9 - 56

File Display-Active 9 - 57

File Combine 9 - 57

File Import 9 - 58

File Export 9 - 60

File Password 9 - 61

Layout Commands 9 - 63

SHADING 9 - 64

Layout Cell-Size 9 - 65

 Layout Cell-Size Width 9 - 65

Table of Contents

Layout Cell-Size Height	9 - 66
Layout Default	9 - 66
Compared to Worksheet-Options	9 - 67
Layout Default Text	9 - 67
Layout Default Values	9 - 67
Layout Format	9 - 69
Layout Justify	9 - 72
Layout Lines	9 - 73
Layout Set-Font	9 - 75
Layout Set-Font Select	9 - 76
Layout Set-Font Change	9 - 76
Layout Set-Font Edit	9 - 77
Layout Set-Font Remove	9 - 78
Layout Worksheet-Options	9 - 79
Layout Worksheet-Options Current-Sheet	9 - 79
Layout Worksheet-Options New-Sheet	9 - 82

Print Commands 9 - 83

Print Preview	9 - 84
Introduction	9 - 84
Print Preview Commands	9 - 84
Print Worksheet	9 - 86
Print Formulas	9 - 87
Print Map	9 - 88
Print Report	9 - 88

Print Report Create	9 - 89
Print Groups	9 - 89
Specifying Print Groups	9 - 90
Using Multiple Block References	9 - 90
Adding Print Groups	9 - 92
Deleting Print Groups	9 - 92
Report Headings and Footings	9 - 92
Headings and Footings	9 - 92
Date Style	9 - 96
Page Number Style	9 - 96
Lines to Enclose Report	9 - 96
Start Page Number	9 - 96
Spacing	9 - 96
Lines Per Inch	9 - 96
Draft mode	9 - 96
Paper Profile	9 - 97
Orientation	9 - 97
Print on Both Sides of the Form	9 - 97
Use Secondary Borders	9 - 97
Page Borders	9 - 98
Print Report Modify	9 - 98
Print Report Remove	9 - 98
Print Report Execute	9 - 99
Print Options	9 - 99
Lines per inch in draft mode	9 - 100
Characters per inch in draft mode	9 - 100
Paper Profile	9 - 100
Orientation	9 - 101
Page Borders	9 - 101
Print Preset	9 - 101

Graph Commands 9 - 102

Graph Quick 9 - 103

Graph Define 9 - 103

Graph View 9 - 104

Graph Metafile 9 - 104

Graph Print 9 - 104

Graph Xy-Plot 9 - 105

Graph Erase 9 - 105

Graph Set-Default 9 - 105

Tools Commands 9 - 106

Tools Preferences 9 - 106

Tools Preferences Spreadsheet 9 - 106

Window Commands 9 - 110

Window Split 9 - 111

Window Close 9 - 111

Window Zoom 9 - 111

Window Border 9 - 112

Window Numbers 9 - 112

Window Paint 9 - 112

Window Paint Border9 - 113
 Window Paint Cells9 - 113
 Window Paint Numbers9 - 114
 Window Paint Window9 - 114
 Window Titles9 - 114
 Window Link9 - 115
 Window Unlink9 - 115

Help Commands 9 - 116

Help About-Help9 - 116
 Help Contents9 - 116
 Help Index9 - 117
 Help On-Error9 - 117
 Help Tutorial9 - 117
 Remember Commands9 - 118
 Quit Commands9 - 118

Index Index - 1

Table of Contents

Chapter 1: Introduction to ANGOSS Spreadsheet

Congratulations on your purchase of ANGOSS Spreadsheet with Business Graphics. By choosing ANGOSS, you have acquired one of the most powerful and versatile spreadsheet programs available.

This manual describes the features and capabilities of ANGOSS Spreadsheet. Topics covered include:

- creating spreadsheets
- editing spreadsheets
- printing spreadsheets and reports
- integrating ANGOSS Spreadsheet with other ANGOSS modules

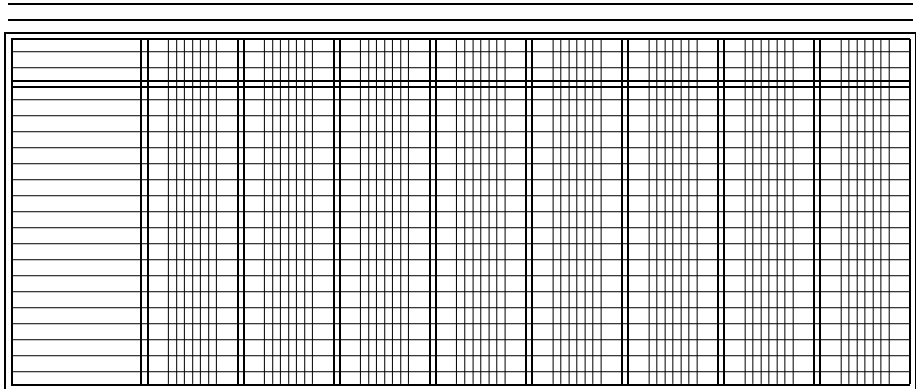
In addition, sample applications have been included in this chapter as suggestions for ways you may use ANGOSS Spreadsheet.

What Is a Spreadsheet?

The term "spreadsheet" is commonly used to refer to a piece of paper that is divided into rows and columns, providing a useful format for entering, organizing, and calculating numeric data.

A spreadsheet program uses a structure similar to the format used for an accounting worksheet. An accounting worksheet is a piece of paper with a number of rows and columns, as shown in Figure 1-1.

Figure 1-1



A spreadsheet program uses the same kind of row and column format found on an accounting worksheet to create an "electronic" worksheet.

In this manual the term "spreadsheet" is used to refer to the actual software program, ANGOSS Spreadsheet. The term "worksheet" is used to refer to the grid of rows and columns (whether in file, display, or printed format) into which you enter text, numeric values, and formulas.

ANGOSS Spreadsheet provides a computerized method for creating and maintaining relational and independent worksheets. Its formula calculation capabilities provide you with trigonometric, statistical, business, date, and time functions, as well as with matrix analysis capabilities. In addition, you can use common logical expressions to evaluate data results, and goal seeking to solve an unknown variable in an equation.

Spreadsheet Applications

ANGOSS Spreadsheet can be used for any application requiring storage and manipulation of numerical data. Some of these applications include:

- real estate amortization schedules
- stock market and investment analyses
- scheduling and production/cost analyses for bid summaries

- cost projections for financial forecasting
- depreciation workpapers and summaries
- payroll summaries
- income tax projection
- survey and questionnaire summaries
- student attendance records and grade summaries

An office supplies budget for quarterly cost projections, as shown in Figure 1-2, is one example of a spreadsheet application. This worksheet shows monthly office expenses for such items as printer ribbons, paper, envelopes, pens and pencils, and file folders.

Figure 1-2

	1	2	3	4	5
1	1ST QUARTER OFFICE EXPENSES				
2					
3	Item	January	February	March	Total
4					
5	Binder, 3-ring 1/2 in	40.00	40.00	56.00	144.00
6	Binder, 3-ring 1.5 in	40.00	44.00	35.00	119.00
7	Book, Steno	3.00	6.00	7.20	16.20
8	Clip, Paper, jumbo	15.00	18.00	22.00	55.00
9	Clip, Paper, no.1	15.00	18.00	18.00	51.00
10	Correction Fluid, white	1.00	1.00	0.00	2.00
11	Dispenser, Tape desk	15.00	18.00	7.50	40.50
12	Dispenser, Tape hand	15.00	18.00	0.00	33.00
13	Folder, File Manila	30.00	36.00	25.00	91.00
14	Folder, Hanging ltr size	150.00	100.00	216.00	546.00
15	Highlighter, lge yellow	12.00	15.00	13.00	45.00
16	Highlighter, lge green	3.00	3.00	4.00	10.00
17	Holder, Calendar	15.00	18.00	0.00	33.00
18	Pad, Scratch	5.00	6.00	9.00	20.00

Menu: Sheet Edit **File** Layout Print Graph Tools Window Help Remember
Quit
Worksheet: expenses Loc: r1c1 FN: 16 Font: B

Using ANGOSS Spreadsheet's formula capabilities, you can calculate the data that is stored in a worksheet. In this example, ANGOSS' SUM function is used to total monthly and quarterly expenses.

Any time that the worksheet is recalculated, updates and changes made to the worksheet are reflected in the totals.

Using ANGOSS Documentation

This manual explains how to create, edit, and print worksheets, as well as how to perform more advanced worksheet operations. Integration of ANGOSS Spreadsheet with the other ANGOSS modules is also discussed. How-to instructions, and practice exercises at the end of the chapters, are provided to encourage you to try the procedures discussed. **Chapter 9: ANGOSS Spreadsheet Command Reference** contains a descriptive, comprehensive listing of all the commands available in ANGOSS Spreadsheet. Refer to **Chapter 9** for in-depth information about the scope and sequence of commands.

Comments, Notes, and Importants

Throughout this manual, you will encounter standard formatting conventions, such as paragraphs with boldfaced NOTE:, COMMENT: and IMPORTANT: labels. Paragraphs labeled with a boldfaced COMMENT: offer information to enhance your understanding of a topic, or provide insight into the interactive capabilities of some commands. Paragraphs labeled with a boldfaced NOTE: contain information that **you should read** before proceeding. Paragraphs labeled with a boldfaced IMPORTANT: contain information that **you MUST read** before proceeding. Failure to read and follow the instructions provided in IMPORTANT paragraphs may cause unexpected results or program failures.

In addition to these formatting conventions, you will also encounter boldface type, numbered lists, and bulleted lists throughout this manual. Please refer to **ANGOSS Software System** for more information about these formatting conventions and how they can help you understand the related information.

Practice Sessions

At the end of Chapters 2 through 7 in this manual, you will find Practice Sessions. These sessions are designed to reinforce the information you have just read. Please take time to perform the Practice exercises before continuing to the next chapter.

Chapter 2: Getting Started

This chapter explains some of the terminology and operating conventions you should become familiar with to make your initial exposure to ANGOSS Spreadsheet enjoyable and productive. Topics covered include:

- how to enter and run ANGOSS Spreadsheet
- key strokes under Unix
- how to use the ANGOSS learning aids (ANGOSS Tutorial, ANGOSS Example Files and ANGOSS Help)
- how to identify the four major areas of the display screen and utilize the information contained in these areas
- how to identify cell references
- how, when, and why to move between ANGOSS Spreadsheet's Data Entry Mode and Command Mode
- how to move around the screen
- how to exit ANGOSS Spreadsheet

Before proceeding with this chapter, it is helpful to have ANGOSS installed on your system. Installation information is available in *Install Manual*.

Running ANGOSS Spreadsheet

To enter ANGOSS Spreadsheet from your operating system, type **angoss** at the operating system prompt. You will then see the Main Menu with a list of keywords including modules, Help, Tools, and Quit. Select the keyword `Spreadsheet` from the Main Menu. Throughout ANGOSS Software System, keywords are selected by positioning the illuminated, rectangular box, called the "highlighter," on top of the keyword you wish to select and pressing **Enter**. The highlighter can be moved forward through any command keyword list by pressing **Spacebar** or backward by pressing **Backspace**.

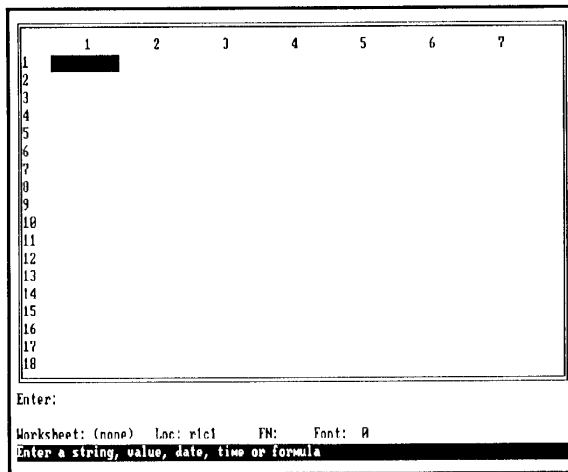
Chapter 2: Getting Started

You can also select a keyword in a single keystroke by pressing the first letter of the desired keyword. Therefore, to select Spreadsheet, you can simply press **S**.

NOTE: You can also enter ANGOSS Spreadsheet directly from your operating system by typing "**angoss s**" where "s" stands for Spreadsheet. This allows you to bypass the Main Menu.

After you select "Spreadsheet," the ANGOSS Spreadsheet program is loaded and your screen appears similar to Figure 2-1.

Figure 2-1



Key Strokes Under Unix

Throughout the documentation and software, keystroke names are the same for DOS and Unix. Because of differences between the two operating systems, the method for producing the key strokes often varies.

In Unix ANGOSS, you may generate these key strokes by using predefined key combinations. For instance, to generate **Alt L** press the **Esc** key followed by the "**L**" key.

ANGOSS supports a large number of terminals. Each terminal has different capabilities which usually affect the manner in which keystrokes are invoked. A few general rules apply across all terminals:

1. The **Esc** key is used as a modifier for the next key stroke.
2. The **Ctrl C** key is used as the **Esc** key.
3. To obtain help on keystrokes, press **Esc Esc **.
4. To perform an **Alt** key, press **Esc** and the letter.
5. Function keys should work the same way as in DOS, if your terminal has them. To obtain function keys that are not on your keyboard press **Esc** and a number located between one and zero inclusively. (**Esc 0 = F10**).
6. Most **Ctrl** keys have been left the same. Though in some cases they have been remapped.
7. You can modify what a keystroke does with the **ETIC** utility. Therefore, your terminal can be customized which will cause special keys to work differently.

The Keystroke conversion table, found in *Appendix C* of the *Install Manual*, shows: the ANGOSS keystroke in column 1; the default keystroke sequence that must be used in column 2; and the actual keystroke required on a properly configured ansi terminal (if it varies from the default) in column 3.

Key Help

There is an on-line keyboard help feature. If you press **Esc Esc ** you will be prompted for a key. Type in the base name of the key that you want to examine. For example, if you wanted to find out how to produce an **Alt F5**, **Ctrl F5** or **Shift F5**, type “**F5**”. To find out how to get any variation of “**A**”, type “**A**”. A small chart will then be displayed showing the keystrokes. This chart shows all customized keystrokes for your terminal.

For more information on Unix keystrokes, refer to the *Install Manual*.

Learning ANGOSS Spreadsheet

The ANGOSS Spreadsheet Tutorial introduces you to the general operating concepts of the ANGOSS Spreadsheet. The tutorial is designed to provide you with a short demonstration of some of the features of ANGOSS Spreadsheet. If you are unfamiliar with electronic spreadsheet programs, you should review the tutorial for an introduction on how to use ANGOSS Spreadsheet

If the tutorials were installed with your system, you can use the following procedure to gain access to them.

IMPORTANT: If you have already created worksheets, you must unload them before executing the tutorial. The tutorial actually runs within ANGOSS Spreadsheet, so if you have active files, you may run out of memory.

IMPORTANT: The ANGOSS tutorials only work on certain screen configurations. In Dos, you must be using a 25x80 character based (non WYSIWYG) screen driver. Under Unix, you must use an ansi terminal type.

1. Make certain you have entered ANGOSS Spreadsheet. A Module Menu beginning with the keyword `Sheet` should appear in the Control Area of your screen.
2. Select the keyword `Help`.
3. Select the keyword `Tutorial` from the subsequent menu.

If you intend to use the tutorials on a network, you must have write and delete privileges. See your network administrator for more information.

Using Example Files

When you install ANGOSS Spreadsheet, you have the option of installing Example Files to help you complete some of the practice exercises. If they were not installed and you are in a single-user DOS environment, you can install them through the Changes and Additions option of the Install program. If they were not installed and you are in a multiuser environment, contact your system administrator.

Because you build on the Example Files as you complete each exercise, you need to have your own copies of them. Do not modify the original files. Do not try to share your Example Files with someone else.

ANGOSS Help

One of the most useful features ANGOSS offers you is the ability to receive on-line help from anywhere within the program. Help is always available to you simply by pressing **F1**.

When you press **F1** at any keyword or option, the help screen appears over your current file. Help includes information about the current topic as well as related topics. Use **up** and **down arrows**, and **PgUp** and **PgDn** to scroll up and down through the Help information. Use **+** and **-** to move through

the related topics list. To select a related topic, position the keyword highlighter over the desired topic and press **Enter**.

In addition, help is available from the Help keyword. A table of contents and an index to *ANGOSS Spreadsheet Command Reference* are provided to help you find the information you need. An explanation of each error message is available through the On-Error option. Information on using Help is available through the About-Help option.

To remove the help information from your screen, press **F10**.

Using The Mouse

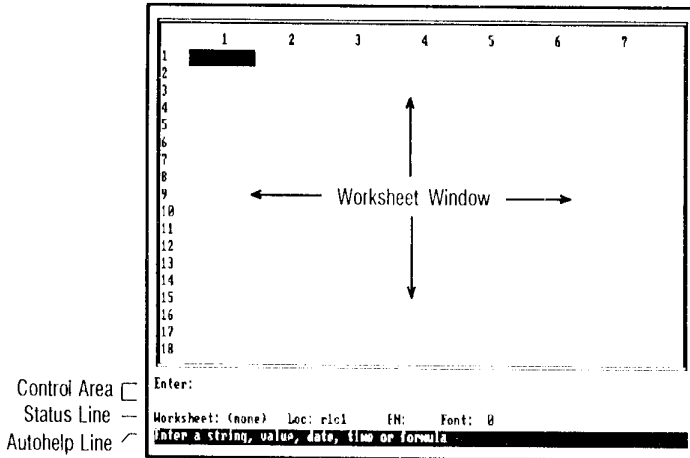
A Microsoft compatible mouse can be used with ANGOSS in the Spreadsheet module. For complete details on using Mouse Support, refer to the section called “*Using the Mouse*” in the *Software System Manual*.

The Display Screen

ANGOSS Spreadsheet's screen, as shown in Figure 2-2, is divided into four distinct areas:

- the Worksheet Window
- the Control Area
- the Status Line
- the Autohelp Line

Figure 2-2



The Worksheet Window

The Worksheet Window occupies the largest area of the screen display and is surrounded by a window border. This is where the worksheet you are creating or modifying appears. The numbers shown horizontally across the top of the window are column numbers. The numbers shown vertically on the left side of the window are row numbers. An ANGROSS worksheet can contain a maximum of 9999 rows and 999 columns.

Identifying Cells

The intersection of a row and a column is called a cell. Each cell is identified by its location, known as a "cell address." For example, the cell address **r1c1** refers to the cell at the intersection of row 1 and column 1. Formulas, numbers, or alphabetic and other characters can be entered and stored in cells. When a particular cell is used in a formula or command, it is called a "cell reference." Likewise, a group of cells is a "block reference."

NOTE: When defining a block reference for a command or formula, a "block" can consist of one cell.

Just as with single cell references, ANGOSS Spreadsheet uses row and column numbers to identify the location of a block of cells. Indicate the range of rows or columns in the block reference by separating the starting and ending row or column numbers with a colon (:), as illustrated in Table 2-1.

Table 2-1

Block Reference	Location
r5:7c12	rows 5 through 7, column 12
r5c1:12	row 5, columns 1 through 12
r1:10c1:10	rows 1 through 10, columns 1 through 10

The cell highlighter, displayed in the Worksheet Window, can be moved from one cell to another in your worksheet. The location of the cell highlighter is referred to as the "current cell."

The cell highlighter (or simply "the highlighter") is used to move around a worksheet in the same way that the cursor is used to move in other ANGOSS modules. In fact, the keys that move the highlighter are referred to as "cursor movement keys." However, the Spreadsheet program also has a cursor that can be moved one character at a time within a cell, field, formula, command response, or in various input screens.

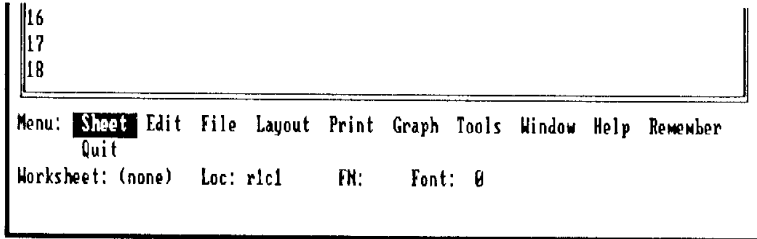
The Control Area

The Control Area of the screen provides specific information about the activity you are performing. It occupies the two lines directly below the Worksheet Window. When you enter ANGOSS Spreadsheet, the Control Area displays the prompt `Enter :`, signifying that the module is in Data Entry Mode and is ready to accept data in the current cell.

As you enter data, the information displayed in the Control Area changes. Depending upon your current activity, the Control Area may display the contents of the current cell, keyword menus or options, prompts, or error messages.

When ANGOSS Spreadsheet is in Command Mode, the Control Area displays the Spreadsheet module menu, as shown in Figure 2-3.

Figure 2-3



Quick Keys

The Control Area can also display lists of ANGOSS Spreadsheet Quick Keys. Quick Keys allow you to select the most frequently used commands without having to use the ANGOSS Spreadsheet Option List.

To display the Quick Key lists in the Control Area, press **F2** repeatedly until you have cycled through the entire series of lists. You may use any Quick Key in either Data Entry or Command Mode. See the *Quick Reference Manual* for a complete list of ANGOSS Spreadsheet Quick Keys.

The Status Line

The Status Line, which provides information about the current worksheet and the current cell, is located directly below the Control Area. When you enter ANGOSS Spreadsheet, the Status Line appears similar to the following:

```
Worksheet: (none)   Loc: r1c1   FN:   Font: 0
```

The `Worksheet: (none)` designation is followed by `(none)` to indicate the current worksheet has not been named. After you name a worksheet, the name you assign is displayed next to the `Worksheet:` indicator. `Loc:` indicates the current location of the cell highlighter. In this example the current location is `r1c1`.

`FN:` will show the font number used for the current cell after data has been entered. `Font:` shows the font number of the default font for the entire worksheet.

The Status Line also displays **CIRC** if the worksheet contains a formula that results in a circular reference, i.e., a formula that refers, either directly or indirectly, to itself.

If a change has been made to the worksheet, **CALC** appears on the Status Line, indicating that the worksheet needs to be recalculated.

While the worksheet is being recalculated, **Count** and a quick display of numbers appear briefly on the right side of the Status Line. The numbers represent the number of formulas remaining to be recalculated.

The Autohelp Line

The Autohelp Line is located at the bottom of the display screen, directly beneath the Status Line. Autohelp performs two functions. It tells you whether ANGOSS is in Command Mode or Data Entry Mode. It provides a definition of the command keyword, option, or prompt you are using in Command mode.

Autohelp is activated or deactivated by selecting Autohelp: **On** or Autohelp: **Off** in the Global Preferences Definition Menu of the Tools Preferences Global command.

Operating Modes

ANGOSS Spreadsheet uses two operating modes, Data Entry Mode and Command Mode. You can toggle between Command Mode and Data Entry Mode by pressing **Esc**.

If you are using Data Entry Mode and you want to execute one command and then return automatically to Data Entry Mode, press **/** instead of **Esc**.

If you are using Command Mode, pressing one of the following keys will invoke an **Enter** prompt for Data Entry:

Key	Type of Entry
:	12 hour time
;	COL 24 hour time

Key	Type of Entry
@	COL date1 date
#	date2 date
\$	COL currency
=	COL formula
“	text

In addition, **Alt Y** and **Alt Z** can be used to access Data Entry Mode and Command Mode, respectively. These keystroke combinations are particularly useful when specifying operating modes in a macro. Refer to *ANGOSS Software System* for information on using ANGOSS macros.

Data Entry Mode

Data Entry Mode is used to enter text, values, and formulas into your worksheet. ANGOSS Spreadsheet is in Data Entry Mode when you execute the module, so you can begin to enter worksheet data immediately.

Highlighter Movement

The cell highlighter can be moved around a worksheet by using the "cursor movement" keys. Table 2-2 lists how each key affects the cell highlighter.

Table 2-2. Cursor Movement Keys

Cursor Movement Keys	Action
up arrow	Up one cell
down arrow	Down one cell

Cursor Movement Keys	Action
left arrow	Left one cell
right arrow	Right one cell
Home	Top cell of current column on screen
End	Bottom cell of current column on screen
Tab	Right side of current window
Shift Tab	Left side of current window
PgUp	Up one window height in current column
PgDn	Down one window height in current column
Ctrl left arrow	Left one window width in current row
Ctrl right arrow	Right one window width in current row
Ctrl Home	Row 1 column 1 of worksheet, or the first cell in an area bordered by fixed titles
Ctrl End	Last entry in column 1 or the leftmost column in an area bordered by fixed titles

Moving to a Specific Cell. To move the highlighter directly to a specific cell, press **F4**, which is the Quick Key for the Goto command. Select the Cell option, and then type the address of the cell you want to go to. (You can also type the cell's name, if you have assigned one. We'll talk about naming cells in *Chapter 4*.)

Command Mode

Command Mode is used to execute Spreadsheet commands. Commands allow you to perform various tasks such as copying, formatting, deleting, saving, and printing, to name just a few.

The cursor movement keys that are used to move around a worksheet while you are in Data Entry Mode can also be used to move around a worksheet while you are in Command Mode.

All of ANGOSS Spreadsheet's commands originate with the keywords listed on the module menu. Remember from *ANGOSS Software System* that commands are built by choosing from several levels of keywords until the command format is complete. Refer to **Chapter 9: ANGOSS Spreadsheet Command Reference** for a complete listing of ANGOSS Spreadsheet commands.

Most commands are completed by pressing **Enter**. Some commands require that you press **F10** to finish. To cancel the last keyword or option in a command sequence, press **Esc**. To abandon a command completely, press **Alt Z**.

To repeat the previous command executed, press **F9**. To edit the previous command, press **Alt X**.

ANGOSS Spreadsheet has a lot of commands and options, but don't be intimidated. Executing a command is easy. Just select keywords and options from the displayed lists. ANGOSS prompts you for other information as it is needed. In addition, the Autohelp Line describes every step as you proceed, and if you need detailed instructions, *ANGOSS Spreadsheet Command Reference* is available by pressing **F1**.

In ANGOSS Spreadsheet, the selection of some keywords (e.g., Layout Worksheet-Options or Tools Preferences Spreadsheet) results in the display of full-screen definition menus rather than a Control Area listing of keyword options or prompts. These definition menus are usually comprised of both option lists and prompts. Refer to *Definition Menus* in this chapter for additional information.

Definition Menus

Some Spreadsheet commands provide listings, called "definition menus," that consist of prompts and option lists. Responses to these prompts and option lists are called "settings." The keys used to select and define menu settings are the same for all definition menus. Refer to the *Tools Preferences Global* section of *ANGOSS Software System* for specific instructions.

Remember from *ANGOSS Software System* that you select the Tools Preferences commands to establish global, hardware, and module-specific settings. Before proceeding to **Chapter 3** of this manual, make certain that you have selected the appropriate settings for display, output, and hardware compatibility.

The settings specified in definition menus control such operating features as how ANGOSS Spreadsheet performs when it is accessed; how worksheets are formatted and displayed; and how worksheet data appears when printed. Several definition menus are described in the paragraphs that follow.

Spreadsheet Preferences

How ANGOSS Spreadsheet performs when it is accessed is determined by the settings in the Spreadsheet Preferences Definition Menu of the Tools Preferences Spreadsheet command. Available features are as follows:

- automatic loading of a macro file
- automatic loading of a worksheet
- automatic or manual recalculation of worksheets
- selecting map characters for formulas, text, and values
- automatic execution of a project file when entering or exiting ANGOSS Spreadsheet
- default data path for worksheets
- encryption driver setting

Worksheet Parameters

Selecting ANGOSS Spreadsheet's Layout Worksheet-Options command provides access to two different definition menus, a Current Worksheet Parameters Definition Menu and a New Worksheet Parameters Definition Menu. The settings in these menus control how worksheets are formatted and displayed. Use these menus to define settings for:

- various types of value formats, such as currency, percent, and date
- numeric precision, zero blanking, comma display, and negative number display for value entries
- alignment of text and value entries

In addition, you can select a default recalculation order, and specify default row and column sizes in the New Worksheet Parameters Definition Menu.

Report Definition

Selecting the Print Report Create or Print Report Modify command provides access to the Report Definition Menu where you can use your worksheets to create reports. Use the Report Definition Menu to define settings for:

Chapter 2: Getting Started

- the placement and content of report headings and footings
- the use of page numbering
- the location of worksheet data (including column and row titles) in the report
- the Page Size and Paper Path being used for printing reports
- the size of top, bottom, left, and right border areas
- the amount of vertical line spacing

Graph Definition

Selecting the Graph Define command provides access to the Graph Definition Menu where you can represent worksheet data in graph form.

Font Selector

Several of the Layout Set-Font options provide access to the Font Selector Menu where you can specify fonts to be used in your worksheets. Use the Font Selector Menu to:

- select a particular font family
- specify a font size
- specify the character set of internal printer fonts
- specify normal or italic slant
- specify attributes such as boldface and underscore
- use subscript and superscript characters
- assign foreground and background colors to fonts

Operating System Access

When you are working in ANGOSS Spreadsheet, you can temporarily suspend the Spreadsheet program and gain access to the operating system to execute system commands by pressing **Ctrl O**. When you have completed your system operations, you can return to ANGOSS Spreadsheet by typing **exit** at the prompt.

You can also select the Tools OS option to execute an operating system command and return immediately to ANGOSS Spreadsheet.

File Extensions

ANGOSS Spreadsheet uses a type of filename suffix called an "extension" to identify different kinds of files. Table 2-3 lists file types and their corresponding extensions. You will learn more about different file types in later chapters.

Table 2-3

File Type	Extension
Worksheets	ws
Report Definition Files	rdf
Business Graph Definition Files	gdb
Text Graph Definition Files	gdt
Scientific Graph Definition Files	gds
Elevation Graph Definition Files	gde
High-Low Graph Definition Files	gdh
Composite Graph Definition Files	gdc
Graph Metafiles	cgm
Graph Quick Define Files	gdq
Macro Files	mac
Project Source Files	pf1
Runtime (Compiled) Project Files	rf1
Input Screen Files	is1

File Type	Extension
Lotus 1-2-3 Worksheets	wks
Lotus 1-2-3 Worksheets Release 2	wk1
Text Files (used with Text-Editor)	txt

Automatic File Backup

You can instruct ANGOSS to backup files automatically by setting the Automatic Backup option in the Global Preferences Definition Menu to **Yes**. This menu is accessed by selecting the Tools Preferences Global command.

When you enable the Automatic Backup feature, ANGOSS retains the previous version of certain files each time you execute a "save" command. Worksheet files, project files, and macro files are backed up in this way. Backup files do not appear in prompter listings. The file types and corresponding extensions assigned to these backup files are shown in Table 2-4.

Table 2-4

File Type	Extension
Worksheet Files	bws
Project Files	bp1
Macro Files	mbk

Files with backup extensions cannot be loaded. To recover a file from the backup copy, use Tools File Rename or Tools File Copy to give the file a normal extension: ws, pf1, or mac. The file can then be loaded as usual.

NOTE: Automatic Backup helps you recover data inadvertently overwritten or deleted but it is not a substitute for your regular backup procedures.

Exiting

Before exiting ANGOSS Spreadsheet, you should save your worksheets by selecting the File Save command. After you have saved your worksheets, select the File Unload command to remove them from memory.

To exit ANGOSS Spreadsheet, select Quit from the Spreadsheet Keyword Menu, or press **F10**. You may then choose to access another ANGOSS module, if available, or select Quit to return to the operating system.

If you accidentally press **F10** or select Quit before you are ready to exit ANGOSS Spreadsheet, press **Esc** to return to your previous location in ANGOSS Spreadsheet.

Practice Session

In this practice session, you will enter the ANGOSS Spreadsheet module from your operating system, move the highlighter around the Worksheet Window, toggle between Data Entry and Command Modes, execute a simple command, and exit ANGOSS Spreadsheet.

1. From the appropriate directory in your operating system, execute the Spreadsheet module. You can either type **angoss s** or type **angoss** and select the Spreadsheet module from the Main Menu. A blank Worksheet Window, in Data Entry Mode, will be displayed.
2. The highlighter is at r1c1. Press **down arrow** 3 times to move the highlighter down three rows. Then press **right arrow** 4 times to move the highlighter four columns to the right, ending in r4c5. **Loc :** on the Status Line shows you the current location of the highlighter.
3. Using the Goto Quick Key, **F4**, select the Cell option; then instruct ANGOSS to move the highlighter to r9999c999. (This is the lower right corner of the worksheet.)
4. Using **Home**, move the highlighter to the upper left corner of the Worksheet Window.
5. Using **Ctrl Home**, move the highlighter all the way back to the upper left corner of the worksheet (r1c1).
6. Press **Esc** to change to Command Mode.
7. Select the Sheet keyword. Then select Calc-Mode, and Display. This command shows calculation mode and order in use by the current worksheet. Press **Enter** to complete the command. Notice that the Keyword Menu, indicating Command Mode, reappears upon completion of the command.

Chapter 2: Getting Started

8. Press **Esc** again to return to Data Entry Mode.
9. Now press **/** to change to Command Mode. Execute the Sheet Calc-Mode Display command again. After you press **Enter**, ANGOSS automatically returns to Data Entry Mode.
10. Press **F10** to exit ANGOSS Spreadsheet. (In Command Mode, you can either press **F10** or select the Quit option.) Next, select Quit to return to your operating system.

Chapter 3: Creating a Worksheet

This chapter explains some of the basic tasks required to create a worksheet using ANGOSS Spreadsheet. Topics covered include:

- how to enter data into a worksheet
- how to enter formulas into a worksheet
- how to use formats and fonts to make your worksheet look more "professional"
- how to save your worksheet for future use
- how to rename your worksheet
- how to remove a worksheet from memory

Practice exercises, designed to help you assimilate the information presented, are provided at the end of this chapter. We suggest that you perform the practice exercises after you have read the material in this chapter. If you are unable to complete the exercises, please reread the chapter and try again.

Entering Data

In *Chapter 2*, we stated that ANGOSS Spreadsheet uses two operating modes, Command Mode and Data Entry Mode. Data can be entered into a worksheet only when ANGOSS Spreadsheet is in Data Entry Mode.

When you enter ANGOSS Spreadsheet, a blank Worksheet Window with the cell highlighter positioned in cell r1c1 is displayed. The `Enter :` prompt in the Control Area of the screen indicates that the module is in Data Entry Mode.

As you type the data, the entry appears beside the `Enter :` prompt. Press **Enter** to record the entry in the cell. Or, press one of the cursor keys (i.e., **down arrow**) to record the entry and move the highlighter with the same keystroke.

If you make a mistake as you are typing data (before you press **Enter** or a cursor key), use **Backspace** to erase one character at a time and then type the correct information.

If you have already recorded data in a cell and notice an error, position the highlighter on the cell containing the mistake and type the correct information.

Text, Values, and Formulas

Three types of data can be entered into worksheet cells: text, numeric values, and formulas. "Text" as input data refers to letters and other characters, including numbers used in a non-numeric way. Street addresses, for example, contain numbers used as text. "Numeric values" include numerals, and characters such as currency symbols and decimal points. Normally, date and time entries are numeric entries. "Formulas" are calculation definitions that can contain numeric values, cell references, arithmetic and other types of operators, and functions.

Entering Text

To enter text, the first key pressed must be a letter, or any key other than a number, @, #, -, +, ., \$, :, or ;. If the text to be entered begins with a number or one of these characters, start the entry with quotation marks, ("), as shown in the following example.

Example:

"1st Quarter

COMMENT: If you begin a text entry by pressing **Spacebar**, the space is interpreted as part of the data and the text is indented one space.

As you begin typing, the `Enter :` prompt in the Control Area changes to `Enter text` above and drops to the second line of the Control Area, leaving only the cursor on the first line. As you type the text entry, the characters appear both in the current cell and in the Control Area. Record the text entry in the current cell by pressing **Enter** or one of the cursor movement keys.

Up to 240 characters can be entered into a cell. If the text you enter fills the current cell, the cell to the right is highlighted, if empty, and the text is displayed over that empty cell. If the cell to the right is not empty, the **display** of text is truncated but the text itself still resides in the cell.

Entering Numeric Values

To enter numeric data, type a number, or precede the entry with "+", "-", ".", or "\$". The `Enter :` prompt then changes to `Enter value :` and the entry appears to the right of the prompt. The entry is recorded and displayed in the current cell when you press **Enter** or a cursor movement key.

Entering Dates and Times

Begin a date entry by pressing either **@** or **#**. If you use **@** to begin a date entry, the **Enter :** prompt changes to **Enter date1 :** and the date will be displayed in Date1 format. If you use **#**, the **Enter :** prompt changes to **Enter date2 :** and the date will be displayed in Date2 format.

Preceding a date entry with "@" or "#" allows the entry to be displayed as a date but used as a number. The number is based upon the date's sequence in relation to day "1," January 1, 1900. For example, January 2, 1900 is "2"; December 31, 1900 is the number "365," and so on.

The correct order to use when entering dates (e.g., MM-DD-YY, DD-MM-YY, YY-MM-DD) depends upon the Date Style setting in the Global Preferences Definition Menu. The date display formats for Date1, Date2, and Date3 are also defined in the Global Preferences Definition Menu. You can access the Global Preferences Definition Menu by selecting the Tools Preferences Global command.

To enter time, begin the entry by pressing **:** for Time12 format, or **;** for Time24 format. You can enter time information in the format HH:MM or HH:MM:SS (where HH is the hour, MM is the minute, and SS is the second), using either a 12-hour or 24-hour format. If you select a 12-hour format, follow the values with A or P. After typing the time, press **Enter** or a cursor movement key to complete the entry.

Entering Formulas

To enter a formula, press **=** first. The **Enter :** prompt changes to **Enter formula :** and the equation you type appears to the right of the prompt. The result of the formula is calculated and displayed in the current cell when you press **Enter**. While the calculation result is displayed in the worksheet, the formula itself is stored in the cell and can be viewed in the Control Area of the screen.

COMMENT: Use the Layout Format Formula-Display command to change the display format of your worksheet to show the formulas in their cells.

Formulas can include references to cells in the current worksheet or any other active worksheet. Formulas can also contain numbers, numeric operators (e.g., +, -, /, *), expressions, and ANGOSS functions (e.g., SUM, AVG, PMT).

The contents of formulas are generally evaluated from left to right. The order of evaluation will vary depending upon the priority of the operators used and the use of parentheses within the formula.

Table 3-1 lists the basic arithmetic operators in the order of priority.

Table 3-1

Priority	Operator
1	^ (Exponentiation)
2	* (Multiplication), / (Division)
3	+ (Addition), - (Subtraction)

Placing parentheses around an expression indicates that it is to be evaluated before other expressions. If parentheses are nested within other parentheses, the innermost level receives the highest priority.

Additional types of operators and their evaluation priorities are discussed in **ANGOSS Formula Reference**.

After numeric values have been entered into a worksheet, you can input formulas to perform calculations on the value entries. As an example, suppose you enter a column of numbers (in column 1, rows 1 through 4) and then want to calculate the sum of the column. To create the formula to perform the calculation, first position the highlighter in the cell that is to contain the total and press **=**.

A sum calculation can be accomplished in several different ways. You can enter a string of specific cell references connected by the "+" operator (i.e., r1c1+r2c1+r3c1+r4c1) to obtain the result.

You can use ANGOSS' SUM function (i.e., sum(r1c1,r2c1,r3c1,r4c1)), which calculates the sum of the items separated by commas inside the parentheses. You can also write the formula: sum(r1:4c1). Notice that the second SUM example specifies a range of rows; the expression "r1:4c1" represents rows 1 through 4 in column 1. If rows are inserted or deleted in the area referenced by the range, the formula is adjusted automatically. Figure 3-1 shows three ways to write an addition formula.

Figure 3-1

	1	2	3	4	5	6	7
1	227.00	227.00	227.00				
2	85.00	85.00	85.00				
3	362.00	362.00	362.00				
4	175.00	175.00	175.00				
5	-----						
6	849.00	849.00	849.00				
7							
8							
9							
10							r1c3 + r2c3 + r3c3 + r4c3
11							
12							
13							sum(r1c2, r2c2, r3c2, r4c2)
14							
15							
16							sum(r1:4c1)
17							
18							

Enter: _
Formula: r1c3+r2c3+r3c3+r4c3
Worksheet: fig_3 1 Loc: r6c3 FN: 0 Font: 0

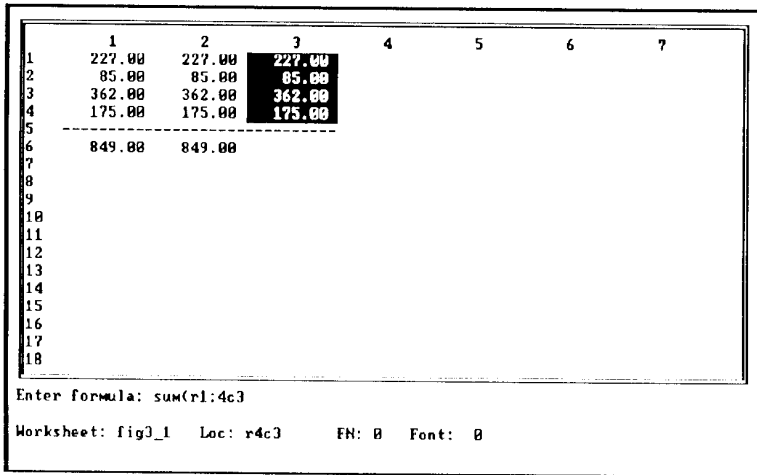
Blockmarking in Formulas

When building a formula using cell references, you can type the references yourself, or you can use the "pointing technique" and let ANGOSS enter the references for you. "Pointing" allows you to refer to the appropriate cells without being concerned about the actual row and column numbers.

Build the formula as you normally would. But instead of typing a cell reference, use cursor movement keys to move the highlighter to the desired cell. As you move the highlighter, notice that the formula shown in the Control Area changes to reflect each cell reference. If you enter an arithmetic operator, a comma, or a parenthesis, the cell marked by the highlighter is used in the formula. The highlighter then returns to the formula cell, permitting you to enter a value or point to another cell. Press **Enter** to complete the formula definition. This method could be used to enter the formulas "r1c3+r2c3+r3c3+r4c3" or "sum(r1c2,r2c2,r3c2,r4c2)" shown in Figure 3-2.

To point to and mark a block of cells rather than individual cells, move the highlighter to the first cell in the block. Press **F2** to "drop anchor," i.e., define a cell as the starting point. Move the highlighter over the block of cells. The highlighter expands as you press the cursor movement keys. Moving back toward the anchor cell contracts the highlighter. You can start over by dropping a different anchor and proceeding.

Figure 3-2



When the entire block of cells is covered by the highlighter, enter an arithmetic operator (or for an ANGOSS function, a left parenthesis) to continue building the formula. The highlighter returns to the formula cell, permitting you to define the next element of your formula. Pressing **Enter** at any time completes the definition. This method could be used to enter the formula "sum(r1:c3)" shown in Figure 3-2.

While you are building a formula, you can press **F3** to make the formula's references absolute or relative. Using absolute and relative references is discussed in detail in *Chapter 4: Editing a Worksheet*.

An important Spreadsheet feature is the ability to use a cell's calculated result in the formulas of other cells. For example, if the sum formula mentioned earlier is in cell r5c1, you can use **r5c1** as a reference in any other formula. If you want to calculate the percent of the whole the value in cell r1c1 represents, you can enter **r1c1/r5c1** as a formula. Or, if you want to multiply the sum of the column by 60%, you can enter **r5c1*.60** to obtain the result.

You can enter up to 240 characters in a formula at the **Enter :** prompt. For longer formulas, press **Alt F** to activate the Formula Editor. The Formula Editor Window temporarily replaces the Worksheet Window to allow you to enter more characters and to allow you to use indentation and multiple lines for clarity. The maximum number of characters that can be used in a formula is 1000.

For more information on creating formulas, refer to *Chapter 5: Managing Worksheets* of this manual, and *ANGOSS Formula Reference*.

Recalculating Formulas

ANGOSS will recalculate every formula in your worksheet each time you press **Shift F5**. To speed up processing of your worksheet, you can recalculate only the formulas that need to be recalculated by pressing **F5**. This is called minimal recalculation. If you have selected Automatic Recalculation, using Tools Preferences Spreadsheet, ANGOSS will recalculate formulas each time you change the worksheet.

You can change recalculation mode on a worksheet-by-worksheet basis by executing the Sheet Calc-Mode command and choosing either the Automatic or Manual option. You can also select the order of recalculation with the Sheet Calc-Order command. The options are Natural-Order (the most common), Row-Order, or Column-Order. The Display option of the Sheet Calc-Mode command shows the calculation settings for the current worksheet.

In addition, when you press **F5**, ANGOSS does not wait until recalculation is completed before returning control to you. You can continue entering data and executing commands immediately. A few commands, such as Graph Generate, which rely on the recalculated result, will not be executed until recalculation is finished. The word `COUNT` is displayed on the Status Line while recalculation is in process.

Basic Worksheet Formatting

Worksheet data can be presented in a variety of ways. Text entries can be left-justified, right-justified, or centered in a cell. Numeric values can be justified or centered and can be expressed in scientific notation or as numbers, currency, percents, bar symbols, dates, or time. In addition, decimal precision and the presentation of negative numbers can be specified for numeric value entries.

Formatting Numeric Values

Many formats are available for presenting numeric entries in a worksheet, as shown in Figure 3-3. A brief description of each possibility follows.

Figure 3-3

	1	2	3	4	5	6
1						
2						
3		Numeric	5.25			
4		Currency	\$5.25			
5		General	5.25			
6		Date	01/05/1900			
7		Time	06:00:00A			
8		E-Notation	5.25E+00			
9		Percent	525.00%			
10		Bar	++++			

Numeric Format. The Numeric format displays values as numerals.

Currency Format. The Currency format displays values with a currency symbol.

General Format. The General format is a numeric format in which nonsignificant trailing zeros and the decimal point are suppressed. A value having a large number of places to the left or right of the decimal point is converted to E-Notation, as is a number too wide to be displayed in a cell.

Date Format. The Date format displays values as dates, allowing you to specify which type of date to use and how to align the entries. If Date format is selected as the default value setting for the worksheet, all numeric entries are displayed as dates. Normally, date formatting is defined only for specific cells.

Time Format. Time format allows you to specify either 12-hour or 24-hour format for numeric entries. If Time format is selected as the default setting for the worksheet, all numeric entries are displayed as time entries.

E-Notation Format. E-Notation displays all numeric entries in scientific notation (i.e., 256 is displayed as 2.56 E+02). While the worksheet displays the numeric entry in scientific notation, the "normal" numeric value is stored in the cell and can be viewed in the Control Area of the screen.

Percent Format. The Percent format displays values as percentages.

Bar Format. Bar format displays numeric entries as a series of symbols representing the value. Positive numbers are represented by "+" symbols. Negative numbers are represented by "-" symbols. A value of 0 is displayed as a period. If the cell is not wide enough to display the bar, it is filled with asterisks.

Formatting a New Worksheet

The formats of text and value entries for new worksheets depend on the default settings specified in the New Worksheet Parameters Definition Menu, accessed by selecting the Layout Worksheet-Options New-Sheet command. You can revise these default settings to fit your needs; if there is a text or value format that you use most of the time, you can simply set that format as the default. A default format applies to all new entries in a worksheet.

Before entering data into a new worksheet, determine whether the default format settings in the New Worksheet Parameters Definition Menu are appropriate for the worksheet. For worksheets that would be better presented using a format other than the default, you can override the default setting on a worksheet-by-worksheet basis. To override default text and value settings for the current worksheet only, select either the Layout Worksheet-Options Current-Sheet or the Layout Default command and revise the settings as needed.

Formats are not irrevocable. The Layout Format command can be used to revise the formats of existing numeric entries. Layout Justify can be used to revise the alignment of existing text or numeric entries. Changes made using Layout Format or Layout Justify apply only to the cells specified. Changing a format is discussed in *Reformatting Existing Worksheets* in *Chapter 4*.

Another worksheet formatting consideration is cell size. Obviously, the cells in the worksheet need to be wide enough to accommodate the data you intend to enter. Likewise, cell size should not be too large if small entries are being made, or columns and rows will be spaced too far apart.

Review the data you plan to enter into your worksheet and count the number of characters, including currency symbols, commas, and decimal positions, required for the longest entry. Also take into consideration the cell size required for any totals you plan to generate. Then adjust the size of the cells in the new worksheet by executing Layout Cell-Size Width.

When you select the Layout Cell-Size Width option, ANGOSS prompts you to enter the width. Whether the width is specified in characters, inches, or points is controlled by the Cell Size settings on the Worksheet Options menus accessed with the Tools Worksheet-Options commands. Each character unit is the size of a 10 cpi character.

Designate whether the new width applies only to particular columns or to the entire worksheet. To change only specific columns, enter the number of columns to change. Begin with the current column and count the number of columns to the right that are to be changed. Enter the total number in response to the prompt. If you are changing the width of the current column only, press **Enter**.

COMMENT: The default cell height is 12 points. Cell height should be increased when you use larger fonts in your worksheet.

As you are formatting your new worksheet, you may also decide to increase the cell height, so that the rows are spaced farther apart when the worksheet is printed. You can select the Layout Cell-Size Height option and specify the cell height you want. Whether the height is entered in points or inches is controlled by the `Cell Size` settings on the Worksheet Options menus accessed with the Tools Worksheet-Options commands.

You must use the Enhanced option of Print commands for the change in cell height to be reflected. If you do not change cell height, the normal height will be used.

Preformatting Cells

Cells that you know are to contain numeric values can be formatted as numeric cells **before** you enter any data. This procedure is called "preformatting" and is useful for assigning numeric formats to cells that are to contain types of entries differing from those specified in the default setting.

Suppose, for example, that on a worksheet with a default format of "numeric," the cells showing totals are to include dollar signs. These cells can be preformatted as "currency" cells by executing the Layout Format Block command with the Currency option. The remaining cells are unaffected. Preformatting can be done only with the Layout Format Block command and applies only to data entry. If data is placed in cells using Edit commands, preformatting for those cells will be lost.

Working with Fonts

"Fonts" are sets of characters in type style families, such as standard, serif, sans serif, and so forth. "Attributes" are enhancements to fonts, such as boldface and underscore. Other characteristics include character width, font size, normal or italic slant, and subscript or superscript shift.

The font for the current cell is shown by number next to `FN:` on the Status Line of the screen. If the cell is blank or has not been predefined as a value cell, no font number will be shown next to `FN:`. The default font for a worksheet is shown next to the word `Font:` on the Status Line.

Font definition is optional. You can print worksheets without ever using the Layout Set-Font commands; ANGOSS automatically uses a standard font. However, should you decide to use a font other

than the standard or to use multiple fonts in one worksheet, the Layout Set-Font commands provide full flexibility.

If you choose to revise a font definition, you can do so from the Font Selector Menu which lists the font and possible characteristics. This menu is accessed via several Layout Set-Font commands. To see the available settings for font family, size or color, position the pointer next to the option on the Font Selector Menu and press **F6**. Point to the setting you want and press **Enter**. If no list appears, no additional settings are available.

Other option settings, such as Width, Slant, Weight, Modifications, and Baseline Shift, are listed on the menu. Highlighted items are the current settings. Items shown in parentheses are not supported by the current printer. You can select options that are not supported by the printer, but the printed output will not match your specifications until you use a printer that can handle the options.

Specifying colors for fonts allows you to see at a glance where various fonts are being used. Font color has precedence over colors assigned through the Window Paint options. If your printer supports colors, font foreground color will be printed.

Default Font

The default font for a worksheet is the font that will be used for all new entries. The default font for the current worksheet can be changed; any new data entered after the change will use the new default font.

A font is assigned to a worksheet by means of a font number or a description of the font. To specify a default font for the current worksheet, use Layout Set-Font Select. A Font Prompter listing will be displayed, showing all the fonts currently attached to the worksheet. Selecting one of the font numbers listed will make that font the default for the worksheet.

To define an unlisted font as the default, choose the Layout Set-Font Select command, pick the font that most closely resembles the font to be created and press **F6**. The Font Selector Menu appears, and you can specify font family, size, and other characteristics. When you press **F10**, your new font becomes the default font for the current worksheet. ANGOSS assigns it the next available number.

Multiple Fonts

As mentioned in the previous section, you can use multiple fonts in your worksheet by selecting a default font, entering data, and then selecting another default font. This method requires that you specify a font before you enter data. However, it is often easier to enter all data using the default font, and then change the fonts in selected areas of your worksheet.

To change fonts in specified areas of the worksheet, use the Layout Set-Font Change command. Select either the Block, Columns, Rows, or All option. For any option except All, ANGOSS asks you to specify the area to be affected. The Font Prompter will then be displayed. You can select an existing font

number or create a new number and description with the Font Selector Menu, just as with the Select option. When you press **F10**, the specified font will be used in the indicated area of the worksheet.

Defining Available Fonts

Current Worksheet. The Layout Set-Font Edit Current-Sheet command allows you to assign or reassign a specific font number to a specific font definition for the current worksheet. The font is attached to the current worksheet, but is not used unless it has been selected with Layout Set-Font Select or Layout Set-Font Change.

When you select the Current-Sheet option, the Font Prompter, showing previously defined fonts, appears. To edit an existing font number, point to the desired font on the prompter listing or type the font number. When the Font Selector Menu appears, you can revise the definition of the font number chosen. Press **F10** to complete the definition.

Changing a font number's description using the Layout Set-Font Edit Current-Sheet command automatically changes the font that is used in the current worksheet. For example, assume that three column headings in your worksheet use Font 4, (which you have defined as "sans serif 12Pt. bold"). Changing Font 4's description to "serif 14Pt. bold" automatically reworks the three headings in the worksheet.

To add a new font to the current worksheet's prompter listing, point to the font that most closely resembles the new font and type an unused number. When the Font Selector Menu appears, you can select the appropriate characteristics. Press **F10** to complete the definition.

New Worksheets. To facilitate assigning fonts to a worksheet, you can use Layout Set-Font Edit New-Sheet to add a font definition to the set of fonts available for all new worksheets. This set of fonts will be displayed on the Font Prompter listing when you execute the Layout Set-Font Edit Current-Sheet command for a new worksheet.

The font defined as "Font 0" in the Layout Set-Font Edit New-Sheet command is always used as the default font for new worksheets. To specify a different font as the default for all new worksheets, assign a different definition to Font 0.

NOTE: "New" worksheets are worksheets that do not yet exist. The current worksheet, even when blank, already exists and thus is not a "new" worksheet. If you define or redefine a font using the New-Sheet option, the prompter list of fonts available for the current worksheet will not reflect the changes shown on the New-Sheet prompter list. To use the updated version of the New-Sheet prompter list on the blank worksheet you are about to begin, execute File Unload before using the Layout Select, Change, or Edit Current-Sheet commands.

Rasterizing New Fonts

If you use many ANGOSS-generated, filled-area fonts in your worksheet, printing can be slowed down considerably. You can speed up the printing of filled-area fonts by "rasterizing" them. Where filled-area fonts have to be redrawn to the proper size and resolution, prerasterized fonts have been drawn ahead of time to a specific size and printer resolution. At print time they are immediately ready to be sent to the printer. Execute Tools New-Font to rasterize a few of your more frequently used fonts. Refer to *Chapter 7: Printing with ANGOSS* in *ANGOSS Software System* for more information on rasterizing fonts.

NOTE: Sideways fonts should only be rasterized for use with printers that do NOT support landscape printing. All other printers should use normal fonts.

Removing Font Definitions

Each worksheet can have a maximum of 64 font definitions. To remove a font from a worksheet, select Layout Set-Font Remove Current-Sheet. Fonts that are available for the worksheet but unused are marked with an asterisk. Unused fonts can be removed by typing the font numbers or by pressing **F6** to mark them for deletion. **F6** is a toggle for marking and unmarking selections. Pressing **F8** marks all unused fonts for deletion.

To delete a font from the list of fonts available for all new worksheets, select Layout Set-Font Remove New-Sheet. All except Font 0 will be marked with an asterisk. Type the font numbers or press **F6** to mark the fonts to be deleted. Or press **F8** to mark all fonts for deletion.

Saving and Unloading Worksheets

Once you have created a worksheet, you can save it in a file for recall at a later date. Changes made to the worksheet residing in memory are reflected in the saved file after you save the worksheet again. You can save a worksheet as many times as you like during a session.

To save a worksheet, select the File Save command; the prompt `Enter worksheet name :` is then displayed. To save the worksheet in the current data directory, just enter a filename.

A filename can consist of up to eight characters, including letters, the "#" sign, the underscore "_" character, or numbers. Although ANGOSS will also accept a hyphen in a worksheet name, the practice is not recommended because the name cannot be used in an external reference. The first character should be a letter, if possible. Filenames cannot contain blank spaces.

To save the worksheet in a directory other than the current data directory, enter a complete file specification, including the data path.

NOTE: An existing worksheet is saved in the directory from which it was loaded, unless you specify otherwise.

Renaming a Worksheet

There are several ways to assign a different name to a worksheet. The first method, using Tools File Rename, changes the name of any stored file. The worksheet being renamed should not be active. At the prompts, enter the name of the worksheet being renamed, and then enter the new name, including the ".ws" extension.

You can execute File Save and at the prompt, specify a different filename for the worksheet. ANGOSS automatically assigns the ".ws" extension. The worksheet on the screen is renamed and is saved in a new file. The file using the original name still exists.

You can also assign another name using File Newname. ANGOSS prompts you to enter a new name for the worksheet displayed on the screen. If you enter a name that is already in use, the message `Worksheet already exists. Continue? (y/n)` is displayed. Answer **y** to use the filename. Answer **n** to cancel the command.

NOTE: Executing the File Newname command renames the worksheet on your screen but does not save it in a file. After using File Newname, execute File Save to store the version under its new name.

Unloading Worksheets

After you have saved a worksheet, you can remove it from memory and from your screen by selecting the File Unload command. If you have more than one worksheet activated when you execute the File Unload command, ANGOSS prompts you to enter the filename of the worksheet to unload. If you have made any changes to the worksheet, and you execute the File Unload command before you save the revised worksheet, ANGOSS displays the message `Worksheet has been modified. Save before unloading (y/n)` in the Control Area of your screen. Enter **y** to save the revised worksheet before unloading it; enter **n** to unload the worksheet without retaining the changes. If you change your mind about unloading, press **Esc** to cancel the command.

If you have other files active, the most recently loaded worksheet appears on the screen. You can also type **all** to unload all active files.

Practice Session

In the practice session for this Chapter, you will:

- create a simple worksheet
- specify default format settings
- in Data Entry Mode, enter text, numeric values, and a simple formula
- change to another font
- save and unload your worksheet

The worksheet will be completed in later practice sessions. Figure 3-4 shows data you will enter.

1. Specify the default format. Using Layout Worksheet-Options Current-Sheet, set the format for value entries as follows: numeric format, right-justified, 2 decimal places, commas, minus sign for negatives, and no zero blanking.
2. Specify left-justification for text entries. Press **F10** when you have finished.
3. Using Layout Cell-Size Width, change the width of column 1 only to 15 characters.

You've specified the default formats for text and value entries, and adjusted the width of the first column. Now you are ready to enter data.

4. To begin, enter text. Move the highlighter to r2c1 and begin entering the names of the sales people shown in Figure 3-4. To save keystrokes, press **down arrow** instead of **Enter** to complete all entries but the last.

Figure 3-4

	1	2	3	4	5	6
1		1st Qtr.	2nd Qtr.	Commission		
2	Smith, J.	6,500.00	6,800.00			
3	Miller, M.	5,400.00	7,300.00			
4	Smith, A.	6,740.00	4,470.00			
5	Anders, C.	4,800.00	8,200.00			
6	Nelson, M.	5,230.00	5,500.00			
7	Kelly, T.	5,990.00	6,000.00			
8						
9	Total	34,660.00				
10						
11						
12						
13						
14						
15	Commission Rate	0.07				
16						
17						
18						

Menu: Sheet Edit **File** Layout Print Graph Tools Window Help Remember
Quit
Worksheet: ssnewch3 Loc: r11c2 FN: Font: 0 Count: 0

5. Move the highlighter to r1c2. Type the three column headings shown. Remember to use " for text entries beginning with a number. To save keystrokes, press **right arrow** to complete the first two headings.
6. Skipping row 8 for now, move the highlighter to r9c1 and type **Total**. Type **Commission Rate** at r15c1.
7. Next, enter the numbers shown under the "1st Qtr" and "2nd Qtr" headings. It is not necessary to enter decimal points or trailing zeros.
8. Move the highlighter to r15c2 and enter **.07** as the rate.
9. At r9c2, enter the formula as shown. You can type the formula, or you can build the formula by pointing to the cells to be included. Be sure to begin the entry with an equal sign.
 $r2c2+r3c2+r4c2+r5c2+r6c2+r7c2$
10. Check your work. The calculated total in r9c2 should be 34,660. You'll enter the remaining formulas in the next chapter.

You've entered all three kinds of data: text, numeric values, and a formula. Next, you will select a different font for one cell, and then you will be finished.

11. Change the font to be used for "Commission Rate." Move the highlighter to r15c1. Execute Layout Set-Font Change Block for that cell. Press **F6** to define a new font. Define a font such as serif 12pt. bold. Press **F10** to return to the worksheet.
12. Save your worksheet by executing File Save. Specify the name **ssnewXXX**, where the characters **XXX** are your initials. We will refer to this worksheet as "ssnewXXX" in later chapters.
13. Remove the worksheet from the screen (and from memory) by executing File Unload.

Chapter 4: Editing a Worksheet

Often, after creating a worksheet you discover that you need to make changes either to the data you have entered or to the format you have chosen. ANGOSS Spreadsheet provides several methods of editing existing data in a worksheet. Editing may be as simple as changing the contents of a single cell, or it may involve blanking a block of cells, deleting worksheet entries, moving blocks of data, copying data from one location in your worksheet to another, or inserting or deleting columns and rows.

This chapter explains some of the basic tasks required to edit a worksheet. Some of the topics covered include:

- loading a worksheet
- editing the contents of a cell
- using the Formula Editor
- using absolute and relative cell references, named blocks, and external worksheet references
- blockmarking in commands
- moving, copying, inserting, and removing data
- filling a worksheet area
- sorting data
- reformatting a worksheet
- searching and debugging a worksheet

Practice exercises are included at the end of this chapter. These exercises are designed to help you understand the information presented here.

Loading a Worksheet

You can redisplay a worksheet that has been saved at least once and unloaded from memory. Select the File Load command. When you select File Load, the prompt `Enter worksheet name:` and a prompt showing the worksheet files contained in the current data directory are displayed. Type the name of the file you want to load, or move the pointer to the desired filename, and press **Enter**. The worksheet is then loaded and displayed in the current window. If you type in the name of a file that does not exist, an error message will be generated.

If the worksheet you want to load is not listed in the prompter menu, the File Load command allows you to search through other sub-directories in an attempt to locate the worksheet.

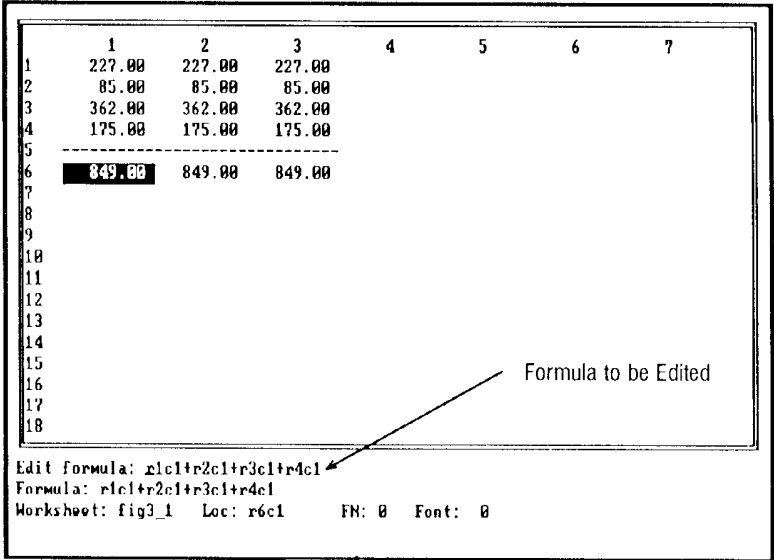
Press **F4** to invoke the Look For a File option. The current path is displayed on the Status Line. Enter the name of the file to be found. ANGOSS returns the location of the first occurrence of the specified filename and allows you to quit or continue the search.

Press **F5** to display a different directory. You can select the directory from the prompter and press **F5** again to view a list of files. Or you can type the specification for the directory, then select the worksheet from the prompter.

Editing the Contents of a Cell

There are several ways to edit the contents of a cell. If you are working in Data Entry Mode, you can position the cell highlighter on the cell containing the entry you want to change and simply enter a new value, text, or formula over the old. If you are working in Command Mode, you can select the Edit-Cell command to access the Cell Editor. One of the prompts `Edit value:`, `Edit formula:`, or `Edit text above` and the contents of the current cell will be displayed in the Control Area of your screen, as shown in Figure 4-1, allowing you to make the desired change.

Figure 4-1



The Cell Editor

The Cell Editor can be used to edit values, text, dates, and formulas of up to 240 characters.

Once you access the Cell Editor and the contents of the current cell are displayed on the edit line in the Control Area of the screen, you can change any part of the cell's contents.

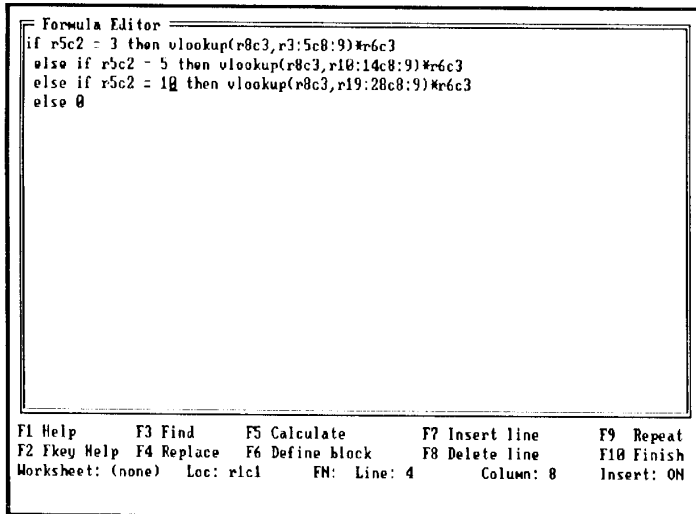
If the cell contains a formula that exceeds the screen width, the edit line scrolls when you reach the edge of the screen. If the formula to be edited exceeds 240 characters, a larger editing screen, called the Formula Editor, is automatically invoked instead of the Cell Editor.

Table 4-1 lists the keys to use in the Cell Editor to change the contents of a cell.

Table 4-1

Key	Action
left arrow	Moves cursor left one character
right arrow	Moves cursor right one character
Tab	Moves cursor right five characters
Shift Tab	Moves cursor left five characters
Ctrl left arrow	Moves cursor to beginning of edit line
Ctrl right arrow	Moves cursor to right end of edit line
Ins	Toggles on or off Insert Mode
Enter	Completes editing and records new contents in cell
Esc	Cancels editing without retaining changes
Alt F	Invokes the Formula Editor

Figure 4-2



The Formula Editor

To edit a large formula, or a formula that you would like to display on different lines, perhaps with indentation to improve readability, position the cell highlighter on the cell containing the formula and press **Alt F**. This activates the Formula Editor. A special Formula Editor Window temporarily displaces the Worksheet Window, and the formula to be edited is displayed in the upper left corner of the window. Figure 4-2 illustrates a formula displayed in the Formula Editor Window.

Table 4-2 lists the keys that can be used to move around the Formula Editor Window.

Table 4-2

Key	Action
left arrow	Moves cursor left one character
right arrow	Moves cursor right one character
Tab	Moves cursor right five characters
Shift Tab	Moves cursor left five characters
Ctrl left arrow	Moves cursor to beginning of current line
Ctrl right arrow	Moves cursor to right end of current line
Ctrl Home	Moves cursor to first character of formula
Ctrl End	Moves cursor to last character of formula
up arrow	Moves cursor up one line
down arrow	Moves cursor down one line
Enter	Moves cursor to first column of next line
Home	Moves cursor to top left corner of Formula Editor Window
End	Moves cursor to last line of formula

Manipulating Worksheet Data

You can manipulate data in your worksheet by using commands to move, copy, and blank cells, to fill a specified area of the worksheet with incrementing numbers, and to insert or delete blocks, rows, or columns. You can also sort data in your worksheet. Knowing how to use editing operations will help you create powerful worksheets quickly and easily.

Most commands require that you identify the cell or group of cells that are to be affected by the operation you are performing. Before we begin talking about the commands, let's spend some time discussing the different types of cell references, and how to specify them in commands.

Cell addresses can be absolute references, relative references, or combination references.

Absolute Cell References

An absolute cell reference **always** refers to a specific cell. When you copy a formula containing an absolute cell reference, the copy of the formula and the original formula refer to the same cell.

Absolute references are denoted by enclosing the row and column numbers in brackets.

Example of absolute references:

```
r[2]c[1]+r[3]c[1]
```

The example formula, which contains two absolute cell references, adds the contents of the cells at row 2 column 1 and row 3 column 1. If you copy the formula to another cell, the copied formula will still refer to the same two cells as the original formula.

Relative Cell References

In contrast to an absolute reference, a relative reference, denoted without brackets, refers to a cell's location relative to a formula cell. In other words, if the formula cell in the example shown is at r4c1, ANGOSS interprets the formula as "add the contents of the two cells immediately above the formula cell." The calculation result will be exactly the same as the formula containing absolute references. The difference lies in what happens when the formula is copied.

Example of relative references:

```
r2c1+r3c1
```

Suppose you want to add the contents of two cells in the next column, using the same basic formula as in the example. The formula is to be placed in r4c2, so, of course, the new formula must be adjusted to refer to column 2 instead of column 1.

When you copy the formula, ANGOSS will change the cell references in the new formula to "r2c2+r3c2." In other words, the contents of the two cells immediately above r4c2 will be added.

Table 4-3 illustrates how ANGOSS would interpret various relative references entered in r3c4.

Table 4-3

Relative Reference	Location
r2c3	1 row up, 1 column left from r3c4
r1c5	2 rows up, 1 column right from r3c4
r6c2	3 rows down, 2 columns left from r3c4
r5c7	2 rows down, 3 columns right from r3c4
r6c	3 rows down from r3c4, current column
c12	current row, 8 columns right from column 4

Notice that the current row or column of a relative reference can be indicated by omitting the number (i.e., r6c), or by omitting both the letter and the number (i.e., c12).

NOTE: Even though an abbreviated format is used to enter the reference, the actual formula contains the complete reference.

Combination Cell References

A combination reference is a cell reference consisting of an absolute row and a relative column, or a relative row and an absolute column. A combination reference is neither totally independent nor totally dependent on the formula position. When a combination reference is copied to another location in the worksheet, the absolute portion of the reference remains unchanged and the relative portion refers to a different row or column. A combination reference is denoted by enclosing the absolute portion of the reference in brackets, as illustrated in Table 4-4. The location interpretations described in Table 4-4 are based on the assumption that the combination reference is entered in cell r3c6.

Table 4-4

Combination Reference	Location
r1c[3]	2 rows up from r3, column 3
r[2]c10	row 2, 4 columns to the right of c6

Since a block reference is simply an expanded form of a cell reference, block references can be relative, absolute, or combination references. The same rules apply to each type of block reference that apply to the corresponding type of cell reference. An example of each form of block reference is shown in Table 4-5.

Table 4-5

Reference Type	Block Reference
Relative	r1:10c1:10
Absolute	r[1]:[10]c[1]:[11]
Combination	r[1]:10c1:[10]

You can define a block reference that begins at the current row by entering a colon and a single number (i.e., r:5 or r5:). The side of the colon that does not have a number is interpreted as the "current row." This is also true for referencing a block that begins at the current column (i.e., c:4 or c4:).

Named Blocks

ANGOSS Spreadsheet's Sheet Name Define command can be used to assign a name to any block or cell in your worksheet. This provides an easy way to reference a block that is used frequently in

formulas. When a block is assigned a name, you can refer to the block by its name, rather than its row and column coordinates.

COMMENT: For ease of use, assign meaningful names, such as "qtr3_sales," to worksheet blocks.

A block name can consist of up to 15 characters with no spaces. The first character must be a letter, an underscore, or #. Subsequent characters can be digits.

A block name is always considered to be an absolute reference. No adjustment to the reference occurs when a formula containing a named block reference is copied.

External Worksheet References

When entering a formula or executing some commands, you can reference a cell or block in the current worksheet or any other existing worksheet, as long as the worksheet containing the cell or block being referenced is an "active" worksheet. (An exception is the File Combine command which does not require the external worksheet to be active.)

An "active" worksheet is one that has been retrieved and loaded into computer memory using either the File Activate or File Load command. The number of worksheets that can be active at one time is limited only by the memory restrictions and operating system limitations of your computer system.

Any worksheet other than the current worksheet is called an "external worksheet." The number of worksheets you can tie together through external worksheet references is limited only by the memory capacity and operating system limitations of your computer system.

An external worksheet reference is denoted by entering the name of the worksheet, a period and the cell or block reference in the external worksheet. For example, the external worksheet reference "income.r4c3" refers to the cell in row 4 column 3 of the worksheet "income."

A block name or reference can also be included in an external worksheet reference, as illustrated in Table 4-6.

Table 4-6

Reference	Location
income.r1:10c2:3	rows 1 through 10, columns 2 through 3 in the worksheet "income"
income.sales	the block named "sales" in the worksheet "income"

To ensure that external worksheet references always accurately refer to the appropriate cells, assign block names to cells you know will be used in external references. Then, if you change a worksheet by inserting or deleting rows or columns, or moving blocks of data, the external worksheet references still refer to the right cells.

Blockmarking in Commands

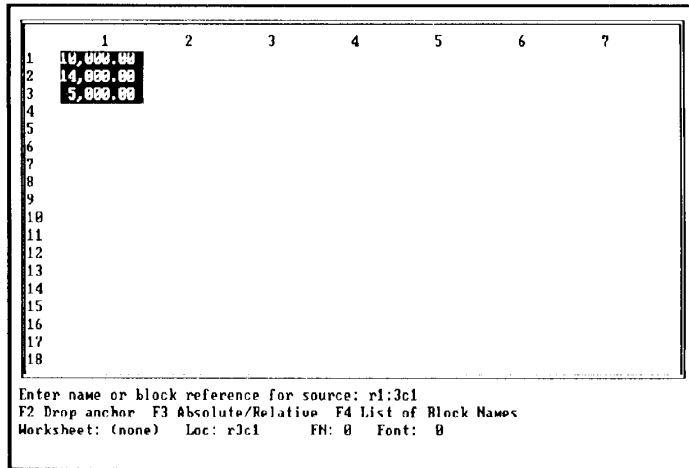
You can use either of two methods to enter a cell reference in a command, just as you can when building a formula. You can type the cell reference or name in response to the prompt `Enter name or block reference:`, or you can point, using the cell highlighter. Pointing allows you to refer to the appropriate cells from a worksheet without being concerned about the actual row and column numbers involved.

To mark a single cell, move the highlighter to the cell desired. When you reach the cell to be used in the command, press **F2** to "drop an anchor" on the cell, and press **Enter**.

COMMENT: The period (.) can also be used to drop an anchor.

To point to a block of cells, move the highlighter to one corner of the desired block and press **F2** to "drop an anchor" and define the beginning cell for the block. Then, move the highlighter to the opposite corner of the block; as the highlighter moves through the worksheet, the block you are marking is highlighted on the screen. When you reach the corner cell of the block desired, press **Enter**. Figure 4-3 shows the resulting marked block. You can reset the anchor by pressing **F2**.

Figure 4-3



Row and Column Marking

Instead of asking for block references, some commands ask you to specify the number of rows or columns (including the current row or column) to be affected. You can type the total number to be included, or you can use the pointing technique.

Press a cursor movement key to expand the highlighter to include additional rows or columns. Notice that as the highlighter moves, the total number of rows or columns entered in the Control area changes. When the necessary number of rows or columns is highlighted, press **Enter**.

You can move the highlighter back toward the current row or column, thereby decreasing the number included. However, you cannot drop a new anchor.

Now that you are familiar with cell and block references, cell and block names, and blockmarking techniques, let's talk about the commands you can use to manipulate data in your worksheet.

Moving Data

ANGOSS Spreadsheet's Edit Move command relocates a specified block, column, or row of cells from its current location in the worksheet to a new position. When you select Edit Move, ANGOSS prompts you to specify the block, column, or row to be moved and the destination location for the data. Identify the data to be moved by specifying the block reference or name, or the number of columns or rows. Specify the destination location by typing or pointing to the reference.

When you move data from one **block** to another in your worksheet, the original location becomes empty. Surrounding worksheet data does not "collapse" to fill the vacated space. The destination area is overwritten by the moved data.

When you move **columns** or **rows**, surrounding columns or rows are shifted to fill the vacated space. The moved data is inserted in new columns or rows in the destination area.

Copying Data

ANGOSS Spreadsheet provides several ways to copy worksheet data. The Edit Copy command is used to duplicate the contents of a cell or block of cells. Besides copying text and values, Edit Copy replicates formulas, making adjustments for relative references. Edit Value-Copy also copies text and values, but copies the calculated results of formulas, not the formulas themselves. Both commands can copy data to active, external worksheets.

File Combine Copy copies data from an external worksheet, which you do not have to load or activate.

When you select either Edit Copy or Edit Value-Copy, ANGOSS prompts you to specify whether you want the duplicated data to appear directly beneath the current cell (Copy Down), to the immediate right of the current cell (Copy Right), or at a completely different location (Copy From).

IMPORTANT: The duplicated data will **overwrite** any data currently residing in the destination area.

When you select the Copy Down option, ANGOSS prompts you to specify whether you want to copy a row or a single cell. If you select Row, you must specify the length of the row to be copied. When you select the Copy Right option, ANGOSS prompts you to specify whether you want to copy a column or a single cell. If you select Column, you must specify the length of the column. In either case, you can type the length or point to cells to mark the length.

Since the Copy Down and Copy Right options automatically copy to an adjacent area, you are not asked to specify a destination.

When you select the Copy From option, you are prompted to specify "from" one block location "to" another. As usual, you can either type or mark the block to be copied. When defining the destination for one copy, you only have to specify the top left cell of the destination block. To make multiple copies, specify a destination block larger than the source block. When the destination block is larger than the source block, ANGOSS makes at least one complete copy of the source and as many additional copies as will fit in the destination. The "from" block and the "to" block can overlap as long as they share the same upper left corner cell.

The copied block can be from the current worksheet or from any active external worksheet.

Copying to Another Worksheet

ANGOSS Spreadsheet allows you to copy data blocks from the current worksheet to any other worksheet that is currently active, through the use of Edit Copy From or Edit Value-Copy From. To copy data from the current worksheet to an external worksheet, select either command and specify the block of data to be copied. In response to the prompt requesting a destination location for the copy operation, enter the name of the external worksheet, followed by a period (.) and the block reference in the external worksheet. For example, entering the external worksheet reference "assets.r4:12c3:5" as a destination block for a copy operation will copy the specified block to rows 4 through 12, columns 3 through 5 in the worksheet "assets."

You can also use named blocks in external references. For example, if you have previously assigned the name "cash" to the block r4:12c3:5 in worksheet "assets," the reference for the destination block in the copy operation will be "assets.cash."

Copying from Another Worksheet

The File Combine Copy command copies text, values, and formulas from a specified external worksheet to the current worksheet. The external worksheet does not have to be active first. You can copy an entire worksheet or a specific block.

Position the highlighter in the upper left corner of the area to receive the copied data. Select File Combine Copy and specify the name of the external worksheet. A prompter listing of worksheets in the current directory is displayed. Next, type the block name or reference from the external worksheet. When you press **Enter**, the external data is copied to the current worksheet.

Deleting Data vs. Blanking Data

There are two commands available for removing worksheet data. Edit Delete removes specified worksheet rows and columns, and adjusts the surrounding area to "close" the vacated space. Edit Blank

works like an eraser, removing the data but not "closing" the vacated space. The Edit Blank option also restores default format and font settings to the blanked area.

Figures 4-4, 4-5a, and 4-5b show the difference between blanking and deleting.

When you select the Edit Blank command, choose either the Block, Columns, or Rows option to blank a particular area of the worksheet. Indicate the area to be blanked by typing or by pointing.

IMPORTANT: Be careful when using the All option, which **immediately** blanks all the cells in the worksheet.

To remove areas (not just data) from a worksheet, select the Edit Delete command and indicate the block, column(s), or row(s) you want to delete. When the command is executed, columns to the right of deleted column(s) or block move left to fill the vacated area; rows beneath deleted row(s) or block move up.

Figure 4-4. Worksheet "before"

	1	2	3	4	5	6
1	Income Statement					
2		1st	2nd	3rd	4th	Total
3	Sales	10,000.50	20,000.00	25,000.00	32,000.00	87,000.50
4	Cost of Goods Sold	4,150.50	10,000.00	12,320.00	1,750.00	28,220.50
5	Gross Income	5,850.00	10,000.00	12,680.00	30,250.00	58,780.00
6						
7	Expenses					
8	Utilities	1,035.32	2,000.00	2,500.00	2,230.00	7,765.32
9	Rent	2,050.00	3,000.00	4,132.00	6,200.00	15,382.00
10	Other	500.00	800.00	1,340.00	1,450.00	4,090.00
11	Total Expenses	3,585.32	5,800.00	7,972.00	9,880.00	27,237.32
12						
13	Net Income	2,264.68	4,200.00	4,708.00	20,370.00	31,542.68
14						

	1	2	3	4	5	6
1	Income Statement					
2		1st		3rd	4th	Total
3	Sales	10,000.50		25,000.00	32,000.00	67,000.50
4	Cost of Goods Sold	4,150.50		12,320.00	1,750.00	18,220.50
5	Gross Income	5,850.00		12,680.00	30,250.00	48,780.00
6						
7	Expenses					
8	Utilities	1,035.32		2,500.00	2,230.00	5,765.32
9	Rent	2,050.00		4,132.00	6,200.00	12,382.00
10	Other	500.00		1,340.00	1,450.00	3,290.00
11	Total Expenses	3,585.32		7,972.00	9,880.00	21,437.32
12						
13	Net Income	2,264.68		4,708.00	20,370.00	27,342.68
14						

Figure 4-5a. After blanking column

	1	2	3	4	5	6
1	Income Statement					
2		1st	3rd	4th	Total	
3	Sales	10,000.50	25,000.00	32,000.00	67,000.50	
4	Cost of Goods Sold	4,150.50	12,320.00	1,750.00	18,220.50	
5	Gross Income	5,850.00	12,680.00	30,250.00	48,780.00	
6						
7	Expenses					
8	Utilities	1,035.32	2,500.00	2,230.00	5,765.32	
9	Rent	2,050.00	4,132.00	6,200.00	12,382.00	
10	Other	500.00	1,340.00	1,450.00	3,290.00	
11	Total Expenses	3,585.32	7,972.00	9,880.00	21,437.32	
12						
13	Net Income	2,264.68	4,708.00	20,370.00	27,342.68	
14						

Figure 4-5b. After deleting a column

Figures 4-6a. and 4-6b.

	1	2	3
		Quarter Ended	Quarter Ended
		July 2, 1988	June 27, 1987
		-----	-----
6			
7			
8			
9			
10	Net Revenues	23,070	14,085
11			
12	Costs and Expenses		
13	Cost of Revenues	3,300	2,230
14	Sales and Marketing	15,000	6,578
15	Research and Development	1,868	1,245
16	General and Administrative	3,602	2,298
17		-----	-----
18	Total Costs and Expenses	24,570	12,351
19		-----	-----
20	Operating Income	(1,500)	1,734
21	Interest Income	155	100
22		-----	-----
23	Income before income taxes	(1,345)	1,834

Enter:
Value: 14085
Worksheet: c4insert Loc: r10c3 FN: 0 Font: 0

Figure 4-6a. Before inserting column

	1	2	3	4
		Quarter Ended		Quarter Ended
		July 2, 1988		June 27, 1987
		-----		-----
6				
7				
8				
9				
10	Net Revenues	23,070		14,085
11				
12	Costs and Expenses			
13	Cost of Revenues	3,300		2,230
14	Sales and Marketing	15,000		6,578
15	Research and Development	1,868		1,245
16	General and Administrative	3,602		2,298
17		-----		-----
18	Total Costs and Expenses	24,570		12,351
19		-----		-----
20	Operating Income	(1,500)		1,734
21	Interest Income	155		100
22		-----		-----
23	Income before income taxes	(1,345)		1,834

Enter: _
Worksheet: c4insert Loc: r10c3 FN: Font: 0

Figure 4-6b. After inserting column

Inserting Blocks, Columns, and Rows

To insert new columns or rows in your worksheet, place the highlighter at the location where you want to make the insertion. Select the Edit Insert command with the appropriate option and enter the number of columns or rows you want to add, or specify the block reference for the area you want to add. When the command is executed, any data in the specified location is pushed either to the right or down to accommodate the inserted columns, rows, or block, as shown in the illustrations in Figure 4-6a and 4-6b.

Filling Worksheet Areas

Sometimes you might find it necessary to enter a series of numbers into a worksheet. A table, for example, might contain an incrementing sequence of numbers such as 50, 100, 150, 200, 250, and so on. Rather than typing each entry manually, you can specify an incremental interval and instruct ANGOSS to generate the numbers for you.

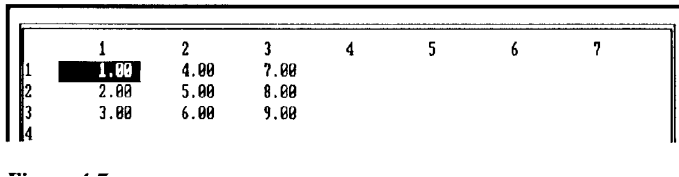
Generating a Series of Numbers

To generate a series of numbers and enter them into the worksheet, select the Edit Fill command. ANGOSS then asks you to indicate whether you want to fill a block, or one or more columns or rows. Next, specify the area to be filled by typing the entry or marking the area.

The starting value and the incrementing value can be whole or decimal numbers. To obtain a descending series of numbers, precede the increment value with a minus sign.

Figure 4-7 shows the filled block specified by the command **Edit Fill Block r1:3c1:3 start 1 increment 1**.

Figure 4-7



	1	2	3	4	5	6	7
1	1.00	4.00	7.00				
2	2.00	5.00	8.00				
3	3.00	6.00	9.00				
4							

The Edit Fill command can be used to generate a series of dates. Determine the starting date's numeric value in relation to January 1, 1900. Enter the numeric value as the starting number in the Edit Fill command. Specify an increment of 1 (or whatever integer increment you need). Then, using the Layout Format command, reformat the values as dates.

Filling a Cell

In designing a worksheet, you might want to separate column headings from the numeric entries by inserting lines, double lines, or other characters. You might also want a line between the last entries and the totals. Characters commonly used are the dash, the underscore, and the equal sign.

COMMENT: Cells filled by pressing \ are adjusted automatically if you increase cell width.

Rather than typing the characters across the cells one at a time, press the backslash key, \. At the prompt Enter text:, press **Enter** to fill the cell with dashes. To use characters other than dashes, press \, followed by the desired character or characters, and then press **Enter**. To repeat the process in another cell, press a cursor movement key instead of **Enter** and press **F9**.

Multiple character sequences can be generated. "ABC" entered after pressing \ will fill a cell with "ABCABCABCABC."

Sorting Data

ANGOSS Spreadsheet's Edit Sort command is used to rearrange specified data in ascending or descending order. When ascending order is selected, text cells are arranged from A to Z and value cells are arranged from the smallest number to the largest. When descending order is selected, text cells are arranged from Z to A and value cells are arranged from the largest number to the smallest. Case is ignored when data is sorted. Digits have lower values than alphabetic characters.

When you select Edit Sort, you are prompted to enter the name or block reference of the area containing the data to sort. Next, specify whether you want the sort executed in ascending or descending order.

After you indicate the cells to sort and the sort order, you must specify the "sort key." The "sort key," containing one or more columns or rows, is the information by which the specified block is sorted. To illustrate how the sort key affects the rest of the block, suppose you have two columns of data in your worksheet. Column 1 contains a list of trade shows and Column 2 contains the dates the shows begin, as shown in Table 4-7.

Table 4-7

Trade Show	Date
CompWorld	11/03/89
World Computer Exhibition	02/18/89
CompuShow	10/12/89
Government Computer Show	01/09/90
Office Automation Show	07/23/89

To continue with the example, suppose you need two lists, one with the shows in alphabetical order, and the other in chronological order. To ensure that the trade show names and dates remain together, you must include both columns of information in the block to be sorted.

To list the show names in ascending alphabetical order, select Edit Sort and include both columns in response to the `Enter name or block reference:` prompt. Next, select Ascending Column. ANGOSS then prompts you to enter the column number(s) for the sort key. Since you want an alphabetical sort by show name, Column 1 is used as the sort key. The corresponding dates in Column 2 are rearranged based on the final arrangement of the data in Column 1.

Table 4-8

Trade Show	Date
CompuShow	10/12/89
CompWorld	11/03/89
Government Computer Show	01/09/90
Office Automation Show	07/23/89
World Computer Exhibition	02/18/89

Similarly, to sort by date, you again select the Edit Sort command. Specify that both columns are to be included in the sort. Once again, select the Ascending Columns options. When you are prompted to enter the column number of the sort key, enter **2** so that the block is sorted by the trade show dates. The order of the trade show names changes to reflect the chronological order of Column 2.

NOTE: When entering dates that will be sorted, use "@" or "#" so that numeric sorting can be performed.

Table 4-9

Trade Show	Date
World Computer Exhibition	02/18/89
Office Automation Show	07/23/89
CompuShow	10/12/89
CompWorld	11/03/89
Government Computer Show	01/09/90

Multilevel sorts can be specified. For example, suppose your worksheet contains a list of employees, their departments, and their divisions. You could choose to have the data sorted in division order, with departments sorted under each division, and employee names sorted under each department.

You can enter up to 15 rows or columns to detail the key(s) to the sort; the hierarchy for the keys is established by the order in which you enter them in response to the prompt. Each row or column number must be separated by a space. The first number you enter is identified as the primary sort key. Additional numbers are used as secondary sort keys, enabling you to provide another level of conditions for the sort to follow when two or more cells being sorted contain the same primary key information.

Secondary sort keys need not reflect the same order (ascending or descending) as the primary key. To specify a different order, type "a" for ascending, or "d" for descending after the row or column number.

Example:

Sort r2:20c1:30 ascending using column "1 3 4d"

The example shown sorts the block (r2:20c1:30) using column 1 as the primary sort key, and column 3 as the first secondary key. Both will be sorted in ascending order (indicated by the ascending option).

The next secondary sort key will be based upon column 4 in descending order.

Reformatting Worksheets

Once you have entered data into a worksheet, you can change part or all of the formatting by using the Layout Justify or Layout Format commands. Layout Justify allows you to change the justification, or alignment, of existing text or value entries. Layout Format allows you to change the display format of existing value or formula cells. These commands offer the same setting options as the Layout Default command, but they apply to specific areas of the worksheet.

Reformatting Text Entries

Normally, text is aligned to the left. There are instances (column headings, for example) when centering or right alignment would look better.

To change the alignment of existing text entries, select the Layout Justify command. Next, choose whether to center the text or align it to the right or left. You are prompted to indicate the block, rows, or columns to be justified, or whether you want to change the justification of all entries in the worksheet.

Reformatting Value Entries

Perhaps you have specified that the default value setting on your worksheet is numeric, carried to two decimal places. However, one of the rows contains account numbers, which you want to be displayed as whole numbers. The worksheet will be easier to read if these account numbers are left aligned rather than right aligned. Following normal bookkeeping procedures, you want to present some values (such as the first entry in a column and any amounts resulting from addition or subtraction) with dollar signs.

To change the alignment of existing values, use the Layout Justify command, just as you would for text.

To reformat value entries, select Layout Format. You are then prompted to select the area of the worksheet to be affected. You can choose to reformat a particular block, certain rows or columns, or an entire worksheet.

Next, choose the format in which to display the values. You can choose bar representation, one of three date formats, time, scientific notation, currency, numbers without currency symbols, percents, or a general numeric format.

For your hypothetical worksheet, you would reformat the account number column to display 0 decimal places. You would reformat the cells requiring dollar signs with the Currency option.

To refresh your memory on any of the format options, see *Numeric Formats* under *Basic Worksheet Formatting* in *Chapter 3*.

In addition, you can also choose Reset. This option resets cells in the specified area to the **default** value format.

Tracking Worksheet Data

When you must use large, complex worksheets to handle an application, tracking data and locating problem areas can become complicated. ANGOSS Spreadsheet provides several commands that make worksheet tracking and debugging operations more efficient.

Searching Worksheets

ANGOSS Spreadsheet's Sheet Find command allows you to search for a variety of entries, as well as for empty, preformatted cells in your worksheets. Suppose, for example, that you are working on an application involving daily product sales for a company. A sample worksheet for this application is shown in the Figure 4-8.

Figure 4-8

	1	2	3	4	5	6	7	8
1	Daily Sales							
2	Date	Ticket	Code	Description	Qty	Price	Amount	By:
3	04/17/1988	15711	1011	std seed mix	1	3.50	3.50	rjm
4	04/17/1988	15712	1014	grit	2	1.00	2.00	rjm
5	04/17/1988	15713	731	med cage	1	54.00	54.00	ldw
6	04/17/1988	15718	1055	bird toys	4	4.50	18.00	lls
7	04/17/1988	15722	1012	finch seed	1	7.00	7.00	rjm
8	04/17/1988	15714	1051	nest box	2	4.75	9.50	ldw
9	04/17/1988	15717	400	macaw	1	1,450.00	1,450.00	jrj
10	04/17/1988	15715	732	large cage	1	410.00	410.00	lls
11	04/17/1988	15716	1056	parrot treat	1	5.50	5.50	akm
12	04/17/1988	15719	413	cockatiel	2	70.00	140.00	lll
13	04/17/1988	15720	1015	cocktl seed	1	7.00	7.00	lls
14	04/17/1988	15721	1011	std seed mix	1	3.50	3.50	ldw
15	04/17/1988	15723	1050	cattle bone	1	1.75	1.75	rjm
16	04/17/1988	15724	732	large cage	1	335.00	335.00	lls
17	04/17/1988	15726	1066	perch	1	32.00	32.00	akm
18	04/17/1988	15725	401	canary	2	48.00	96.00	jrj

Enter: _

Worksheet: c4find Loc: r1c8 FH: Font: 0

As you can see, each sale has been entered with the date of the sale, ticket number, product code number, description of the item, quantity sold, unit price, total dollar amount, and the salesperson's initials. If you want to track the sales of a particular person through the entire worksheet, position the highlighter at r1c1 and use the Sheet Find All Text command to search the whole worksheet and find successive occurrences of the person's initials. Beginning at the current cell, ANGOSS searches to the right and down to locate the first occurrence of the specified text. Press **F9** to continue the search. You can evaluate the person's performance sale by sale. You can also find a particular sales figure by selecting the Sheet Find All Value command.

If you want ANGOSS to search only a certain area of the worksheet, use the Block option, rather than All. Block references can be typed, or marked with the pointing technique.

ANGOSS' Sheet Find command can also be used to track formula errors in your worksheets. By selecting the Sheet Find All Calc-Error command, you can instruct ANGOSS to search the remainder of the worksheet (beginning with the cell to the immediate right of the current cell) and find each formula error.

Or, you can use Sheet Find All Empty to locate preformatted empty cells that exist in the worksheet. (Refer to *Preformatting Cells* in *Chapter 3*.)

You can use Sheet Find Highlight to locate cells highlighted by the Sheet Audit command.

Debugging Worksheets

By using the Sheet Audit commands, you can check your worksheet for anomalies or potential errors, such as:

- formulas that reference empty cells
- formulas that are not referenced by other formulas
- cells that contain circular references
- cells that are used by a particular formula
- formulas that reference a particular cell

You can instruct ANGOSS to highlight cells containing anomalies and then display those cells in contrasting colors with the Window Paint command.

Auditing Worksheets

The Sheet Audit commands, with the exception of Sheet Audit Circular, locate and place a highlighter over all cells containing the specified type of entry.

Sheet Audit Circular highlights the first occurrence of a group of cells constituting a circular reference (i.e., a cell that directly or indirectly references itself.) To highlight the next occurrence, press **F9**. Any editing of the worksheet causes the Sheet Audit Circular command to begin the search at the first occurrence again.

NOTE: A circular reference is not necessarily an error. Refer to *Using Circular References* in *Chapter 5* of this manual.

Use Sheet Audit Formulas to highlight related formulas, blank or empty formulas, or unused formulas. Use Sheet Audit Unused to highlight unused text or value cells. Use Sheet Audit Restore to remove the highlighting.

Figure 4-9 shows unused formula cells that have been highlighted by the Sheet Audit Formulas command.

Figure 4-9

	1	2	3	4	5	6	7	8
1	Daily Sales							
2	Date	Ticket	Code	Description	Qty	Price	Amount	By:
3	04/17/1988	15711	1011	std seed mix	1	3.50	3.50	rjm
4	04/17/1988	15712	1014	grit	2	1.00	2.00	rjm
5	04/17/1988	15713	731	med cage	1	54.00	54.00	ldw
6	04/17/1988	15718	1055	bird tnys	4	4.50	18.00	lls
7	04/17/1988	15722	1012	finch seed	1	7.00	7.00	rjm
8	04/17/1988	15714	1051	nest box	2	4.75	9.50	ldw
9	04/17/1988	15717	400	macaw	1	1,450.00	1,450.00	jrb
10	04/17/1988	15715	732	large cage	1	410.00	410.00	lls
11	04/17/1988	15716	1056	parrot treat	1	5.50	5.50	akw
12	04/17/1988	15719	413	cockatiel	2	70.00	140.00	lll
13	04/17/1988	15720	1015	cocktl seed	1	7.00	7.00	lls
14	04/17/1988	15721	1011	std seed mix	1	3.50	3.50	ldw
15	04/17/1988	15723	1050	cuttle bone	1	1.75	1.75	rjm
16	04/17/1988	15724	732	large cage	1	335.00	335.00	lls
17	04/17/1988	15726	1066	perch	1	32.00	32.00	akw
18	04/17/1988	15725	401	canary	2	48.00	96.00	jrb

Worksheet: c4find Loc: r3c7 FN: 0 Font: 0

Painting Cell Types

Another command that facilitates worksheet tracking and debugging (if your system supports color) is the Window Paint command. You can choose from up to 16 colors to paint the window border, various kinds of cells, row or column numbers, or the entire window. Select the Cursor option of Window Paint Cells to paint the cell in which the highlighter appears; select the Formulas option to track all cells containing formulas; select the Highlight option to track cells highlighted by the Sheet Audit command; select the Locked-Cells option to track all locked cells in the worksheet; or select the Text or Values options to track cells containing text or values.

Producing Coded Maps

To display your worksheet as a coded map showing the various types of cells, select Layout Format Formula-Display Map. To print your worksheet as a coded map, execute Print Map.

Practice Session

In this practice session, you will continue to build and modify the worksheet "ssnewXXX" created in *Chapter 3*. You will:

- edit text and formula entries
 - use both relative and absolute references while copying formulas
 - insert a new column and assign numbers to the sales people
 - reformat certain cells
 - instruct ANGOSS to find a sales person's name
 - sort the sales people's data alphabetically
1. Put the worksheet "ssnewXXX" in the Worksheet Window by executing File Load. Remember that "XXX" stands for your initials. Figure 4-10 illustrates how your screen will look once you have loaded the worksheet.

Figure 4-10

	1	2	3	4	5	6
1		1st Qtr.	2nd Qtr.	Commission		
2	Smith, J.	6,500.00	6,800.00	931.00		
3	Miller, M.	5,400.00	7,300.00	889.00		
4	Smith, A.	6,740.00	4,470.00	704.70		
5	Anders, G.	4,800.00	8,200.00	910.00		
6	Nelson, M.	5,230.00	5,500.00	751.10		
7	Kelly, T.	5,990.00	6,000.00	039.30		
8	-----					
9	Total	34,660.00	38,270.00	5,105.10		
10						
11						
12						
13						
14						
15	Commission Rate	7.00%				
16						
17						
18						

Enter: _

Worksheet: ssnewch4 Loc: r1c1 FN: Font: 0 Count: 0

2. Move the highlighter to r5c1. "Anders, G." should be "Anders, B." Press **Alt E** to edit the cell without retyping the whole entry.
3. Now, enter the first commission calculation formula. At r2c4, enter the formula exactly as shown. Begin with an equal sign.
 $r2c2+r2c3*r15c2$
4. Check the result. ANGOSS should have calculated a commission of 6,976.00. Seems a little high, doesn't it. Something must be wrong with the formula. Edit the formula by pressing **Alt F**. Insert parentheses as shown, and press **F10**.
 $(r2c2+r2c3)*r15c2$
5. The correct commission should be 931.00. Do you see why inserting the parentheses made a difference? Review the paragraphs concerning evaluation priorities in formulas in **Chapter 3** if you need more information.

You've edited a cell containing text and a cell containing a formula. In the next section, you will be copying two types of formulas: one containing relative references, and the other containing absolute references.

6. Move the highlighter to r9c2 and look at the formula shown in the Control Area. You want to copy the same basic formula to r9c3, but you want to use the figures for the second quarter, not the first.
7. Execute Edit Copy Right Single-Cell and specify 2 copies. After the formula has been copied, it may be necessary to press **F5** to recalculate. Now, look at the new formulas. Do you see that ANGOSS has adjusted the cell references for you? Relative references are always adjusted when they are copied.
8. Move the highlighter to r2c4 and look at the formula that calculates commission. When you copy this formula, you want ANGOSS to adjust the references for the sales amounts but always use r15c2 for the rate. The reference r15c2 must be converted to an absolute reference.
9. Press **Alt E** (or **Alt F**) to edit the formula. Change **r15c2** to **r[15]c[2]**.
10. Execute Edit Copy Down Single-Cell and specify 5 copies. Move the highlighter over the new formulas and notice which references changed and which stayed the same.

In the next section, you will do two types of "filling." You will fill a cell to draw a separator line, and you will fill a block of cells with numbers. You will also insert a new column into your worksheet.

11. First, put the separator line above the row containing the totals. Move the highlighter to r8c1 and press ****. Press **right arrow** and then **F9** to repeat the command. Extend the line through column 4.
12. It would be helpful to have a numbered list of sales people. Move the highlighter to r2c1 and insert a new first column by executing Edit Insert Columns 1.
13. Beginning in the new r2c1, number the sales people by executing Edit Fill Rows. Specify 6 rows to be filled, and enter a starting value of **1** and an increment value of **1**.

In the next section, you will do some reformatting to make the changed areas look better.

14. The sales people are numbered 1.00 through 6.00, so reformat the column to remove the decimal places. Execute Layout Format Columns 1 Numeric. Specify no-commas, negatives with a minus sign, show-all zeros, and decimal precision of 0.

15. The first column is now too wide. Reduce the width by executing Layout Cell-Size Width. Specify a width of 4 characters. Then select the Columns option and specify 1 column.
16. Use Layout Justify to right-align the headings in row 1.
17. Move the highlighter to the commission rate (now in r15c3). Reformat the cell as a percent cell. Use the Layout Format command with the Block option to reformat one cell. Specify 2 for decimal precision; you should be able to determine the other options on your own.
18. When you have finished reformatting, go to the upper left corner of the worksheet.

Next, you will find a particular text entry in your worksheet. You will also sort a worksheet block.

19. Instruct ANGOSS to find the cell containing "Kelly." Execute Sheet Find All Text and type **kelly** at the prompt. The highlighter moves to r7c2.
20. Move the highlighter to r2c2. Sort the sales people (and their accompanying data) into alphabetical order.
21. Execute Edit Sort and specify **r2:7c2:5** as the area to be sorted. Select the Ascending option, and inform ANGOSS that the sort key is in a column by selecting the Column option. Specify **2** as the column number containing the sort key. Then press **Enter**. The list is now alphabetized.
22. Save your worksheet by executing the File Save command.

In the last section, you will create a second worksheet by saving it under a new name.

23. Create a new worksheet by executing File Save again and entering the name of a nonexistent worksheet. Use **ss2XXX** (where the characters **XXX** are your initials) for the new filename.
24. Type the words **Prior Year** in r1c2. Change some of the amounts in the 1st and 2nd Qtr columns and recalculate. This will give you another worksheet to use later.
25. Save the new worksheet (ss2XXX) when you are finished.

Chapter 5: Managing Worksheets

This chapter explains some of the features of ANGOSS Spreadsheet that allow you to manage your files more efficiently and with greater protection. Topics include:

- how to use multiple windows and worksheets
- combining worksheets
- protecting your data
- using ANGOSS Tools commands

Multiple Windows, Multiple Worksheets

One of the most useful features of ANGOSS Spreadsheet is the ability to section the Worksheet Window into multiple windows. A maximum of 50 windows can be simultaneously displayed; however, it is highly unlikely that you would ever need that many windows.

The ability to display multiple windows is helpful in many different situations. For example, if you are working on a large worksheet and you want to view or edit several sections of the worksheet concurrently, you can create multiple windows and display a different section of the worksheet in each window.

Or, suppose you are consolidating departmental budgets or sales reports that were prepared by different persons. You can view several worksheets at the same time, displaying a different worksheet in each window.

Splitting the Worksheet Window

ANGOSS Spreadsheet's Window Split command is used to divide the current window into two smaller windows. When you select Window Split, you must specify whether you want to split the window horizontally or vertically.

When you first enter ANGOSS Spreadsheet, the window displayed is Window 1; however, when only one window exists on your screen, no window identifier number is shown. As new windows are created, ANGOSS automatically assigns sequential numbers to the windows. The window identifier number appears in the upper left corner of the window. If you have elected to toggle off either row or column numbers (or both), no window identifier numbers are shown.

COMMENT: If a window is too small to split, try turning off column and row numbers.

You can increase the size of each window by turning off the border display with the Window Border toggle command. Removing the borders can make it difficult to distinguish one window from another, so use the Window Paint Window command to paint each window a different color.

Splitting a Window Horizontally

The Window Split Horizontal command is used to horizontally divide the current window into two smaller windows. Position the highlighter at the location on your screen where you want the split to occur and select Window Split Horizontal. The new window appears directly below the highlighter.

If you try to split your window horizontally when you are on row 1 of your worksheet, ANGOSS displays the message `Window Too Small` in the Control Area of the screen and no split occurs.

Splitting a Window Vertically

The Window Split Vertical command is used to vertically divide the current window into two smaller windows. Position the highlighter at the location on your screen where you want the split to occur and select Window Split Vertical. The new window appears directly to the right of the highlighter.

If you split your window vertically when you are in column 1 of your worksheet, ANGOSS executes the split, but the window will be too small to display any entries you make. To view the contents of any cells, you must execute the Window Zoom command. Zooming a split window is discussed in the section *Enlarging Split Windows*.

Moving to a Different Window

Once you have split the screen into multiple windows, you can move between the windows using the Sheet Goto Window command. Enter the number of the window to go to and press **Enter**. The highlighter is moved to the specified window, making it the "current" window. You can also use Quick Key **F4** to execute the Sheet Goto command; then select the Window option.

Using Multiple Worksheets

Once you have split the screen and moved to the desired window, select the File Load command and specify the name of the worksheet to be loaded. File Load always produces the specified worksheet in the current window. Continue splitting the window and loading additional worksheets, as necessary. Use the Sheet Goto Window command to move from one window to another.

You can make any active worksheet the current worksheet by executing the Sheet Goto Sheet command, regardless of whether the window has been split. A prompter menu lists the worksheets that are currently active. Once a worksheet is displayed in the current window, you can perform any editing, reformatting, or data entry operations you desire.

If you wish to start a new worksheet while others are active, select (none) from the prompter. A blank, unnamed worksheet will be displayed. You can also use Sheet Goto Sheet (none) to move to a unnamed worksheet in which you have entered data.

Enlarging Split Windows

ANGOSS Spreadsheet's Window Zoom command is used to expand the current split window to the full size of the screen. After a window has been zoomed, you can execute the Sheet Goto Window command to display another window; it will also be displayed in full size. Window Zoom is a toggle command. Therefore, to return an enlarged window to its original size, execute the Window Zoom command again. Figures 5-1a and 5-1b illustrate the effect of the Zoom command.

Figure 5-1a. A "zoomed" window

#3	1	2	3	4	5	6	7	8
2	Date	Ticket	Code	Description	Qty	Price	Amount	By:
3	04/17/1988	15711	1011	std seed mix	1	3.50	3.50	rjm
4	04/17/1988	15712	1014	grit	2	1.00	2.00	rjm
5	04/17/1988	15713	731	med cage	1	54.00	54.00	ldw
6	04/17/1988	15718	1055	bird toys	4	4.50	18.00	lls
7	04/17/1988	15722	1012	finch seed	1	7.00	7.00	rjm
8	04/17/1988	15714	1051	nest box	2	4.75	9.50	ldw
9	04/17/1988	15717	400	macaw	1	1,450.00	1,450.00	jrk
10	04/17/1988	15715	732	large cage	1	410.00	410.00	lls
11	04/17/1988	15716	1056	parrot treat	1	5.50	5.50	akw
12	04/17/1988	15719	413	cocktail	2	70.00	140.00	lls
13	04/17/1988	15720	1015	cocktl seed	1	7.00	7.00	lls
14	04/17/1988	15721	1011	std seed mix	1	3.50	3.50	ldw
15	04/17/1988	15723	1050	cattle bone	1	1.75	1.75	rjm
16	04/17/1988	15724	732	large cage	1	335.00	335.00	lls
17	04/17/1988	15726	1066	perch	1	32.00	32.00	akw
18	04/17/1988	15725	401	canary	2	40.00	80.00	jrk
19								

Enter:
 Date: 04/17/1988
 Worksheet: c4find Loc: r10c1 FN: 0 Font: 0

Figure 5-1b. Three windows unzoomed

#1	1	2	3	4	5	6
1	Income Statement					
2		1st	2nd	3rd	4th	Total
3	Sales	10,000.00	20,000.00	25,000.00	32,000.00	87,000.00
4	Cost of Goods Sold	4,150.00	10,000.00	12,320.00	1,750.00	28,220.00
5	Gross Income	5,850.00	10,000.00	12,680.00	30,250.00	58,780.00
6						

#2	1	2	3
1	But		
2	At least	less than	
3	-----		
4	4,000.00	4,050.00	174.00
5	4,050.00	4,100.00	100.00
6	4,100.00	4,150.00	186.00
7	4,150.00	4,200.00	192.00
8	4,200.00	4,250.00	190.00
9	4,250.00	4,300.00	204.00

#J	1	2	3	4
2	Date	Ticket	Code	Description
3	04/17/1988	15711	1011	std seed mix
4	04/17/1988	15712	1014	grit
5	04/17/1988	15713	731	med cage
6	04/17/1988	15718	1055	bird toys
7	04/17/1988	15722	1012	finch seed
8	04/17/1988	15714	1051	nest box
9	04/17/1988	15717	400	macaw
10	04/17/1988	15715	732	large cage

Enter: _
 Date: 04/17/1988
 Worksheet: c4find Loc: r10c1 FN: 0 Font: 0

Closing Windows

ANGOSS Spreadsheet's Window Close command is used to close the current window or "unsplit" the screen. Worksheet windows do not have to be closed in the order in which they were created. For example, suppose you have four windows displayed on your screen and you want to close only Window #3. Simply make Window #3 the current window and execute the Window Close command. Window #3 is then removed from the screen and one of the remaining windows (Window #1, #2, or #4) expands to fill the empty space left by Window #3.

Closing a Worksheet Window does not unload from memory the worksheet it displayed. The worksheet remains active and can be re-displayed by executing the Sheet Goto Sheet command.

Fixing Titles

If you have a large worksheet that cannot be viewed on one screen, you can freeze column or row headings in place and leave the remaining data free to be scrolled across the Worksheet Window. The command to use is Window Titles Fix with either the Column or Row option. You are asked to specify the number of columns or rows to be fixed.

Remove fixed titles from your worksheet by executing Window Titles Drop.

Linking and Unlinking Windows

There may be times when you need to scroll through two or more worksheets simultaneously to compare data. By linking windows together, you can scroll multiple worksheets in the same direction and at the same speed.

Suppose, for example, you created four worksheets showing quarterly expenditures for overnight delivery services used by your company. The worksheets are named FIRST, SECOND, THIRD, and FOURTH to reflect the fiscal quarters each represents. In an attempt to minimize expenses, you now want to compare total costs for each quarter, as well as to spot any cost increases levied by the individual delivery services. To accomplish this, you want to link the four worksheets together and simultaneously scroll through the data contained in each.

To link the worksheets, use the following procedure:

1. Load the worksheet named FIRST.

2. Move the cursor to the position on your screen where you want to split the window and execute the Window Split command.
3. Select Sheet Goto Window and enter **2** in response to the prompt for a window number.
4. Load the worksheet named SECOND.
5. Repeat steps 1-4 for the remaining worksheets.
6. Select Window Link and specify the number of each window you want linked, inserting a space between each number.

Now that your windows are all linked, you can scroll up and down and from side to side through each worksheet simultaneously. When you no longer need one or more of the windows linked, you can remove the link by selecting Window Unlink and specifying the window numbers to unlink. You do not have to unlink all the windows displayed on your screen.

Combining Worksheets

ANGOSS Spreadsheet offers you an easy way to combine the data in two worksheets. The File Combine command allows you to add, subtract, or copy all or part of the data from a worksheet into the current worksheet, based upon the location of the highlighter at the time the command is executed.

The Add and Subtract options of the File Combine command operate on values only. Text, formulas, and format are not affected. The Copy option, which copies from a worksheet into the current worksheet, copies all text and values. File Combine does not require the second worksheet to be active.

Combining worksheets is particularly useful when you have two or more sets of data that you need to view separately and together. For example, suppose you have one worksheet that calculates gain or loss of the sale of assets, and a second worksheet that computes total depreciation for each asset. Figure 5-2 shows the two worksheets.

Figure 5-2

#1	1	2	3	4	5	6
2	Descr.	Acquired	Sold	Price	Basis	Gain/Loss
3	Asset #1	01/12/1970	12/18/1980	14,000.00	15,000.00	(1,000.00)
4	Asset #2	01/10/1980	12/18/1980	12,000.00	12,000.00	0.00
5	Asset #3	01/04/1972	12/10/1980	26,000.00	25,000.00	1,000.00
6	Asset #4	01/04/1972	12/18/1980	14,000.00	18,000.00	(4,000.00)
7	Asset #5	01/04/1979	12/18/1980	15,600.00	14,000.00	1,600.00
8	Asset #6	01/14/1975	12/18/1980	42,000.00	35,000.00	7,000.00

#2	3	4	5	6	7	8	9
1		Life	Years	Depr	Depr	Depr	
2	Cost	Years	Used	Prior	Current	Total	
3	15,000.00	15	9	9,000.00	1,000.00	10,000.00	
4	12,000.00	10	7	0,400.00	1,200.00	9,600.00	
5	25,000.00	20	15	18,750.00	1,250.00	20,000.00	
6	18,000.00	15	15	18,000.00	0.00	18,000.00	
7	14,000.00	10	8	11,200.00	1,400.00	12,600.00	
8	35,000.00	25	12	16,800.00	1,400.00	18,200.00	

Enter:
Text: Cost
Worksheet: c5_2 Loc: r2c3 FN: 0 Font: 0

Since calculation of gain or loss requires that an asset's basis be reduced by the amount of depreciation, you could use the File Combine Subtract command to compute the net result.

You would position the highlighter on the first entry under the word "Basis" in the first worksheet (i.e., r3c5).

Next, execute the File Combine Subtract command. You enter the name of the second worksheet. You then select the Block option because you want to use data from a specific block in the second worksheet. The block to be used, (r3:8c8), contains the total depreciation amounts. You must type the reference manually; the pointing technique cannot be used here.

When you press **Enter**, the figures from the second worksheet are subtracted from the amounts in the first worksheet. Press **F5** to recalculate and notice the difference in the amounts of gain and loss. Figure 5-3 shows the net result.

Figure 5-3

#1	1	2	3	4	5	6
2	Descr.	Acquired	Sold	Price	Basis	Gain/Loss
3	Asset #1	01/12/1978	12/18/1988	14,000.00	5,000.00	9,000.00
4	Asset #2	01/10/1980	12/18/1988	12,000.00	2,400.00	9,600.00
5	Asset #3	01/04/1972	12/18/1988	26,000.00	5,000.00	21,000.00
6	Asset #4	01/04/1972	12/10/1990	14,000.00	0.00	14,000.00
7	Asset #5	01/04/1979	12/18/1988	15,600.00	1,400.00	14,000.00
8	Asset #6	01/14/1975	12/18/1988	42,000.00	16,800.00	25,200.00

#2	3	4	5	6	7	8	9
1		Life	Years	Depr	Depr	Depr	
2	Cost	Years	Used	Prior	Current	Total	
3	15,000.00	15	9	9,000.00	1,000.00	10,000.00	
4	12,000.00	10	7	0,400.00	1,200.00	9,600.00	
5	25,000.00	20	15	10,750.00	1,250.00	20,000.00	
6	18,000.00	15	15	18,000.00	0.00	18,000.00	
7	14,000.00	10	8	11,200.00	1,400.00	12,600.00	
8	35,000.00	25	12	16,800.00	1,400.00	18,200.00	

Enter:
Value: 5000
Worksheet: c5_1 Loc: r3c5 FN: 0 Font: 0

If you simply want to copy from one worksheet to another, you can use File Combine Copy, which replaces values, text, and formulas in the current worksheet with values, text, and formulas from another worksheet.

Creating Protected Worksheets

Sometimes it may be necessary for you to protect your worksheet data by limiting access to it or by preventing any editing. ANGOSS enables you to protect your worksheets at both the file level and the cell level. You can assign a password to a file. You can also lock cells in a worksheet.

File Password Protection

ANGOSS Spreadsheet allows you to assign one password to a worksheet by selecting the File Password Attach command. Type the password (which is not displayed as you type), press **Enter**, then verify that you typed the password correctly by entering it again. Passwords can contain from one to sixteen characters, including blanks. They can be any combination of printable characters (i.e., letters, numbers, and symbols).

File Password Attach also encrypts a file.

To retain a new password attached to a worksheet file, you must save the worksheet after executing File Password Attach.

IMPORTANT: Passwords are case sensitive. For example, if you assigned the word "WORK" as a password, you would not be allowed access to the worksheet if you entered "Work" or "work" in response to the `Enter password:` prompt.

When converting files created under earlier versions of ANGOSS, load the worksheet using the "save permission" password. Otherwise, ANGOSS will not load the worksheet. The old "save permission" password becomes the ANGOSS worksheet password, which you can then change if necessary.

To remove an existing password, load the worksheet using the password attached to it. Select the File Password Remove command and press **Enter**. You must then save the worksheet to complete the password removal.

Locking and Unlocking Worksheet Cells

Another method for protecting worksheets is implemented at the cell level. The Sheet Lock command allows you to prevent the accidental overwriting of information contained in a worksheet by locking specific areas of a worksheet, such as blank (empty) cells, value cells, text cells, or formulas.

Once a cell is locked, it cannot be edited, deleted, blanked, or overwritten by the Edit commands. In addition, a locked cell will not accept any new data.

COMMENT: The location of locked data can be shifted when Edit Move Columns or Rows is executed, but the locked status remains intact.

To lock blank cells, simply select Sheet Lock Blanks and all blank cells are automatically locked. To lock formula, text, or value cells, you must specify whether you want to lock a block of cells, certain columns or rows, or all cells of this type. Enter a block name or reference, or the desired columns

or rows, by typing your entry or using the cursor keys, beginning with the current column or row. Selecting All automatically executes the command for all cells of the designated type.

When locking a specified number of rows, Sheet Lock operates on the current row and the rows below the current row. When locking a specified number of columns, Sheet Lock operates on the current column and the columns to the right of the current column. For example, if you specify that five rows are to be locked, the current row and the four rows below the current row are locked; if you specify that three columns are to be locked, the current column and the two columns to the right of the current column are locked.

To permanently unlock a locked cell, execute the Sheet Unlock command. To temporarily suspend the locked status of cells, select the Sheet Lock Disable command. You can then edit the cells as necessary. After the changes have been made, reactivate locked status by selecting the Sheet Lock Enable command. ANGOSS remembers which cells were affected by the Sheet Lock Disable command and automatically locks them again.

NOTE: ANGOSS remembers which cells were disabled, not what type of cells. Therefore, if you disable formula locking, enter new formulas in blank cells, then enable formula locking, the new formulas will not be locked.

Sheet Lock Protect preserves all formulas in the current worksheet by preventing them from being edited or displayed. The current worksheet must be unmodified before Sheet Lock Protect is executed. Therefore, if you have made any changes to the worksheet since it was last saved, you must execute the File Save command to save the worksheet before selecting Sheet Lock Protect. When you select Protect, you are prompted to verify that you want to protect the worksheet.

IMPORTANT: If you save a worksheet after executing Sheet Lock Protect, the formula cells are permanently protected in the worksheet file. **Formula protection cannot be removed.** You should save the protected version of the worksheet under a new filename and retain the original version in an unprotected form for future use or reference.

Protected formula cells usually recalculate faster and result in a smaller stored file. However, unlike locked formula cells, protected formula cells can be blanked, deleted, or overwritten. To prevent protected formulas from accidentally being removed or overwritten, you can also lock their cells.

When the highlighter is positioned on a protected formula cell in Data Entry Mode, the word "PROTECTED" (rather than the actual formula) appears in the Control Area of the screen. If you attempt to edit a protected formula, ANGOSS Spreadsheet displays a message to inform you that a protected formula cannot be edited.

Hiding Worksheet Data

The Edit Hide command allows you to hide any data contained in your worksheet when it is displayed on your screen. It is important to note, however, that ANGOSS' Hide feature is not intended to be used as a security measure for your worksheet data; use a password or formula protection instead. When ANGOSS Spreadsheet is in Data Entry Mode and the cell highlighter is moved to a hidden cell, the contents of the cell are displayed in the Control Area of the screen.

No readjustment of the worksheet is done when you specify that a block of data should be hidden; the specified area of the worksheet simply appears blank. In Figure 5-4, columns 2, 3, and 4 have been hidden using the Edit Hide command.

Figure 5-4

	1	2	3	4	5	6
1						
2	Descr.				Basis	Gain/Loss
3	Asset #1				15,000.00	(1,000.00)
4	Asset #2				12,000.00	0.00
5	Asset #3				25,000.00	1,000.00
6	Asset #4				18,000.00	(4,000.00)
7	Asset #5				14,000.00	1,600.00
8	Asset #6				35,000.00	7,000.00
9						

To redisplay hidden data, select the Edit Unhide command. ANGOSS provides you with the option of redisplaying all or part of the data you have hidden.

Listing Files

To view a list of all files in the current directory, select the Tools Directory Display command. Unless you specify otherwise when executing a command such as File Load or File Save, the current directory will be used. To change the current directory, select the Tools Directory New-Directory command, and enter another directory name.

To display a list of all currently active files, select the File Display-Active command. When you execute the command, the Worksheet Window is temporarily displaced by the Index of Active Worksheets screen, showing complete paths for all files except those in the default directory. A path that is too long to fit on the screen is abbreviated, beginning at the left. An ellipsis (...) indicates that a path has been abbreviated. The Index of Active Worksheets screen also shows the number of entries and formulas in each worksheet, and the status of each worksheet. "Save permission" indicates that a worksheet can be saved. "Modified" means that a worksheet has been changed but has not been saved.

To remove the index from the screen and return to the Worksheet Window, press any key.

Using ANGOSS Tools

The Tools commands provide you with the capability to perform a variety of file management activities, such as:

- making, displaying, and removing directories
- copying and erasing files
- setting preferences for Spreadsheet, system formats, and for hardware
- defining macros
- prerasterizing fonts

In addition, through the Tools commands you have access to a calculator, a text-editor, and to your operating system.

The Tools commands are available from the Main Menu and from each ANGOSS application you have installed. Refer to *ANGOSS Software System* for information about using the Tools commands.

Advanced Worksheet Tools

The remainder of this chapter explains some of the advanced capabilities of ANGOSS Spreadsheet:

- ANGOSS functions in formulas

- Using circular references
- Matrix mathematics

Using ANGOSS Functions

Formulas such as "r1c1+r2c1+r3c1" are easy to enter, but can become time-consuming and prone to error if they become too long. Some formulas, besides containing many cell references, are quite complicated. Functions provide solutions to both of these difficulties. Functions are words that instruct ANGOSS to perform special tasks using the input data you specify.

The SUM function, for example, can be used in place of the formula in the previous paragraph. SUM(r1:3c1) tells ANGOSS to calculate the sum of the values in rows 1 through 3 of column 1. Notice that parentheses surround the argument, i.e., the variable data ANGOSS will use to perform the function. Most functions, but not all, require arguments. Arguments can be cell references or values, and in some functions, text.

A function can be used at any point within a formula. Multiple functions can be used within a single formula, and functions can be arguments of other functions. (Remember to include all the necessary sets of parentheses.)

MAX and MIN are useful functions. MAX returns the largest numeric value in an item list. For example, MAX(r1c1,r1c2) returns the larger value of the contents of the two cells. If the contents of both of the cells are negative, MAX(r1c1,r1c2,0) prevents the result from going negative.

MIN returns the smallest numeric value in the item list. MIN(r4c2,100) limits the result to 100.

Another versatile function is IF-THEN-ELSE, which means IF the specified condition occurs THEN perform a specified task ELSE (otherwise) perform an alternate task. The statement **must** end with an ELSE clause.

The IF-THEN-ELSE function uses "relational" operators. Table 5-1 lists valid relational operators and their meanings.

Table 5-1

Operator	Meaning
=	equal to
>	greater than
<	less than
>=	greater than or equal to
<=	less than or equal to
<>	not equal to

For example, to calculate a price based on a quantity entered in r8c1, you could enter a formula like the following:

```
IF r8c1 >= 1000 THEN 2 ELSE IF r8c1 >= 500 THEN 3 ELSE 4.
```

Translated, the formula says "If the value in the cell r8c1 is **greater than or equal to** 1000, the price is 2.00; else if the value is **greater than or equal to** 500, the price is 3.00; otherwise the price is 4.00."

Notice the use of the ">=" (greater than or equal to) operator in determining the breaking point to the next price level. This allows the value 1000 to be included in the 2.00 bracket. If ">" (greater than) had been used instead, the value 1000 would have been in the 3.00 bracket because 1000 is not greater than 1000.

Some functions do not require input arguments. Simply entering TODAY as a formula inserts the current system date into the cell. TIME returns the current system time. The ERROR function is used to generate the error message "ERROR 35" when a user defined error condition occurs.

ANGOSS Spreadsheet has functions for many different applications. There are functions for calculating depreciation, interest, principal, net present value, future value, and other business related items. There are functions for calculating mean (average), standard deviation, variance, sum of the squares, and other statistical values. There are functions for calculating square root, tangent, sine, cosine, and logarithm. There are several functions that look up and return values from a table.

For more information about using functions in formulas in ANGOSS Spreadsheet, refer to *ANGOSS Formula Reference*.

Using Circular References

A circular reference is a formula that references itself, either directly or indirectly. A circular reference is not always an error, however. Assume, for example, that you are creating a worksheet for expense modeling to cover the next five years. Total accumulated expenses are in the current cell, r10c4. A projected "trial" expense amount is in r9c4. You could enter a formula such as "r10c4+r9c4" that would begin with the value already in r10c4, add the amount from r9c4 and end with the new accumulated total in r10c4. By pressing **F5** four more times, you are able to see the new expense totals and their effect upon other items in the worksheet.

IMPORTANT: Because circular references used as "accumulators" continue to be updated each time the worksheet is recalculated, you may want to limit their use to projection tests or "what if..." or convergence scenarios.

If you use row-order or column-order recalculation, the Sheet Audit Circular command will cause circular references to be zeroed out. In addition, changing from row-order or column-order to natural order recalculation will also cause circular references to be zeroed out.

Matrix Mathematics

The ANGOSS Sheet Matrix commands perform a variety of sophisticated calculations. Many of the commands require familiarity with matrix mathematics or linear algebra. We will concentrate on four of the most commonly used options: Parallel, Transpose, N-Solve, and Regression.

A matrix is an ordered group of numbers. Most Sheet Matrix commands ask you to specify the location of a matrix block. Data in this block will be used in the calculation. Sometimes the original matrix block is overwritten with the result of the calculation, and sometimes you are asked to define another matrix block to receive the result. Refer to *ANGOSS Spreadsheet Command Reference* for specific instructions on using Sheet Matrix commands.

Sheet Matrix Parallel

The Sheet Matrix Parallel command allows **A** (a matrix block) and **B** (a second matrix block, cell, or value) to be added, subtracted, multiplied, or divided on an element-by-element basis. The result is placed in a third matrix block.

The Sheet Matrix Parallel command has a variety of uses. It can combine worksheets. It is a convenient way of performing calculations with two blocks of data at one time. It is also useful for performing calculations with a constant, using either an input value or the contents of a cell.

For example, if you select Sheet Matrix Parallel with the Multiply option, you will be asked to enter the matrix block containing the amounts to be multiplied. You are then asked to enter the multiplier in the form of another matrix, a cell, or value. Finally you are asked to enter a third matrix block to receive the result.

Sheet Matrix Transpose

The Sheet Matrix Transpose command allows you to convert the location of data from rows to columns and columns to rows. The Transpose option is useful when you have simply changed your mind about the organization of your worksheet, or when you transfer data to or from ANGOSS Database, which considers each worksheet row a record, and each column a field.

IMPORTANT: The Sheet Matrix Transpose command does **not** adjust cell references in formulas.

After selecting Sheet Matrix Transpose, you are prompted to enter a matrix block. Enter the block name or location of the area to be transposed. If the number of rows and columns to be transposed are the same, the transposition is straightforward. However, if the area to be transposed is not square, (i.e., rows and columns are not equal), the result is more complex.

For example, suppose you want to transpose a block that is 6 rows long by 3 columns wide. The result would be a block that is only 3 rows long but 6 columns wide. ANGOSS moves data from cells outside the original 3 column width to fill the area vacated by the original 6 row length. Figure 5-5 shows the original matrix. Figure 5-6 shows the transposed matrix.

NOTE: If the area surrounding the matrix is blank, you need only be sure the transposed block will fit within the boundaries of the worksheet.

Figure 5-6. Transposed matrix

	1	2	3	4	5	6	7
1	1.00	2.00	3.00	a	b	c	row 1
2	4.00	5.00	6.00	d	e	f	row 2
3	7.00	8.00	9.00	g	h	i	row 3
4	10.00	11.00	12.00	j	k	l	row 4
5	13.00	14.00	15.00	m	n	o	row 5
6	16.00	17.00	18.00	p	q	r	row 6
7	19.00	20.00	21.00	s	t	u	row 7
8							

Figure 5-5. Original matrix

	1	2	3	4	5	6	7
1	1.00	4.00	7.00	10.00	13.00	16.00	row 1
2	2.00	5.00	8.00	11.00	14.00	17.00	row 2
3	3.00	6.00	9.00	12.00	15.00	18.00	row 3
4	a	d	g	j	k	l	row 4
5	b	e	h	m	n	o	row 5
6	c	f	i	p	q	r	row 6
7	19.00	20.00	21.00	s	t	u	row 7
8							

Sheet Matrix N-Solve

Sheet Matrix N-Solve allows you to solve multiple equations having multiple unknowns. For example, suppose you have the following three equations:

$$a + 2b + 6c = 8$$

$$-a + b - c = 4$$

$$a + 2b - 5c = 18$$

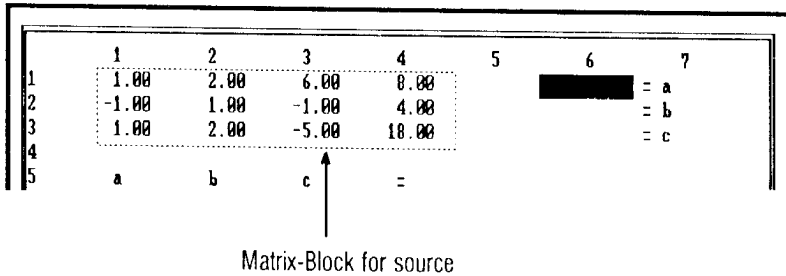
Solve for a, b, and c.

When you execute Sheet Matrix N-Solve, ANGOSS asks you to enter the matrix block for the source. This is the area containing the equations. Think of each variable (a, b, c) as a column heading.

Enter the numeric coefficients in the appropriate variable's column. Enter the constant representing the equation result in the right-most column.

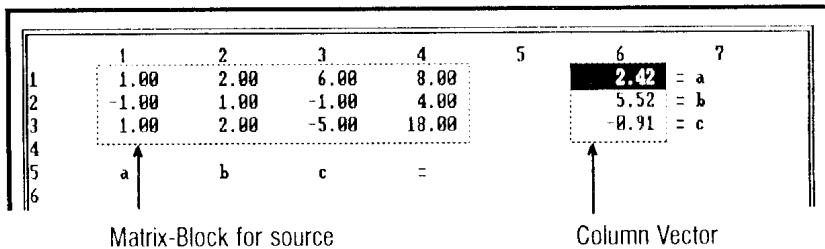
Figure 5-7 shows a worksheet block that would be used to solve the example. In the first equation, for example, the 1 entered in the "a" column means "a"; the 2 in the "b" column means "2b"; the 6 in the "c" column means "6c." The 8 in the last column is the equation result.

Figure 5-7



At the prompt `Enter cell, column vector, or row vector:`, specify a location for the solution. When you press **Enter**, ANGOSS will calculate the correct values for the variables (e.g., a, b, c) and put them in the block you specified, beginning with the variable from the first column. Figure 5-8 shows the equation matrix block and the column containing the solutions.

Figure 5-8



If the equations are too similar in their effect on the result, the error message "Equations not independent" is generated.

Sheet Matrix Regression

The Sheet Matrix Regression command performs multiple linear regression on values in a specified worksheet block.

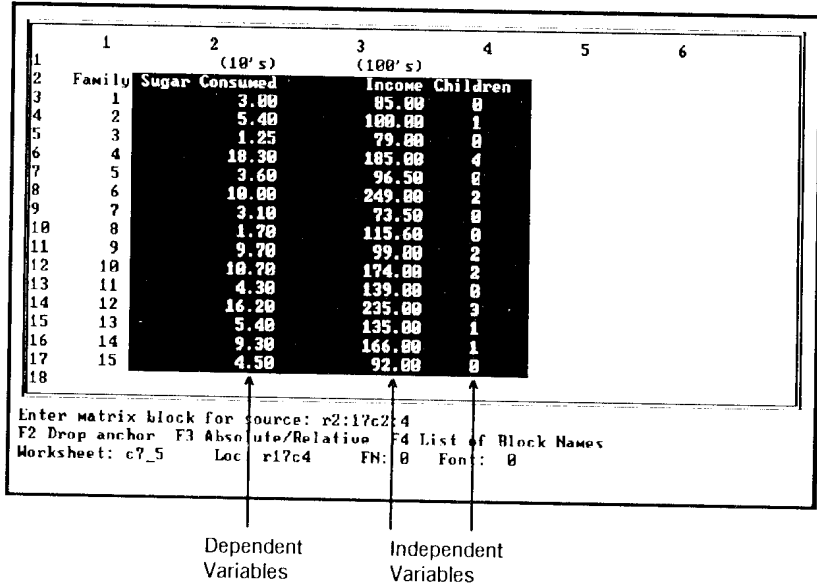
Linear regression operates on the principle that from a group of data points scattered on a graph, a line can be drawn which will touch or come closest to all of the data points. To find that line, two or more constants (intercept and a coefficient for each independent variable) must be found. The intercept is the point at which the line crosses the Y axis of the graph. The coefficient is the amount of vertical change between two points on the line. When coordinates of the line have been calculated, the line can be extended to predict likely future activity.

Regression analysis involves examining calculated data that can be used to predict the values of one variable from the values of another variable. The group of values whose future activity is being predicted is called the dependent variable. The group of measured values from which the prediction will be made is called the independent variable. When two or more independent variables are used, the calculation is called multiple regression.

Regression analysis also includes assessing the amount of error in the estimate, the amount of confidence in the correlation, and the proportion of explainable variance. You should have some familiarity with statistical calculations. You will also need a standard F-Ratio table and a Students T Distribution table to be able to assess the calculated results properly.

After you select the Regression option, you are prompted to enter a matrix block. This is the area of the worksheet containing the dependent and independent variable amounts. The dependent variable must be in the left column of the block. If the cell in the top row of the block contains text, it will be considered to be the name of the variable and will be used in the report. All other text entries will be ignored. The columns to the immediate right of the dependent variable column are considered to be the independent variables. Text at the top of these columns will also be considered names of variables.

Figure 5-9. Matrix block



You are then asked to choose between the Report and No-Report options. Report provides a complete listing of the results of the calculations. No-Report provides only the values of intercept and coefficients.

If you select the Report option, you are asked to define a second matrix block to contain the report data. You need indicate only the upper-left cell of the block. The resulting report will occupy a block 6 columns wide by (the number of independent variables plus 21) rows.

Once you have defined the second matrix block for the report, or if you selected the No-Report option, you are prompted to enter a cell or vector for coefficients. This is the area which is to contain the intercept and the coefficients resulting from the regression calculation.

Figure 5-10 shows a sample of the Multiple Linear Regression Report.

	1	2	3	4	5	6	7
1	MULTIPLE LINEAR REGRESSION						
2							
3	Dependent Variable: Sugar Consumed						
4							
5			Parameter	Standard	T for H0:		
6	Variable	Mean	Estimate	Error	parameter=0		
7							
8	Intercept		1.71	1.02	1.67		
9	Income	134.91	0.01	0.01	1.35		
10	Children	1.07	3.49	0.40	8.76		
11							
12			Sum of	Mean			
13	Source	DF	Squares	Square	F-Value		
14							
15	Model	2.00	349.66	174.83	102.95		
16	Error	12.00	20.38	1.70			
17	Total	14.00	370.04				
18							
19	Dependent Mean			7.10			
20	Root Mean Square Error			1.30			
21	Coefficient of Variation			18.36			
22	R-Square			0.94			
23	Adjusted R-Square			0.94			
24							

Dependent Variable. The name of the dependent variable, taken from the matrix block, is shown at the top of the report.

Independent Variables. Under the column heading "Variable," you will find "Intercept" and the names of the independent variables listed as labels. The independent variable names were also taken from the matrix block.

Mean. The mean (or average) for each independent variable is shown under the heading "Mean."

Parameter Estimate. The values in the next column, "Parameter Estimate," are the values used to create the prediction equation. The first amount is the Intercept. The remaining amounts are the net regression coefficients; they estimate the effect on the dependent variable due to a change in each independent variable.

Standard Error. The values under "Standard Error" are the measures of accuracy of the estimate. In other words, the amounts measure the extent that reality deviates from the estimates.

T for H0: Parameter = 0. The values under "T for H0: parameter = 0" are the calculated T values for testing the null hypothesis that there is no relationship between the dependent variable and each of the independent variables. The critical value of T from the Students T Distribution Table defines the amount considered to be significantly different from zero. Therefore, using standard statistical procedures for looking up the critical value of T in the table, you can then compare the critical value to the T values.

If a T value is greater than the critical value, the relationship between the dependent variable and the independent variable is significantly greater than zero. If the T value is less than the critical value, the relationship is not significantly greater than zero, and therefore, there is not a significant relationship between the dependent variable and the independent variable.

ANOVA Table. The next area of the report contains the headings "Source," "DF," "Sum of Squares," "Mean Square," and "F-Value." The headings and the information under them make up an ANOVA table for the analysis of variation. Variances do not follow normal curve distribution and thus require the use of the F-Ratio.

The values in the column headed "DF" represent the degree of freedom calculated for each item listed under "Source."

The values under "Sum of the Squares" represent variation. The Model amount is the variation due to the regression or model. The Error amount is variation due to error, i.e., the variation that could not be explained by the independent variables. The Total amount is the total variation.

The values in the column headed "Mean Square" represent the mean of the Sum of the Squares. The calculated F-Value is compared to a critical value from a standard F-Value table to test for significance.

Additional Statistical Information. At the bottom of the report is a list of additional statistical information. The Dependent Mean is the mean of the dependent variable. The Root Mean Square Error is the square root of the Mean Square Error amount from the ANOVA

table. The Coefficient of Variation is the Root Mean Square Error amount divided by the Dependent Mean amount.

The R-Square value is the coefficient of correlation, representing the proportion of explained variation. When R equals 1 or -1, there is perfect, direct correlation between the dependent variable and the independent variables. When R equals zero, there is no correlation. In other words, a change in the independent variables has no effect on the dependent variable.

The Adjusted R-Square value is the R-Square amount adjusted for degree of freedom.

Practice Session

In the practice session for this chapter, you will:

- split the Worksheet Window to view two areas of a worksheet at the same time
 - view two separate worksheets at one time
 - combine data from an external worksheet with the current worksheet
 - lock and unlock cells.
1. To begin, load the worksheet "ssnewXXX" that you have been using in the previous chapters.

Figure 5-11

	1	2	3	4	5	6	7
1			1st Qtr.	2nd Qtr.	Commission		
2	1	Anders, B.	4,800.00	8,200.00	910.00		
3	2	Kelly, F.	5,990.00	6,000.00	839.30		
4	3	Miller, M.	5,400.00	7,300.00	809.00		
5	4	Nelson, N.	5,230.00	5,500.00	751.10		
6	5	Smith, A.	6,740.00	4,470.00	784.70		
7	6	Smith, J.	6,500.00	6,800.00	931.00		
8	-----						
9		Total	34,660.00	30,270.00	5,105.10		
10							
11							
12							
13							
14							
15		Commission Rate	7.00%				
16							
17							
18							

Enter: _

Worksheet: ssnewch5 Loc: r1c1 FN: Font: 0 Count: 0

2. Move the highlighter to r1c3. Execute Window Split Vertical. Notice that the worksheet is displayed in both windows.
3. Press **F4** (the Goto Quick Key), select the Window option, and specify window 2.
4. Execute Window Zoom. Window 2 expands to fill the screen. Execute the Window Zoom command again to "unzoom" the window.
5. Restore the screen to a single window by executing Window Close.
6. Using the File Activate command, activate the worksheet saved as "ss2XXX", where the characters "XXX" are your initials. Then press **F4**, select the Sheet option, and specify the ss2XXX as the worksheet to go to. Your "Prior Year" worksheet should be displayed in the Worksheet Window; nevertheless, the original worksheet is still active.
7. Move the highlighter to r1c1, then to r10c1. Split the window horizontally.
8. Press **F4** and select the Window option. Go to Window 2.

9. Press **F4**, select the Sheet option, and enter the name of the worksheet called "ssnewXXX." Visually compare amounts from the two worksheets.
10. From Window 2, execute Window Close. The current window is closed, leaving open only the other window, displaying the worksheet called "ss2XXX."
11. Position the highlighter at r2c4. Combine data from two worksheets by executing File Combine Add. Enter the name of the worksheet called "ssnewXXX." Select the Block option, and then type **r2:7c4** as the block to be added to the current worksheet. Observe what happens to the amounts in the 2nd Qtr column of ss2XXX.
12. Begin with cell locking. With ss2XXX still displayed as the current worksheet, execute Sheet Lock Values All, and then try to type **4900** in r2c3.
13. Remove cell locking by selecting Sheet Unlock Values All. Type **4900** in r2c3.
14. Save the current worksheet. Then execute Sheet Lock Protect. Remember that you can't remove protection from formulas, but at the prompt, answer y anyway. You won't be saving this version. Move the highlighter over formula cells and notice that the formulas cannot be seen.
15. Execute File Unload and type a11 in response to the prompt for the filename. Type y in response to the question about unloading all files without saving.
16. Reload the same worksheet.

Figure 5-12

1	2	3	4	5	6	7
2		1st Qtr.	2nd Qtr.	Commission	Bonus	
3	1 Anders, B.	4,800.00	8,200.00	918.00	91.00	
4	2 Kelly, T.	5,990.00	6,000.00	839.30	83.93	
5	3 Miller, M.	5,400.00	7,300.00	809.00	80.90	
6	4 Nelson, N.	5,230.00	5,500.00	751.10	0.00	
7	5 Smith, A.	6,740.00	4,470.00	784.70	0.00	
8	6 Smith, J.	6,500.00	6,800.00	931.00	93.10	
9	Total	34,660.00	30,270.00	5,105.10	356.93	
10						
11						
12						
13						
14						
15	Commission Rate	7.00%				
16						
17						
18						

Enter:

Worksheet: ssnewch7 Loc: r1c1 FN: Font: 0 Count: 0

17. Add the word **Bonus** at r1c6, and change alignment to right-justification. Extend the line at row 8, by pressing ****, to include column 6 as shown.
18. The first function you will use is the SUM function. Move the highlighter to r9c5, and type over the existing commission total formula. Don't forget to press **=** first. After you type **sum(**, you can either type the references manually, or move the highlighter to point to the cells. Be sure to close parentheses.

$$\text{sum}(r2:7c5)$$
19. Since the original formula and the new formula achieve the same result in this instance, the total commission amount should not change.
20. The next function is the IF THEN ELSE function. Move the highlighter to r2c6. Enter a formula that will compute a bonus amount if the commission amount is greater than 800, but will compute no bonus for commissions of 800 or less. The bonus should be 10 percent of the commission amount.

$$\text{if } r2c5 > 800 \text{ then } r2c5 * .10 \text{ else } 0$$
21. Check your progress. The first bonus amount should be 91.00.

22. Using the Edit Copy Down Single-Cell command, copy the formula to the remaining 5 cells.
23. Using the SUM function, enter a formula to calculate the total bonus amount at r9c6.
24. Save your worksheet by executing File Save.

The next section uses the Sheet Matrix Transpose command to change rows to columns and columns to rows.

25. Press **Ctrl Home** to move to the upper left corner of the worksheet. Then, execute Layout Cell-Size Width to widen all columns to 15 characters. This will allow the names currently in column 2 to be displayed properly when the worksheet is transposed.
26. Execute Sheet Matrix Transpose and mark a block so that the matrix is r1:9c1:9. Notice that you have included some blank columns in the matrix block. You have done this because you are converting 9 rows to 9 columns.
27. After the block has been transposed, revise the column widths to fit the new data, blank the column containing the underlines, and, using Layout Justify, right-adjust the row containing the names.
28. To retain the worksheet as it was before the transposition was done, unload the worksheet without saving. Answer **n** to the question about saving before unloading.

Chapter 5: Managing Worksheets

Chapter 6: Printing Worksheets and Reports

This chapter discusses procedures for printing worksheets in various formats. Topics covered include:

- printing a copy of the worksheet itself
- setting worksheet print options
- producing a report from a worksheet
- printing a list of formulas in the worksheet
- producing a "map" showing the type of data in each cell.

Before reading this chapter, you should read *Chapter 4 of ANGOSS Software System*, which provides basic information about ANGOSS printing.

Before You Print

There are several steps you should take before printing a worksheet. First, execute Tools Preferences Hardware and review your printer settings. Make sure that the `Current Printer:` setting reflects the printer and resolution you will be using. Also review all other printer related items to make sure they are set properly for the current print job. For more information on each of these settings, see *Chapter 7: Printing in ANGOSS in ANGOSS Software System*.

Next, set up the format of a worksheet printout by specifying basic information such as:

- whether or not row and column numbers will be printed
- paper path and size
- and landscape or portrait orientation

These items are specified on the Current Print Options menu.

Print Options

Select the Print Options command to display the Current Print Options menu. On this menu are a number of settings that control how a worksheet is printed. These settings affect only the worksheet that was current when you executed Print Options.

You can set up default values for each of these settings by executing Print Preset. This command displays the same menu as Print Options. Instead of being tied to the current worksheet, however, these settings are attached to all newly created worksheets. When you create a new worksheet, the values from the Print Preset menu are copied into the Current Print Options menu for that worksheet. To change the default settings for a particular worksheet, select Print Options and edit the settings as necessary.

Following is a detailed discussion of options on the Print Options and Preset menus.

Print Column Numbers

Select **Yes** to print column numbers with your worksheet. Select **No** and column numbers will not be printed. Column numbers will only be printed when you use the Draft option of the Print command.

Print Row Numbers

Select **Yes** to print row numbers with your worksheet. Select **No** and row numbers will not be printed. Row numbers will only be printed when you use the Draft option of the Print command.

Lines per inch in draft mode

Select **6** or **8** to determine the number of lines per inch that will be printed when you select the Draft option of the Print command. Selecting 8 lines per inch allows printing of more information on the same page.

Characters per inch in draft mode

Select **10**, **12** or **Compressed** to determine which font will be used to print your worksheet when you select the Draft option of the Print command. If you select 10-cpi, the worksheet will be printed with your printer's internal 10-cpi font. Selecting 12-cpi will use the printer's internal 12-cpi font. The compressed setting will print the worksheet in the internal compressed font. A compressed font's cpi varies between 15 and 20, depending on the printer.

NOTE: Not all printers will support all three of these options.

If you wish to use any other internal printer font, you must use the Print Enhanced command or define a report to print your worksheet.

Paper Profile

A paper profile is made up of the page size and paper path you want to use to print a file. The paper path tells ANGOSS where the printer will find the paper for this job, and how it will be moved through the printer. For example, you can specify the use of a tractor feed, or manual feed; choose between several paper trays; or specify the use of an envelope or single sheet feeder. Page size tells ANGOSS whether you will be printing an 8-1/2-by-11 inch page, an envelope, or a custom page size.

This paper profile will control the printing of everything from the Spreadsheet **except** reports. The paper profile for printing reports is on the Report Definition menu accessed with the Print Report Create command. Printing in the Word Processor and Database Reports is controlled by paper profile settings within each module. Printing from editors, such as the Text-Editor, non-report Database printing, and printing through Project Processing are controlled by the default paper profile on the Hardware Preferences menu.

The following steps explain how to select a paper profile.

STEP 1: With the cursor on Paper Profile:, press F6.

A two-column pop-up box is displayed listing available paper paths and sizes. Figure 6-1 illustrates this box.

Figure 6-1

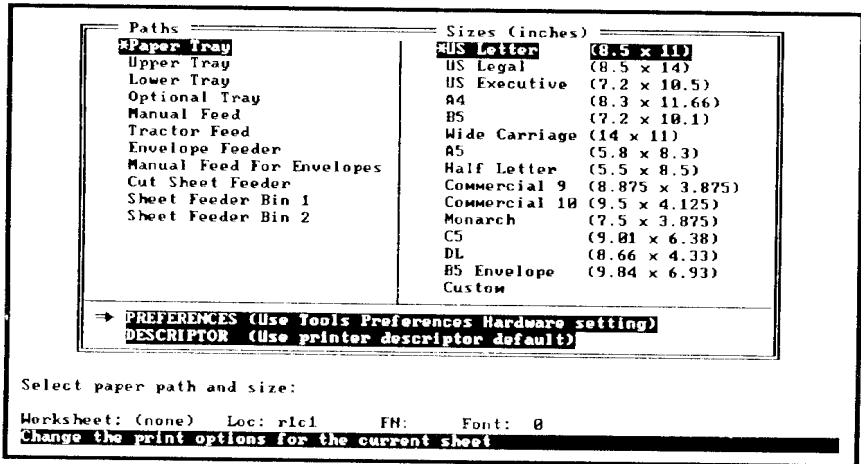


Table 6-1 explains the path selections in this box.

Paths	Definition
Paper Tray	If your laser printer has only one tray, select this path
Upper Tray	Paper will be taken from the upper tray of a laser printer
Lower Tray	Paper will be taken from the lower tray of a laser printer
Optional Tray	If you have purchased a special attachment to allow you to add a second tray to your printer, select this path to use that optional second tray
Manual Feed	Paper will be manually fed into the printer.

Paths	Definition
Tractor Feed	A tractor feed device will be used to move paper through the dot matrix printer
Envelope Feeder Attachment	An attachment will be used to feed envelopes into the printer
Manual Feed for Envelopes	Envelopes will be manually fed into the printer
Cut Sheet Feeder Attachment	If your dot matrix printer has only one sheet feeder attached, select this option
Sheet Feeder Bin 1	Paper will be coming from Sheet Feeder Bin 1 to a dot matrix printer
Sheet Feeder Bin 2	Paper will be coming from Sheet Feeder Bin 2 to a dot matrix printer

Paths that are appropriate for the current printer are highlighted. As you move the arrow down the list of paths, the appropriate paper sizes for that path are highlighted.

Notice that one path and one paper size are marked by asterisks. This indicates that these are the default path and paper size as listed in the current printer descriptor file.

ANGOSS gets information about appropriate selections and the default path and page size from the currently selected printer descriptor file. If you wish to change the default settings, or if you know your printer supports a particular path or size that is not highlighted, you may want to edit the appropriate descriptor file. Read *Chapter 8: Editing Descriptor Files* in *ANGOSS Software System* for more information.

STEP 2: Use up or down arrows to move the pointer through the path selections. When the arrow points to the appropriate path, press Enter or right arrow.

If you wish to select the default path and paper size, move the arrow to the word **DESCRIPTOR** at the bottom of the box. If you wish to select the same settings you made on Tools Preferences Hardware, move the arrow to the word **PREFERENCES**. If you move to either of these words, the path and page size they represent are highlighted as a reminder.

Chapter 6: Printing Worksheets and Reports

If you set all paper profiles throughout ANGOSS to the PREFERENCES selection, you can change all the profiles by making changes in one place, the Hardware Preferences menu.

If you do not wish to select DESCRIPTOR or PREFERENCES, select a highlighted path. The arrow then moves to the Page Size column.

STEP 3: Select one of the highlighted sizes and press Enter.

If you select **Custom** in the Size column, a prompt is displayed on the command line. Enter the width and length of the custom paper size in inches. Some printers will not allow the use of custom paper sizes.

You are returned to the Print Options screen and your selections appear, separated by a comma, at the `Paper Profile:` prompt. If you select a size or path that is not supported by the current printer, a warning message will be generated when you execute a Print command. You can abandon printing and change to a more appropriate profile, or continue. If you continue the print job, the printer driver will select the "default" profile for your printer as specified in the current descriptor file.

Orientation

Select **Portrait** to print the worksheet across the width, or horizontal, side of the page. Select **Landscape** to print the worksheet "sideways" across the length, or vertical, side of the page. You can set this prompt to **Landscape** and use the Draft option of the Print Command to print landscape on a dot matrix printer.

The ability of landscape printing to get more information on a single page makes it particularly useful in the Spreadsheet. Detailed information about printing worksheets with a landscape orientation and with compressed fonts is provided later in this chapter.

Page Borders

The Page Border is the margin or amount of white space between the edge of the page and the worksheet data. Some printers, particularly laser printers, have preset "hard margins." Page borders must be wider than the printer's hard margins. Your printer manual should tell you if your printer has hard margins.

Specify top, bottom, left, and right margins in inches.

Press **F10** to leave the Current Print Options menu and return to the worksheet window. You can press **Esc** at any time to abort the changes you have made to the menu.

Printing Worksheets

ANGOSS Spreadsheet provides two basic ways to output worksheet information. The Print Worksheet command prints worksheet data quickly and simply, much as it appears on the screen.

More complicated printouts that include data from different worksheets or from different parts of the same worksheet can be created with Print Report. Reports can also contain headings, footings, and page numbers.

Instructions for creating a report are provided later in this chapter. The following steps explain how to use Print Worksheet to print part or all of a worksheet.

STEP 1: Select Print Worksheet.

STEP 2: Select All to print the entire worksheet, or Block to print only part of it.

If you select **Block**, you will be prompted to mark the section of the worksheet you want to print. Use standard block-marking techniques to highlight the block. Only one contiguous block can be marked.

STEP 3: Select Enhanced or Draft.

If you want to print ANGOSS-generated, filled-area fonts in your worksheet, you must select the **Enhanced** option. Selecting **Draft** will give you faster printing, but any filled-area fonts will be replaced with the standard internal printer font.

STEP 4: Enter the number of worksheet copies you want printed.

STEP 5: Select Printer or Disk.

Selecting **Printer** sends the file to the current printer. **Disk** writes the file to a disk file in ASCII text file format. If you print the worksheet to a disk file, ANGOSS prompts you to enter a name for the file that will be created.

NOTE: A file that is written to disk will contain printer control codes. These codes allow the file to be printed outside of ANGOSS. At the DOS level, you can print the file by copying it to your printer and it will look just like it was printed from within ANGOSS. However, printer control codes make it difficult to view or edit this file. To create a file containing no printer control codes, select the generic printer descriptor on the Hardware Preferences menu **before** printing the file to disk.

Landscape Printing

It is often desirable to get more information on a page by printing a worksheet in a landscape orientation. The following steps explain this process.

STEP 1: Load the worksheet you want to print.

STEP 2: Execute Print Options.

STEP 3: Make sure your paper profile reflects the proper paper path and size.

STEP 4: Select Landscape at the Orientation prompt.

STEP 5: Press F10 to return to the worksheet.

STEP 6: Select Print Worksheet.

STEP 7: Specify how much of the worksheet you wish to print.

STEP 8: Select Draft or Enhanced

If you are printing to a dot matrix printer that does not have graphics ability, you must select the Draft option of the Print command. Since ANGOSS must rotate the characters before they are sent to the printer, printing may be slow.

STEP 9: Specify the number of copies you want printed, and whether you want the file to go to a printer or to a disk file.

Resizing Worksheet Cells

Using the Print Worksheet Draft command to print landscape limits you to specific internal printer fonts. If you wish to use other internal fonts or ANGOSS-generated filled-area fonts, you must use Print Worksheet Enhanced.

NOTE: ANGOSS cannot print landscape on dot matrix printers that do not support landscape printing if the Enhanced option is used.

The lines per inch and characters per inch settings on Current Print Options menu have no effect when you print Enhanced. Otherwise, the steps for printing landscape are the same as described previously.

NOTE: You can access other internal fonts if you use Print Report to generate a report from the worksheet.

If you use large or small fonts you may need to resize your worksheet cells for the font to print correctly. You may want to print your worksheet once to see what it looks like. If there is too much or too little white space around the data, resize your cells accordingly.

To change the height of a cell, select Layout Cell-Size Height. Enter a number for the height you want. Whether this number is entered in inches or points will be determined by the `Cell-size` settings on the Layout Worksheet-Option menu. This number should be the same as the height of the font. For example, if you are printing an eight point font, set the cell height to eight points.

Specify what part of the worksheet will be affected by this change. Select All to change the size of all cells in the worksheet. Select Rows to change the size of only certain cells. If you specify rows, enter the number of rows, from the current cursor position down, to be affected. The changed cell height will not be reflected on the screen. It will be evident only when you print the file.

To change the width of a cell, select Layout Cell-Size Width. Enter a number for the width you want. Whether this number must be entered in characters, points, or inches depends on the `Cell-Size` setting on the Layout Worksheet-Options menu.

The amount you need to reduce or increase the width of cells varies with each font you use. You can calculate how many points wide your cell should be by finding the characters per inch of the specific font. The cpi of internal printer fonts should be listed on the font cartridge or in the printer manuals.

Divide 70 by the characters per inch. Multiply the result by the number of characters in the cells. If the number of characters in your cells varies, use the highest number. This tells you how many points wide your cell should be.

NOTE: If you are sizing cells to print filled-area fonts, begin by assuming 10 cpi. You will then have to print the file and make adjustments to the cell size until you are satisfied with the worksheet's appearance.

Specify what part of the worksheet will be affected by this change. Select All to change the size of all cells in the worksheet. Select Columns to change the size of only certain columns of cells. If you select columns, enter the number of columns to be affected. The number goes from the current highlighter position to the right.

NOTE: If you decrease the width of a cell so that all characters cannot be displayed in it on the screen, the cell will be filled with asterisks. This will not affect the printing of the worksheet.

You must use the Enhanced option of Print commands in order for changes in cell size to be reflected during printing. You may have to print your worksheet several times and adjust cell size to get the appearance you want.

Printing with Compressed Fonts

You can also increase the amount of data on a page by using compressed fonts, and specifying more lines per inch. The following steps explain this process.

STEP 1: Load the worksheet you want to print.

STEP 2: Execute Print Options.

STEP 3: Select 8 for the prompt Lines per inch in draft mode:.

STEP 4: Select Compressed for the prompt Characters per inch in draft mode:.

STEP 5: Press F10 to return to the worksheet.

STEP 6: Select Print Worksheet.

STEP 7: Specify how much of the worksheet you want printed.

STEP 8: Select the Draft option.

STEP 9: Specify how many copies you want and whether you want the file to go to a printer or a disk file.

Using Sideways Fonts

In some cases, you may be able to print your worksheet in a landscape orientation, even if your printer does not support this feature. This is accomplished using filled-area fonts. The following steps detail this process.

STEP 1: Execute Tools New-Font Sideways from the Main Module.

STEP 2: Define the filled-area font you wish to use. Then press F10.

For specific information about each prompt of the Font Selector, see *ANGOSS Software System*.

A message will be displayed at the bottom of the screen to let you know the font is being rasterized.

STEP 3: Select Layout Set-Font Change.

STEP 4: Specify how much of the worksheet will be affected by the change.

STEP 5: Press F6 to display the Font Selector menu, and redefine the font you just rasterized.

The Source: prompt should indicate Preraster-Font and not Filled-Area. Press **F10**.

STEP 6: Select Print Options and specify Portrait printing at the Orientation prompt. Press F10.

STEP 7: Select Print Worksheet All Enhanced *number of copies* Printer.

You must use the **Enhanced** option of the Print command. The document will output with the text in a landscape orientation.

Producing Reports

The Print Report commands allow you to produce a professional looking report from your worksheet. In addition to the worksheet information, the report can have headings, footings, and page numbering. You can also include information from more than one worksheet on a report.

To generate a worksheet report, you must first create a report definition file. Once this definition file is set up, it can be executed at any time.

Creating Report Definitions

The following steps explain how to define and execute a report.

STEP 1: Take a moment to study your worksheet data and determine how you want it presented.

STEP 2: Select Print Report Create.

STEP 3: Enter a name for the report definition you are about to create.

A report definition filename can consist of up to 8 characters and is assigned the extension .rdf.

STEP 4: Select New or Similar.

Selecting **New** brings up an empty definition menu and you can start your definition from scratch. Select **Similar** to use an existing report definition as a template. When prompted, enter the name of the file to be used as a template.

The Report Definition menu is then displayed. There are four categories of information you will have to specify in this definition:

- Print groups
- Headings
- Footings
- Print options

Print Groups

Print Groups, the major sections of a report, define column headings, labels, and worksheet data to be printed as a unit in a report. A print group is comprised of a report body block (normally, numeric or calculated worksheet data) and optional horizontal and vertical title blocks. Horizontal title blocks correspond to column headings on the worksheet. Vertical title blocks correspond to row labels.

If data from one print group cannot fit on a single page, overflow pages will be produced. The appropriate headings and labels will be repeated on additional pages. **Each print group you define will begin at the top of a new page.**

Figure 6-2 shows the parts of a print group in relation to a worksheet.

Figure 6-2. Parts of a Print Group

	1	2	3	4	5	6
2	INCOME STATEMENT					
3		1988	1987	1986	1985	1984
4	Sales	58,000.00	55,000.00	52,500.00	48,756.00	42,360.00
5	Cost of goods sold	45,000.00	40,000.00	38,500.00	36,450.00	31,700.00
6	Gross profit	13,000.00	15,000.00	14,000.00	12,306.00	10,660.00
7						
8	Operating Expenses					
9	Selling	7,800.00	8,900.00	8,800.00	8,100.00	8,400.00
10	Administration	2,300.00	2,000.00	1,650.00	1,450.00	1,300.00
11	Depreciation	1,300.00	1,000.00	1,200.00	1,400.00	1,250.00
12	Total Oper Expenses	11,400.00	11,900.00	11,650.00	10,950.00	10,950.00
13	Operating Income	1,600.00	3,100.00	2,350.00	1,356.00	290.00
14						
15	Interest/Inc(Exp)	200.00	-800.00	-845.00	-860.00	-725.00
16	Income before taxes	1,800.00	2,300.00	1,505.00	496.00	-1,015.00
17	Income taxes	450.00	575.00	376.25	124.00	0.00
18	Net Income	1,350.00	1,725.00	1,128.75	372.00	-1,015.00
19	Earnings per share	1.35	1.73	1.13	0.37	0.00

Enter: _____
 Text: INCOME STATEMENT
 Worksheet: c6inc Loc: r2c1 FN: 0 Font: 0

Fixed Vertical Title Block Body Block Fixed Horizontal Title Block

A report definition must have at least one print group, consisting of at least one body block. The title blocks are optional. If the data and titles from your worksheet will fit well on one report page, cells containing column headings and row labels can simply be included in the body block definition.

Sometimes, however, the information needs to be arranged differently from the way it appears in the worksheet. Or sometimes the information from a body block will not fit on one report page. Title blocks provide headings and labels for rearranged information, or for body blocks that overflow to additional pages.

Specifying print groups

For each of the three prompts in a Print Group, `Horizontal Title:`, `Vertical Title:`, and `Body Block:`, you have the option of typing in information or using **F6** to go to the worksheet and mark references.

Horizontal and Vertical Titles. For titles, enter a cell reference, use **F6** to mark a block containing the text from the worksheet, or enter a text string for the titles. References must be either cell references or text entries; they cannot be a combination of the two.

To line up properly on the report, the width of a horizontal title block, must match the width of the body block. The length of the vertical title block must also match the length of the body block.

Title blocks can consist of more than one block reference. Use of multiple block references is discussed later in this chapter.

Body Blocks. For body blocks, enter a cell reference, or use **F6** to mark a block on the worksheet. Body blocks can consist of more than one block reference.

Using Multiple Block References

Multiple block references can be specified for body blocks and title blocks. References to more than one block of worksheet data must be separated by either commas or semicolons. The use of a comma or semicolon determines how the blocks are positioned on the report.

Comma	Blocks are placed one below the other, on the same page if possible.
Semicolon	Blocks are placed side by side, on the same page if possible

Figure 6-3 shows worksheet blocks to be used in a report.

Figure 6-3. Worksheet to be used in a report

	1	2	3	4	5	6
2	INCOME STATEMENT					
3		1988	1987	1986	1985	1984
4	Sales	58,000.00	55,000.00	52,500.00	48,756.00	42,360.00
5	Cost of goods sold	45,000.00	40,000.00	38,500.00	36,450.00	31,700.00
6	Gross profit	13,000.00	15,000.00	14,000.00	12,306.00	10,660.00
7						
8	Operating Expenses					
9	Selling	7,800.00	8,900.00	8,800.00	8,100.00	8,400.00
10	Administration	2,300.00	2,000.00	1,650.00	1,450.00	1,300.00
11	Depreciation	1,300.00	1,000.00	1,200.00	1,400.00	1,250.00
12	Total Oper Expenses	11,400.00	11,900.00	11,650.00	10,950.00	10,950.00
13	Operating Income	1,600.00	3,100.00	2,350.00	1,356.00	-290.00
14						
15	Interest/Inc(Fxp)	200.00	-800.00	-845.00	-860.00	-725.00
16	Income before taxes	1,800.00	2,300.00	1,505.00	496.00	-1,015.00
17	Income taxes	450.00	575.00	376.25	124.00	0.00
18	Net Income	1,350.00	1,725.00	1,128.75	372.00	-1,015.00
19	Earnings per share	1.35	1.73	1.13	0.37	0.00

Enter: _
 Text: INCOME STATEMENT
 Worksheet: c6:inc Loc: r2c1 FN: 0 Font: 9

r4:20c1 r4:20c2 r4:20c4 r4:20c6

The title blocks and body blocks necessary to create the report in Figure 6-4 are as follows:

- Horizontal Title: r3c2,r3c4,r3c6
 Vertical Title: r4:20c1,r4:20c1,r4:20c1
 Body Block: r4:20c2,r4:20c4,r4:20c6

Figure 6-4 illustrates the resulting report when worksheet blocks are separated by commas.

Figure 6-4. Report using commas

	1988
Sales	58,000.00
Cost of goods sold	45,000.00
Gross profit	13,000.00
Operating Expenses	
Selling	7,800.00
Administration	2,300.00
Depreciation	1,300.00
Total Oper Expenses	11,400.00
Operating Income	1,600.00
Interest/Inc (Exp)	200.00
Income before taxes	1,800.00
Income taxes	450.00
Net Income	1,350.00
Earnings per share	1.35
	1986
Sales	52,500.00
Cost of goods sold	38,500.00
Gross profit	14,000.00
Operating Expenses	
Selling	8,800.00
Administration	1,650.00
Depreciation	1,200.00
Total Oper Expenses	11,650.00
Operating Income	2,350.00
Interest/Inc (Exp)	-845.00
Income before taxes	1,505.00
Income taxes	376.25
Net Income	1,128.75
Earnings per share	1.13
	1984
Sales	42,360.00
Cost of goods sold	31,700.00
Gross profit	10,660.00
Operating Expenses	
Selling	8,400.00
Administration	1,300.00
Depreciation	1,250.00
Total Oper Expenses	10,950.00
Operating Income	-290.00
Interest/Inc (Exp)	-725.00
Income before taxes	-1,015.00
Income taxes	0.00
Net Income	-1,015.00
Earnings per share	0.00

Figure 6-5 shows the result when the blocks are separated by semicolons.

Figure 6-5. Report using semicolons

ABC Income Statement			
	1988	1986	1984
Sales	58,000.00	52,500.00	42,360.00
Cost of goods sold	45,000.00	38,500.00	31,700.00
Gross profit	13,000.00	14,000.00	10,660.00
Operating Expenses			
Selling	7,800.00	8,800.00	8,400.00
Administration	2,300.00	1,650.00	1,300.00
Depreciation	1,300.00	1,200.00	1,250.00
Total Oper Expenses	11,400.00	11,650.00	10,950.00
Operating Income	1,600.00	2,350.00	-290.00
Interest/Inc (Exp)	200.00	-845.00	-725.00
Income before taxes	1,800.00	1,505.00	-1,015.00
Income taxes	450.00	376.25	0.00
Net Income	1,350.00	1,128.75	-1,015.00
Earnings per share	1.35	1.13	0.00

The title blocks and body blocks necessary to create the report in Figure 6-5 are as follows:

- Horizontal Title: r3c2;r3c4;r3c6
Vertical Title: r4:20c1
Body Block: r4:20c2;r4:20cr;r4:20c6

To use **F6** to mark multiple blocks, use the following steps.

STEP 1: Press F6.

STEP 2: Mark the first block.

STEP 3: When the block is highlighted, type a comma or a semicolon, depending on how you want the blocks positioned.

STEP 4: Continue marking blocks in this manner until all necessary references are included.

Referencing Multiple Worksheets

To use more than one worksheet in a single report definition, precede a block reference with the worksheet name and a period.

Example:

qtr1.r1:9c2:4,qtr2.r1:9c2:4

The example shown would print a block from the worksheet qtr1 above a block from the worksheet qtr2.

Adding Print Groups

By default, prompts appear to allow three print groups to be specified. The print groups will be printed in the order in which they appear on the definition menu. The report will start with Print Group 1 and print as many pages as necessary to print the data you have specified. Then Print Group 2 will start at the top of a new page and print as many pages as necessary. Then Print Group 3 will be printed.

The report definition settings for a report containing two print groups are listed below. Notice that in this report the Gross Profit data makes up the first print group, and the Operating Expenses data makes up the second print group. Figures 6-6 and 6-7 show the resulting two-page report.

1. Horizontal Title: r3c2:4,r3c5:7,r3c8:10
Vertical Title: r4:7c1,r4:7c1,r4:7c1
Body Block: r4:7c2:4,r4:7c5:7,r4:7c8:10
2. Horizontal Title: r3c2:4,r3c5:7,r3c8:10
Vertical Title: r8:14c1,r8:14c1,r8:14c1

Body Block: r8:14c2:4,r8:14c5:7,r8:14c8:10

Figure 6-6. Report Page 1 and **Figure 6-7.** Report Page 2

	1988	1987	1986
Sales	58,000.00	55,000.00	52,500.00
Cost of goods sold	45,000.00	40,000.00	38,500.00
Gross profit	13,000.00	15,000.00	14,000.00

	1985	1984	1983
Sales	48,756.00	42,360.00	43,000.00
Cost of goods sold	36,450.00	31,700.00	32,000.00
Gross profit	12,306.00	10,660.00	11,000.00

	1982	1981	1980
Sales	41,000.00	39,500.00	37,000.00
Cost of goods sold	30,540.00	30,100.00	29,400.00
Gross profit	10,460.00	9,400.00	7,600.00

Figure 6-6. Report Page 1

	1988	1987	1986
Operating Expenses			
Selling	7,800.00	8,900.00	8,800.00
Administration	2,300.00	2,000.00	1,650.00
Depreciation	1,300.00	1,000.00	1,200.00
Total Oper Expenses	11,400.00	11,900.00	11,650.00
Operating Income	1,600.00	3,100.00	2,350.00

	1985	1984	1983
Operating Expenses			
Selling	8,100.00	8,400.00	8,000.00
Administration	1,450.00	1,300.00	1,000.00
Depreciation	1,400.00	1,250.00	1,250.00
Total Oper Expenses	10,950.00	10,950.00	10,250.00
Operating Income	1,356.00	-290.00	750.00

	1982	1981	1980
Operating Expenses			
Selling	7,500.00	6,900.00	6,750.00
Administration	900.00	900.00	500.00
Depreciation	1,250.00	1,250.00	700.00
Total Oper Expenses	9,650.00	9,050.00	7,950.00
Operating Income	810.00	350.00	-350.00

Additional Print Groups can be defined by adding them with **F7**.

STEP 1: Move the prompter arrow to the Print Group you want the new group to follow.

Remember, the Print Groups will be printed in order, so if you want to insert a new print group between Print Groups 1 and 2, position the prompter arrow on Print Group 1. If you want the new group to come at the end of the report, position the prompter arrow on the last Print Group.

STEP 2: Press F7.

A new Print Group will be added directly below the Print Group you were pointing to and all Print Groups will be renumbered accordingly. Any settings in the Print Group you were pointing to will be copied into the new print group. You can edit those settings as necessary.

Deleting Print Groups

To remove a Print Group from the Report Definition menu, point to it and press **F8**. The Print Group will be deleted and all other Print Groups will be renumbered accordingly.

Report Headings and Footings

The report heading, which is optional, is information to be printed at the top of each page of the report. The report footing, which is also optional, is printed at the bottom of each page.

Headings and Footings

You can specify headings or footings to be printed on some or all pages of your report. The first group of settings on the Print option menu specifies heading information and the second group specifies footing information. The settings used to specify headers and footers are very similar, so they are discussed together here.

Print Heading/Footing On

Specify which pages will have printed headings or footings. You can choose to have the headings or footings printed on:

- all pages
- only the first page
- on all pages except the first page

Blank Lines after Heading/Footing

Enter a number from 0 to 3 to specify the number of blank lines that separate the heading from the first line of report data or the footing from the last line of data.

Use Secondary Heading/Footing

Two types of headings or footings are available: primary and secondary. If you select **No**, the primary heading or footing is printed on all pages. If you specify **Yes**, primary headings or footings are printed on odd-numbered pages, and secondary headings or footings are printed on even-numbered pages.

Primary and Secondary Headings/Footings

A maximum of five lines can be specified for each type of heading or footing. Enter up to 255 characters (including control codes and printable characters) for each line. If the text you want for a heading or footing is in your worksheet, you can press **F6** to mark the cell reference. If you have named a block of cells, you can enter the name reference instead of the cell reference. Heading and footing entries must be cell references **or** text, not both. If text and cell references are found on the same line, only the text will be printed.

A line is printed if it contains characters or is followed by a line that contains characters. If you leave lines one and two blank, and enter heading information on line three, your heading will consist of two blank lines and one line of text.

Print Control Codes

Print control codes are special character sequences that can be specified in headings or footings. The codes are used to control the alignment of information, or are replaced by current data, such as date, time, or page number. Print control codes can only be used with text strings. Cell references get their font and justification information from the worksheet. The following table lists the print control codes.

Control Code	Description
%L	Left justifies the text immediately following the control code until a different print control code is encountered, or until the end of the current line
%C	Centers the text immediately following the control code until a different print control code is encountered, or until the end of the current line
%R	Right justifies the text immediately following the control code until a different print control code is encountered, or until the end of the current line
%P	Replaces the control code with the page number
%T	Replaces the control code with the current time
%F	Replaces the control code with the name of the file being printed
%[#]	Specifies a font for the text immediately following the control code. (# must be a valid font number.) The font number must be surrounded by brackets and can be followed by B or U to boldface or underscore text

NOTE: Since the percent sign (%) is part of all control codes, you must enter %% if you want a percent sign to print in a header or footer.

Control codes can be used in any combination, with more than one control code appearing on a line. Control codes do not appear in the printed report. Do not separate the control codes from literal information with blank spaces unless you want the blank space printed in the report.

Following are examples of two print control code strings that could be entered as headers or footers and an illustration of the results.

Example:

%L%F%C-%P-%R%D

filename.ext

-10-

11-14-90

%L%F causes the name of the current file to be printed at the left margin. %C-%P- causes the current page number to be centered on the line between two dashes. %R%D causes the current date to be printed at the right margin.

Example:

```
%LQuarterly Report%CACME Shoes%R3rd Quarter
```

```
Quarterly Report
```

```
ACME Shoes
```

```
3rd Quarter
```

%LQuarterly Report causes the text "Quarterly Report" to be printed at the left margin. %CACME Shoes causes the text ACME Shoes to be centered on the line. %R3rd Quarter causes the text 3rd Quarter to be printed at the right margin.

Primary and secondary headings or footings are allocated equal space on the printed page, even when they are not the same length. The heading or footing requiring the greater number of lines determines the space allocated for both.

Example

The following steps show how to print a heading on every other page.

STEP 1: Select All-pages for the Print Heading On: option.

STEP 2: Specify Yes for the Use secondary heading: option.

STEP 3: Leave either the primary or the secondary heading blank.

Depending on the heading you have left blank, headings will be printed on all even pages or all odd pages only.

Date Style

If you use the %D print control code to insert the current date in a header or footer, you must specify the format in which you want that date printed. Select one of the available date styles. The formats represented by **Date1**, **Date2**, and **Date3** are set on the Global Preferences menu, accessed with the Tools Preferences Global command.

Page Number Style

If you use the %P print control code to insert the current page number in a header or footer, you must specify how you want that number printed. Select **Arabic**, **Roman-Small** (lowercase Roman numerals), or **Roman-Caps** (uppercase Roman numerals.)

Lines to Enclose Report

Select **None** to have no lines enclose report data. **Single** or **Double** will place a single or double line below the heading and above the footing, enclosing the data.

Start Page Number

If you use the %P print control code to insert the current page number in a header or footer, you must enter the page number the report will start with.

Spacing

Specify how you want the body of a report printed. Select **Single** to single space data, or **Double** to double space data.

Lines Per Inch

Select **6** or **8** to determine the number of lines per inch that will be printed when you select the Draft option of the Print Report Execute command. Selecting 8 lines per inch allows printing of more information on the same page.

Draft mode

Select **10-cpi**, **12-cpi**, **Compressed**, or **Internal-Fonts** to determine which font will be used to print your worksheet when you select the Draft option of the Print Report Execute command. If you select 10-cpi, the worksheet will be printed with your printer's internal 10-cpi font. Selecting 12-cpi will use the printer's internal 12-cpi font. The compressed setting will print the worksheet in the internal compressed font. A compressed font's cpi varies between 15 and 20, depending on the printer.

NOTE: Not all printers will support all three of these options.

If you wish to use any other internal printer font, you must select the **Internal-Fonts** setting. Then ANGOSS picks up the font you have requested from the worksheet.

Paper Profile

A Paper Profile is made up of the page size and paper path you want to use to print a file. The paper path tells ANGOSS where the printer will find the paper for this job, and how it will move it through the printer. For example, you can specify the use of a tractor feed, or manual feed; choose between several paper trays; or specify the use of an envelope or single sheet feeder. Page size tells ANGOSS whether you will be printing an 8-1/2 by 11 inch page, an envelope or a custom page size.

This paper profile will control printing of Spreadsheet Reports only. Other Spreadsheet printing features will be controlled by the Paper Profile setting on the Current Print Options menu. Printing in the Word Processor and Database Reports is controlled by Paper Profile settings within each module. Printing from editors, such as the Text-Editor, non-report Database printing, and printing through Project Processing are controlled by the default paper profile on the Hardware Preferences menu.

Detailed steps for selecting a paper profile are offered earlier in this chapter under *Print Options*.

Orientation

Select **Portrait** to print the report across the width, or horizontal, side of the page. Select **Landscape** to print the report "sideways" across the length, or vertical, side of the page. Landscape printing can only be accomplished with this option if your printer supports it.

Print on Both Sides of the Form

Select **Yes** to print on both sides of the page. This process is sometimes called duplex printing. Select **No** to print on only one side of the page. Duplex printing can only be accomplished if your printer supports it.

Use Secondary Borders

Select **Yes** to be able to set different borders, or margins, for even numbered report pages. The size of secondary borders are controlled by settings at the Page Border option. Select **No** if you want odd and even pages to have the same borders.

Page Borders

The Page Border is the margin or amount of white space between the edge of the page and the report data. Some printers, particularly laser printers, have preset "hard margins." Your printer manual should tell you if your printer has "hard margins." In this case, the Page Borders are measured not from the edge of the page, but from the printer's hard margin.

Specify a top and bottom margin in inches. Under the `Primary` option, specify left and right margins in inches. These boundaries will apply to all pages if you have specified no secondary boundaries, or odd numbered pages if you have specified secondary boundaries.

If you selected **Yes** for the `Use of secondary pages` you must also specify left and right margins for even pages.

When you have made all necessary changes, press **F10** to leave the Report Definition screen.

Executing Reports

After you have completed the report definition, you can print it any time with the following steps:

STEP 1: Load or activate all worksheets referenced in the report definition.

STEP 2: Select Print Report Execute and enter the name of the report definition file.

STEP 3: Select Draft or Enhanced.

To print ANGOSS-generated, filled-area fonts in your worksheet, you must select the **Enhanced** option. Selecting **Draft** will give you faster printing, but any filled-area fonts will be replaced with the standard internal printer font.

STEP 4: Enter the number of worksheet copies you want printed.

STEP 5: Select Printer or Disk.

Selecting **Printer** sends the file to the current printer. **Disk** writes the file to a disk file in ASCII text file format. If you print the worksheet to a disk file, ANGOSS prompts you to enter a name for the file that will be created. The extension `.prn` is automatically assigned to this file.

NOTE: A file that is written to disk will contain printer control codes. These codes allow the file to be printed outside of ANGOSS. At the DOS level, you can print the file by copying it to your printer and it will look just like it was printed from within ANGOSS. However, printer control codes make it difficult to view or edit this file. To create a file containing no printer control codes, select the generic printer descriptor on the Hardware Preferences menu **before** printing the file to disk.

Modifying Report Definitions

You can edit a report definition at any time. Execute Print Report Modify and select the report definition you wish to edit. The Report Definition menu is displayed, and you can make any necessary changes.

Removing Report Definitions

If you no longer have a use for a report definition, you can remove it from your system with Print Report Remove. Select the report definition you wish to remove.

Printing Formulas

You can print a list of all the formulas in a worksheet with the Print Formulas command. Rather than showing the formulas in their location on the worksheet, they are listed by row and column number. You can list formulas for the entire worksheet or mark a block to be listed. This can be helpful for debugging procedures.

Figure 6-8 shows an example of the list that is generated with this command.

Figure 6-8. A listing created with Print Formulas

FORMULAS FOR WORKSHEET c6inc

ROW	COL	FORMULA
6	2	r4c2-r5c2
12	2	sum (r9:11c2)
13	2	r6c2-r12c2
16	2	r13c2+r15c2
17	2	max (0, (r18c2*0.25))
18	2	r16c2-r17c2

19 2 max (0, (r18c2/1000))

Printing a Map of Your Worksheet

Print Map provides a printed "map" of a worksheet. Two-character identification codes are assigned to each type of ANGOSS Spreadsheet cell through an option of Tools Preferences Spreadsheet.

By selecting the Print Map command, you can produce a coded map of your worksheet, as illustrated by the sample map shown in Figure 6-9.

Figure 6-9. A worksheet "map"

```

          1 2 3 4 5 6 7 8
3      . . . . . F F F
4      1 F F F F F F F
5      1 F F F F F F F
6      1 F F F F F F F
7
8      1
9      1 . . . . . F . . .
10     1 F F F F F F F
11     1 F F F F F F F
12     1 . . . . . F . . .
13     1 . . . . . F . . .
14
15     1 F F F F F F F
16     1 . . . . . F . . .
17     1 . . . . . F . . .
18     1 . . . . . F . . .
19     1 . . . . . F . . .
    
```

You can change the two letter codes by executing Tools Preferences Spreadsheet and changing the appropriate settings. The following list displays the default codes for the various formats and types of cells.

Formula Character:	","
Left-justified:	l
Centered:	c
Right-justified:	r
General:	G
Fixed-decimal:	F
Scientific notation:	S
Currency:	C
Percentage:	P
Date 1:	D
Time:	T
Histogram:	+
Preformatted blank cells:	b

Text and value cells show formatting information only. Formula cells are depicted with the formula code and a format code.

Practice Session

In this practice session, you will execute some of the Print commands. Verify that your printer has been correctly selected through Tools Preferences Hardware.

Chapter 6: Printing Worksheets and Reports

You will send a worksheet to print in Draft mode and in Enhanced mode. You will also create a report definition file and print a report. Keep in mind that the printed output may vary from what is described in the exercises due to the capabilities and limitations of your printer.

1. To begin, load the worksheet saved as "ssnewXXX" in earlier chapters. Remember that the characters represented by "XXX" are your initials. Figure 6-10 shows a loaded worksheet.

Figure 6-10

1	2	3	4	5	6	7
1		1st Qtr.	2nd Qtr.	Commission		
2	1 Anders, B.	4,800.00	8,200.00	910.00		
3	2 Kelly, T.	5,990.00	6,000.00	839.30		
4	3 Miller, M.	5,400.00	7,300.00	889.00		
5	4 Nelson, N.	5,230.00	5,500.00	751.10		
6	5 Smith, A.	6,740.00	4,470.00	784.70		
7	6 Smith, J.	6,500.00	6,800.00	931.00		
8						
9	Total	34,660.00	38,270.00	5,105.10		
10						
11						
12						
13						
14						
15	Commission Rate	7.00%				
16						
17						
18						

Enter:

Worksheet: ssnewch6 Loc: rlc1 FN: Font: B Count: 0

2. Change the font used in columns 3, 4, and 5 of row 9. Using Layout Set-Font Change with the Block option, choose the same font (such as serif 12 pt. bold) that you used for the word "Total."
3. Execute Print Worksheet All Draft 1 copy Printer.
4. Now, execute Print Worksheet All Enhanced 1 copy Printer. Depending upon your printer's capabilities, the enhanced version should be produced using two fonts.

The next command you will try is the Print Report command.

5. To produce a report, you must first create a report definition file. Execute Print Report Create and enter a filename for the definition file: **rptXXX**, where the characters **XXX** represent your initials.
6. When the Report Definition Menu appears, move the pointer to the first Horizontal Title: prompt and press **F6**. Move the highlighter to r1c3. Press **F2** to drop anchor, and move the highlighter so that r1c5 is included. Press **Enter**. The entry "r1c3:5" has been recorded on the line.
7. Move the pointer to the Vertical Title: prompt. Press **F6**, and in the same manner, mark r2:9c2.
8. Move the pointer to the Body Block: prompt. Press **F6** and mark r2:9c3:5.

Take a moment to look at the three blocks you have just defined. Notice that the **width** of the Fixed Horizontal Title Block matches the **width** of the Body Block: columns 3 through 5. Notice that the **length** of the Fixed Vertical Title Block matches the **length** of the Body Block: rows 2 through 9. If the blocks do not match in this manner, your report data will not line up properly when printed.

9. Continuing down the Report Definition menu, select **All-pages** for Print heading on:.
10. Move to Line 1 under Primary Heading. Enter **%CABC Company**. Enter **%CToledo, Ohio** for the second line. Type **%CSales Summary** for the third line.
11. Select **All-pages** for Print footing on:.
12. At Line 1 under Primary Footing, enter **%R%D%C-%P-**. This will print the date, right-justified, and the page number, centered between two dashed, at the bottom of each page.
13. Select **Date1** for Date Style:, **Arabic** for Page number style:, and **Single** for Lines to enclose report:.
14. Verify that the Paper Profile setting is appropriate for your printer.
15. Press **F10** to complete the definition.
16. To produce a printed copy of the report, execute Print Report Execute. Enter the filename of the report definition file you created. Select Draft or Enhanced, enter 1 copy and select printer.
17. Save your worksheet when you are finished.

Chapter 6: Printing Worksheets and Reports

Chapter 7: Using ANGOSS Graphics

Graphs present numerical information in a way that makes it easy to study and understand. They can be used to summarize information in order to convey a specific message to an audience. The relationships that are clarified by a graph can also give fresh insight into the analysis of data.

In ANGOSS, a graph can be generated automatically, based on information in an ANGOSS worksheet and the settings stored in a graph definition file. Understanding which graph type to use in a given situation and creating a graph definition file to generate that graph is what this chapter is all about.

Graph Terminology

As you read this chapter and work with the Graph Definition menus, you will encounter terms that have special meaning in the context of ANGOSS. Most are defined in the glossary in the back of your system manual. For convenience, however, they are also repeated here. Take a minute to study them now, then refer to them any time you encounter a term you do not understand. Learning the special terminology will help you create useful, attractive graphs much more quickly.

Alignment refers to the horizontal positioning of title and footnote areas. There are four types of alignment: left, right, center, and off. Off disables the title or footnote entirely.

Areas are the five rectangular regions that comprise an ANGOSS graph. The five areas are the title area, the plot area, the legend area, the footnote area, and the background area.

Area settings are the settings that define the border, fill, and shadow for each of the five areas that comprise an ANGOSS graph.

Auxiliary axis refers to a second measurement axis that can be added to the plot on some types of graphs. It is used when plotting all series on the same scale would be misleading or impractical. On bar, line, area, step, combination, horizontal bar, and Xy graphs, the auxiliary axis appears on the right side of the plot opposite the vertical axis. On horizontal bar graphs, the auxiliary axis appears at the top of the plot.

Axis display mode determines how much information is included on an axis. There are three axis display modes: normal, line-only, and off. Normal is the most common. It displays a line, tics, and an axis title, all of which are user-definable. Line-only displays a straight line and a title, but no tics. Off displays no line, no tics, and no title.

Axis titles can be placed next to an axis on an ANGOSS graph. They can be entered on the Graph Definition menu itself or in a referenced worksheet cell.

Background area refers to the large rectangular area that encloses title, plot, legend, and footnote areas of most graphs. (See also CGM background.)

Background color is the color that shows through the "holes" in a non-solid fill pattern. (The foreground color is applied to the pattern itself.) When pattern 0 (hollow) is selected as the fill pattern, neither the foreground color nor the background color is visible.

Base refers to the three-dimensional "platform" on which bars, lines, etc. normally rest in most 3d graphs. On surface and wireframe graphs, base refers to the two-dimensional rectangle that appears at the bottom of a plot when the graph sides are disabled by setting Display (general setting) to Sides Off.

Borders are the rectangular outlines that surround the five areas on an ANGOSS graph. Borders have three attributes: type (single, double, inside thick, or outside thick), color, and size (expressed in points).

Border type defines how the edge of an area is displayed and printed. There are five border types: none, single, double, inside thick, and outside thick.

Business graphs are the graphs normally used in business. ANGOSS can create 13 types of business graphs: bar, line, area, step, combination, pie, horizontal bar, 3d bar, 3d line, 3d area, 3d step, 3d combination, and 3d pie.

CGM background, refers to the special background included in composite graph metafiles and some metafiles imported from other applications. The CGM background differs from the normal ANGOSS background in that it has no specific size or shape, it cannot include a fill pattern, and it can be disabled when the metafile containing it is used in another ANGOSS composite graph. You can add a CGM background to an ANGOSS metafile by specifying a

hollow fill pattern (pattern 0) for the background then making it the only metafile on a composite graph.

CGM files (See metafiles.)

Class (See graph class.)

Column names label one side of the data matrix for an elevation graph. In a worksheet block arranged for use with the Graph Quick command, they appear across the top, to the right of the title.

Column order is a method of interpreting a block of worksheet data for use in a graph. When column order is specified, data series are assumed to be arranged in columns.

Combination graphs are business graphs that allow each data series to be displayed using a separate graph type. The graph types allowed in a combination graph are bar, line, area, and step.

Composite graphs are a special class of graphs that allow you to combine the contents of up to eight CGM or GMF files to form a single displayed or printed image.

Contour bands (when shown) depict values as variations in color rather than variations in position along an axis. On a contour graph, each band represents a distinct range of values. Contour bands or lines always appear on a contour graph and can be projected onto the base of surface and wireframe graphs.

Contour color table refers to the table in the Plot Area portion of an Elevation Graph Definition menu where the colors for contour bands and contour lines are specified.

Contour lines (when shown) mark specific values (elevations) on an elevation graph. Contour lines or bands always appear on a contour graph and can be projected onto the base of surface and wireframe graphs.

Data labels (See series data labels.)

Data matrix refers to the block of worksheet cells that contains the data values used in an elevation graph. (Unlike business, high-low, and scientific graphs, the data for elevation graphs is not divided into series but is entered as a single one- or two-dimensional block of cells.)

Data series (See series.)

Depth axis refers to the back-to-front axis on a 3d graph. Normally, individual data series are arranged along the depth axis. (Some rotation angles cause the depth axis to appear in other than a back-to-front orientation.)

Divisions contain one value from each series in a graph. The first division, for instance, contains the first value in each series. When row order is specified during block marking, divisions are assumed to be arranged in columns on the worksheet, with division names (if present) in a row across the top. When column order is specified, divisions are assumed to be in rows, with division names in a column on the left. On most graphs, series values are plotted by division along the horizontal axis, with division names below.

Division names normally appear along the horizontal axis of a graph.

Elevation angle is the vertical angle from which a 3d plot is viewed. It must be an integer from 0 to 90.

Elevation graphs are a special class of graphs that interpret data as height or elevation on a surface. In ANGOSS, there are three graph types in the elevation class: contour, surface, and wireframe.

Exploded pie pieces are separated from the rest of a pie for emphasis.

Fill patterns determine how color is applied to the five areas of a graph. When a solid pattern is selected for an area, only the foreground color shows. When a non-solid pattern is selected, the background color shows through the "holes" in the pattern. When a hollow pattern (pattern 0) is selected, the area is transparent and neither the foreground color nor the background color is visible.

Fonts are distinct lettering styles. There are two types of fonts available in ANGOSS: internal fonts and filled-area fonts. Internal fonts are defined inside your printer and vary from one printer to the next. Filled-area fonts are special fonts included with ANGOSS that can be

printed on any printer ANGOSS supports. Internal fonts print relatively quickly. Filled-area fonts offer more flexibility, but take longer to print. Graphs use filled-area fonts exclusively.

Footnote area refers to the rectangular area at the bottom of a graph where a one to three line footnote can be displayed. The text for a footnote can be entered directly or referenced in the worksheet and can be justified flush left, flush right, or centered. The footnote area as a whole can be aligned left, right, or centered within the background area.

Foreground color is the color applied to the fill pattern in the five areas that make up a graph (title area, plot area, etc.) When a non-solid fill pattern is selected, the background color shows through the "holes" in the pattern.

GMF files are graphics metafiles created by versions of ANGOSS prior to version 1.5.

Graphs are graphic displays of worksheet data. There are 21 graph types divided into six classes: business (13 types), high-low (one type), scientific (two types), elevation (three types), text (one type), and composite (one type). All except text and composite have five major components: a title area, a plot area, a legend area, a footnote area, and a background area.

Graph classes are the categories into which individual graph types are divided according to data type. There are six graph classes: business, high-low, scientific, elevation, text, and composite.

Graph definition files are created in ANGOSS Spreadsheet from a Graph Definition menu. Each contains specifications and worksheet references on which an ANGOSS graph is to be based. Graph definition files have extensions that identify them by class: .gdb for business, .gdh for high-low, .gds for scientific, .gde for elevation, .gdt for text, and .gdc for composite.

Graph Definition menus are the six full-screen menus in ANGOSS Spreadsheet that allow you to create graph definition files.

Graph sides are the vertical surfaces on the sides of a surface graph that make the graph appear solid. The base of a surface graph is visible only when the sides are disabled.

Graph type describes the specific way in which worksheet data is depicted graphically. In ANGOSS, there are 21 graph types: bar, line, area, step, combination, pie, horizontal bar, 3d

bar, 3d line, 3d area, 3d step, 3d combination, 3d pie, high-low, Xy, polar, contour, surface, wireframe, text, and composite.

Grids are parallel lines extending from the tics on an axis through the plot interior area. Major grid lines extend from major tics. Minor grid lines extend from minor tics. Width, color, and line pattern can be set individually for each grid type on each axis. (See also surface grid.)

Hiding a series prevents it from being displayed on a graph. A blank space remains in the plot area when a series is hidden. The components of the legend area are repositioned to fill the space left by a hidden series.

High-Low graphs are a special class of graphs used by stock analysts to present the high, low, and closing prices of individual stocks.

Horizontal axis refers to the axis along the bottom of a plot, where divisions are normally marked.

Inside thick is a double border type with an outer border in the width you specify and an inner border twice as thick.

Justification refers to the horizontal positioning of individual lines of text within the title and footnote areas of most graphs. There are three types of justification: flush left, flush right, and centered.

Legend area refers to the part of a graph that shows the color, line pattern, symbol, etc. used to depict each series on a graph. It can be positioned above, below, or on either side of the plot area. Use of the legend area is optional.

Line pattern describes the type of line used to depict a series on a line graph. There are seven line patterns: invisible, solid, dot, dash, dash-dot, dash-dot-dot, and dash-dash-dot.

Location, on a Composite Graph Definition menu, specifies where and how large a CGM or GMF file is to be rendered. On a Business Graph Definition menu, it determines the horizontal position of the title or footnote area.

Manual offset refers to the thickness of the base on a non-pie 3d business graph. It can be established manually as a percent of the vertical axis or automatically by ANGOSS.

Margins are blank bands that separate components on a graph. On text graphs, they provide a blank area around the edge of the graph in which no text is printed. On composite graphs, they separate CGM/GMF files from each other and from the edge of the graph. On all other graphs, margins separate the areas from each other and the components within areas from the area border.

Metafiles are the files used to store ANGOSS graphs as *pictures* rather than as definitions. Metafiles generated by ANGOSS version 1.5 (and later) conform to industry standards and can be used by most programs compatible with the CGM (computer graphic metafile) format. The extension used on CGM metafiles is .cgm. Metafiles with the .gmf extension, which were created in earlier versions of ANGOSS, are also recognized by ANGOSS version 1.5.

Multiple choice settings are settings on a Graph Definition menu that allow only specific pre-defined entries. Multiple choice fields are differentiated from character entry fields by the presence of brackets ([and]) around the field.

Numeric text is any automatically generated text on an ANGOSS graph. Such text appears neither on the Graph Definition menu itself nor in referenced cells. It is displayed along any axis used for measurement and in place of division and series names when none are specified.

Outside thick is a double border type with an inner border in the width you specify and an outer border twice as thick.

Percent scaling is an axis scaling method that plots the highest value on the graph at scale maximum (100%) and labels major tics as percentages.

Plot area refers to the large rectangular area where the data values are plotted on most graphs.

Plot interior refers to the rectangular area(s) on 2d and 3d graphs where grid lines are drawn.

Point size is a typographic measurement based on 72nds of an inch. A two-point line is $\frac{2}{72}$ or .028 inches wide. Text set in 24-point type (without extra spacing between lines) is $\frac{24}{72}$ or .334 inches from base line to base line. Many measurements in ANGOSS are expressed in points.

Polygons are geometric shapes whose outlines are composed of a series of connected line segments. In ANGOSS, metafiles can be generated in which text strings are stored as rows of character shaped polygons.

Polylines are lines composed of a series of connected line segments.

Position, on a Graph Definition menu, refers to the location of the legend area in relation to the plot area. There are five legend positions: left, right, top, bottom, and off. Off disables the legend entirely.

Quick is an option on the Spreadsheet's Graph menu that provides a shortcut process for generating graphs by combining default settings with a special block of values and labels in the current worksheet.

Quick graph refers to a graph created using the Graph Quick command.

quick.gdq is a file that contains the worksheet cell reference used to create the last quick graph. It can be edited using the Graph Define command to create a complete graph definition file.

Rotation angle establishes the angle about the base from which a 3d plot is viewed.

Row names label one side of the data matrix for an elevation graph. In a worksheet block arranged for use with the Graph Quick command, they appear down the left side, under the title.

Row order is a method of interpreting a block of worksheet data for use in a graph. When row order is specified, data series are assumed to be arranged in rows.

Scales are the lines, tics, and labels that define an axis.

Scale type specifies the tic positions and numeric labels applied to a data measurement axis. There are three scale types: linear, logarithmic, and percent.

Scale dimensions refer to the minimum value, the maximum value, and the number of major and minor ticks on a data measurement axis. They can be established manually or set automatically by ANGOSS.

Scientific graphs are a special class of graphs used to plot pairs of worksheet values as mathematical coordinates. There are two graph types in the scientific class: Xy and Polar. Xy graphs plot values on a Cartesian coordinate system. Polar graphs plot values on a polar coordinate system.

Series are distinct groups of values that are plotted on a graph. A series, for instance, might include the closing price of a specific stock for every trading day in a month. When row order is specified, series are assumed to be arranged in rows on the worksheet, with series names (if present) in a column on the left. When column order is specified, series are assumed to be in columns, with series names in a row across the top. On most graphs, each series is represented by a separate shade, color, line pattern, or symbol, which is depicted in the legend beside the series name.

Series data labels are labels you can display in the plot area next to each plotted value in a series. They can consist of the series name, the values from the worksheet, or the values expressed as a percent of scale maximum. Series data labels can be positioned at the top, bottom, or center of the objects in the plot. They are not available on non-pie 3d graphs.

Series information table refers to the table in the Data Settings portion of a Graph Definition menu where series are defined for business, high-low, and scientific graphs.

Series names appear in the legend of most business graphs. On three-dimensional graphs, they also appear along the depth axis.

Series width determines the width of bars on a bar chart. It is expressed as a percentage of the space available to each bar. When series width is 50%, for example, the bars and the spaces between them are equal. When bar width is 100%, bars occupy all of the space allotted to them (i.e., they touch each other).

Shading is the process of darkening one side of objects in a three dimensional plot in order to enhance the three-dimensional effect.

Shadows are black rectangles that can be displayed "behind" any of the five areas that comprise a graph. Shadows are used to give areas a three-dimensional look.

Shadow offset is the distance, in points, between an area border and the edge of its shadow. Shadow offset has two components: X (horizontal) and Y (vertical).

Smoothing is the process of rounding the vertices on line, area, Xy, polar, contour, surface, and wireframe graphs.

Stacking is the process of displaying series elements one above the other rather than in separate columns. Area and step graphs are normally stacked. Bar graphs are sometimes stacked to make a special point.

Starting angle specifies the position of the pie piece that represents the first series on a pie chart. The default starting angle is 0 degrees (i.e., the piece rests on a horizontal line extending from the center to the right edge of the pie).

Surface grid refers to the grid that marks the three-dimensional surface of an elevation graph. The resolution of the surface grid is controlled by the smoothing factor (under General Settings). The higher the smoothing factor the finer the surface grid; the lower the smoothing factor the coarser the surface grid. (See also grids.)

Symbols are marks used to highlight data points on line, Xy, and polar graphs. There are 12 symbol types: none, plus, X, box, circle, diamond, dot, thick plus, thick X, filled box, thick circle, and filled diamond.

Text graphs are a special class of graphs that are comprised only of text. They are used primarily as support material in presentations and for adding titles to composite graphs.

Tics appear along an axis to mark divisions, series, or numerical values. Tics come in two varieties: major and minor. Major tics normally appear at each division on a horizontal axis, each marked value on a vertical axis, and each series on the depth axis. Minor tics normally appear only at unmarked, intermediate values on axes used for measurement.

Title area refers to the rectangular area at the top of a graph where a one to three line title can be displayed. The text for a title can be entered directly or referenced in the worksheet and can

be justified flush left, flush right, or centered. The title area as a whole can be aligned left, right, or centered within the background area.

Viewpoint refers to the point from which a 3d graph is "viewed." Three parameters establish the viewpoint: viewpoint X, viewpoint Y, and viewpoint distance. Viewpoint X and Y determine the point inside the bounding rectangle of the plot that is in the viewer's direct line of sight. Legal values for X and Y are integers from 0 to 100. Viewing distance establishes the distance, as a percent of front-to-back plot size, from which the plot is viewed. Legal values are 50-1001%. A distance of 1001% disables perspective entirely.

Vertical axis refers to the axis along the left side of a 2d plot (or the back of a 3d plot), where numeric values are normally marked. On most graphs, the vertical axis is the scale against which numeric values are plotted.

Weighting determines the relative size of each pie in a multi-pie graph. (Divisions on a pie graph are represented by separate pies.) There are three types of weighting: by sum, by reference, and off. Weighting by sum is the default. It causes pies to be sized according to the sum of the values they represent. Weighting by reference sizes pies according to values in a specified block of worksheet cells. When weighting is turned off, all pies are of equal size.

Selecting a Graph Type

ANGOSS is capable of generating many types of graphs. Some, such as polar and contour graphs, are best for conveying specific types of information. Others, such as bar and line graphs, can convey a variety of information. With so many graph types available, choosing the right one for a project can be quite a challenge. This section attempts to simplify the task by illustrating and briefly describing each type of graph you can create.

There are 21 distinct graph types available in ANGOSS. Nineteen are based on plotted worksheet data. One is composed of text only (text graph). And one is composed of existing CGM and GMF files combined to form a single image (composite graph).

The graph types are divided into six classes as follows:

Graph Class	# of Types	Description of Types of Graphs
Business Graphs	13	Bar, Area, Combination, Horizontal Bar, 3D Line, 3D Step, 3D Pie, Line, Step, Pie, 3D Bar, 3D Area, 3D Combination
High-Low Graphs	1	High-Low
Scientific Graphs	2	Xy, Polar
Elevation Graphs	3	Contour, Surface, Wireframe
Text Graphs	1	Text
Composite Graphs	1	Composite

Bar Graphs

A bar graph is the most basic type of business graph. It depicts worksheet values as vertical or horizontal bars. The bars vary in length according to the values they represent. Shorter bars represent lower values. Longer bars represent higher values. Bar graphs are versatile and very easy to understand. Because of this they are perhaps the most commonly used graphs, suitable for all presentations that compare discrete values. Included in Figure 7-1 are examples of the three types of bar graphs you can create in ANGOSS: a normal bar graph, a 3d bar graph, and a horizontal bar graph.

Bar graphs have either two or three axes. The horizontal axis is the one along which individual bars are arranged, grouped by division. The vertical axis contains the scale against which bars are plotted. (Horizontal bar graphs reverse these two axes.) The depth axis appears only on 3d graphs and serves to separate individual series in "space." The auxiliary axis is an option on 2d bar graphs. It provides a second scale of measurement for selected series and is useful when a single scale is not practical.

The legend of a bar graph contains the names of the series plotted on the graph. Beside each series name is a sample of the shade or color used to represent the values in the series. Use of a legend is optional.

When stacking is enabled on a bar graph, values within each division are represented by bars that are "stacked" on top of each other. Stacking is not available on 3d bar graphs.

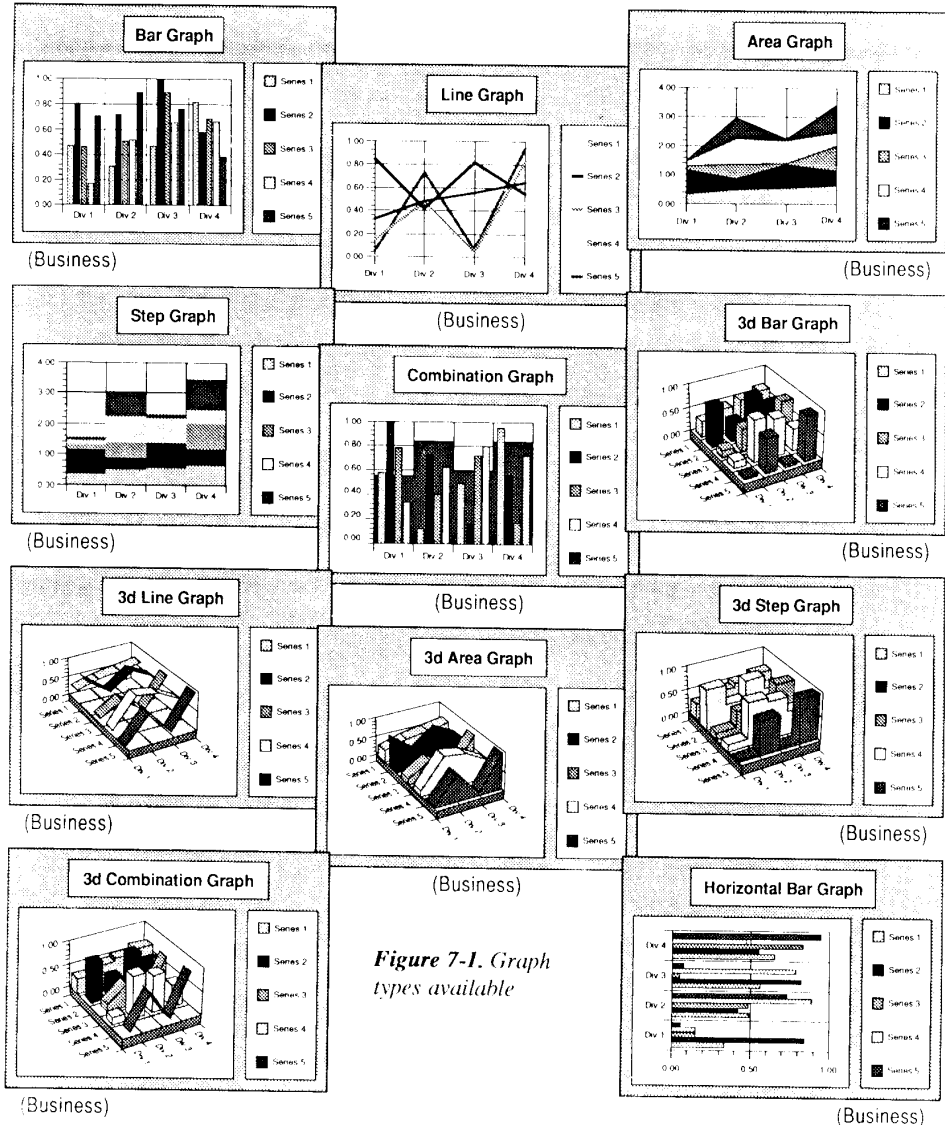


Figure 7-1. Graph types available

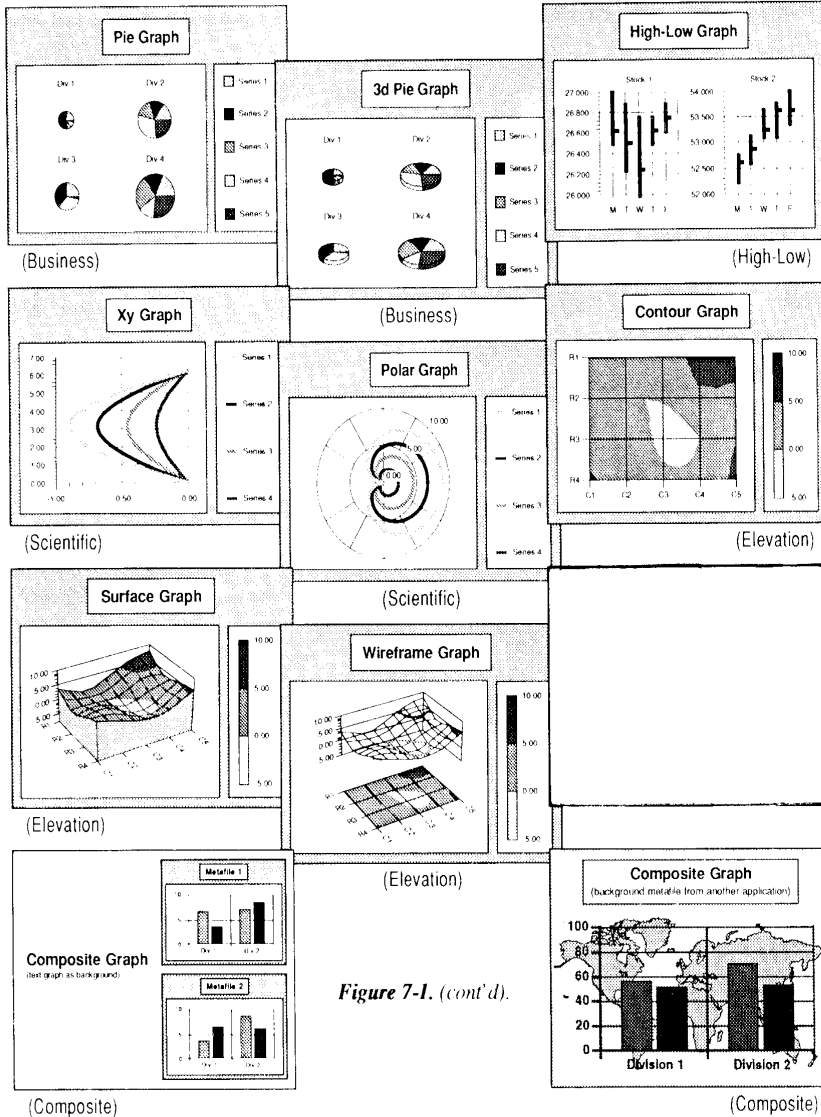


Figure 7-1. (cont'd).

Line Graphs

A line graph depicts a block of worksheet values as a group of polylines. Each series in the block results in a polyline with separate color, width, and line pattern. The values within a division are plotted along a line that extends vertically from the division name below the horizontal axis.

Like bar graphs, line graphs lend themselves to a variety of situations. A line graph is most useful when the point of the graph is to demonstrate trends or when the number of divisions makes a bar graph impractical. Figure 7-1 contains examples of typical 2d and 3d line graphs.

Line graphs have the same axis and legend characteristics as bar graphs. Two-dimensional line graphs can be stacked, but normally are not. When a stacked graph is needed, an area or step graph is usually a better alternative.

Area Graphs

An area graph (sometimes called a layer graph) is similar to a stacked line graph, but is much more dramatic. Instead of representing each series with a polyline, an area graph uses the filled area between two polylines.

In general, an area graph is a good choice when you must demonstrate a trend and at the same time convey the idea of accumulated mass or volume. Figure 7-1 shows a typical area graph and a typical 3d area graph.

Area graphs have the same axis and legend characteristics as bar graphs. Two-dimensional area graphs can be either stacked or unstacked, but are normally stacked. When an unstacked graph is needed, a line or bar graph is often a better choice.

Step Graphs

A step graph is almost identical to a stacked bar graph when series width is set to 200%. The most noticeable difference is the lack of a line separating series values. Step plots are commonly used as backgrounds for other plot types on combination graphs. Figure 7-1 contains typical 2d and 3d step graphs.

Step graphs have the same axis and legend characteristics as bar graphs. Two-dimensional step graphs can be either stacked or unstacked, but are normally stacked. When an unstacked graph is needed, a line or bar graph is often a better choice.

Combination Graphs

A combination graph allows you to plot each series on a graph using a separate graph type. Any combination of bar, line, area, and step graphs can be used. Combination graphs are most useful when a

distinction must be made between different types of data that must be shown on the same graph. Figure 7-1 shows a combination graph in which a series plotted as a step graph serves as a background for other series plotted as bars. The 3d combination graph in Figure 7-1 illustrates all four plot types that can be used in a combination graph.

Combination graphs have the same axis and legend characteristics as bar graphs. Two-dimensional combination graphs can be either stacked or unstacked.

Pie Graphs

A pie graph is the basic graph type for representing a group of worksheet values as parts of a whole. In a pie graph, each pie slice represents a single series value. Each division results in a separate pie labeled with the division name. Pie graphs have legends like those found on other business graphs, but have no axes. Both normal and 3d pie graphs are illustrated in Figure 7-1.

High-Low Graphs

A high-low graph is used exclusively to present information on stock prices, usually over time. Each series on a high-low graph represents a single security or financial index and results in a separate plot. Divisions are normally time intervals such as days, weeks, months, or years. Legends are available on high-low graphs but are usually unnecessary because series names are already displayed above the individual plots. Figure 7-1 contains a typical high-low graph.

There are two axes on high-low graphs: horizontal and vertical. Division names (time intervals) are displayed along the horizontal axis. Prices are displayed along the vertical axis. All plots share the same axis settings. Scaling on all vertical axes is automatic, but the scale range is customized for each plot.

Xy Graphs

An Xy graph is a line graph in which the vertical and horizontal axes are both used for measurement. Series on Xy graphs are composed of multiple Xy coordinate pairs. There are no divisions. An Xy graph is the basic graph type for scientific analysis.

Polar Graphs

A polar graph displays pairs of values within a circular field. One value in each pair represents an angle, expressed in radians. The other represents a distance from the center of the plot. Polar graphs are used in any type of scientific analysis when one value in the coordinate pair is an angle.

Contour, Surface, and Wireframe Graphs

Contour, surface, and wireframe graphs depict values within a rectangular field. Contour graphs represent the values as color variations. Surface and wireframe graphs show them three-dimensionally. All are appropriate for any situation that involves physical elevation, such as topography and geology, or other "levels," such as rainfall over a given area or noise levels over a factory floor. Figure 7-1 contains example contour, surface, and wireframe graphs based on identical data.

Text Graphs

A text graph is one made up entirely of filled-area text. It can contain up to 40 lines employing the full range of ANGOSS colors, filled-area fonts, and text control characters. Lines can be entered directly on a Text Graph Definition menu or referenced on the current worksheet.

Composite Graphs

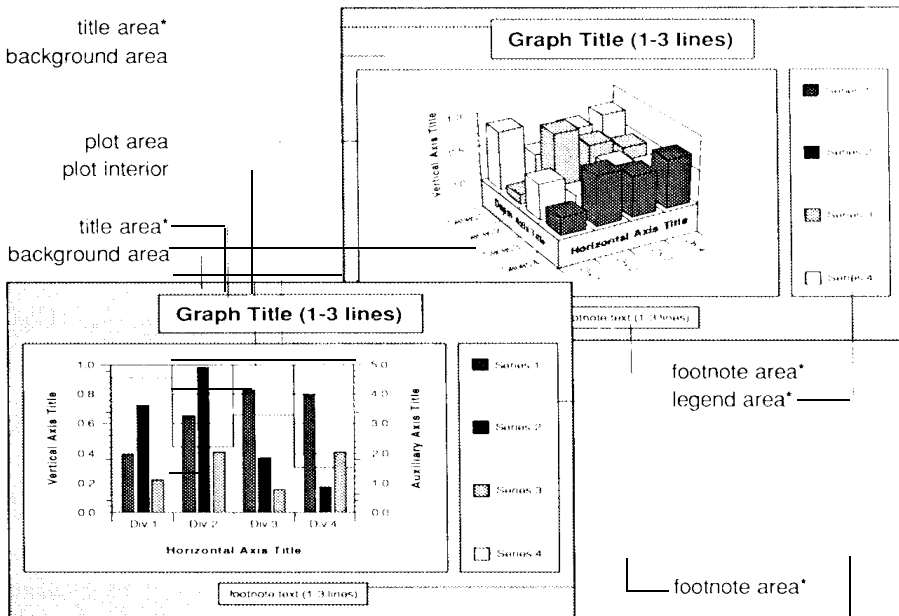
A composite graph allows you to combine up to eight existing CGM or GMF files to form a single image. Figure 7-1 contains two composite graphs. One combines a title in a text graph with two ANGOSS bar graphs. The other combines a bar graph with a background illustration from a drawing application.

Components of a Graph

Of the 21 graphs you can create in ANGOSS, all but text and composite graphs share the same physical and logical organization. Understanding this organization is important because the menus used to define graphs are structured to reflect the organization of the graphs themselves. This section describes the organization of most ANGOSS graphs and identifies the individual components common to most ANGOSS graphs.

Each business, high-low, scientific, and elevation graph is divided into five distinct areas: the plot area, the title area, the legend area, the footnote area, and the background area. The plot and background areas are always present. Use of the others is optional. Each of the five areas has its own border and fill settings. For information on how to define the border and fill for any of the five areas on an ANGOSS graph, refer to *Defining Areas* in the *Defining Graphs* section of this chapter. Figure 7-2 illustrates the five areas as they might appear on typical 2d and 3d graphs.

Figure7-2. Common components of most ANGOSS graphs.(Asterisk indicates use of component is optional.)



Plot Area

The plot area is the part of an ANGOSS graph where values from your worksheet are depicted graphically. On non-pie graphs, it consists of a backdrop called the plot interior, two or three axes, and a group of objects used to represent worksheet values. On pie graphs, it consists only of a series of pies representing the divisions in your worksheet data. Pie graphs have no plot interior and no axes.

The plot interior is a rectangle or circle that serves as a backdrop for the plotted data. It has border and fill characteristics separate from those of the plot area itself. On non-pie 2d graphs except polar graphs, the plot interior is a rectangle. On polar graphs, it is a circle. On all 3d graphs, including surface and wireframe graphs, it is the pair of rectangles that form the "walls" at the back of the plot. For

information on how to define the plot interior, refer to *Plot Interior Settings* in the *Defining Graphs* section of this chapter.

The axes can have up to five components each: a line, a set of tics, a set of grid lines extending across the plot interior, a series of labels, and a title. Each component is definable on the Graph Definition menu. Depending on the type of graph you are defining, different axes are available. On most 2d business graphs, for example, there is a horizontal axis, a vertical axis, and an optional auxiliary axis. On most 3d graphs, there is a horizontal axis, a vertical axis, and a depth axis. For information on how to define an axis, refer to *Axis Settings* in the *Defining Graphs* section of this chapter.

NOTE: The numeric formatting of labels on a measurement axis is taken from the values referenced on the worksheet. For example, if values plotted on a bar graph are formatted as currency with two-place precision, the labels on the vertical axis will have the same formatting.

The objects used to depict worksheet values vary depending on the type of graph you are creating. A bar graph, for example, has a separate series of colored bars for each data series on your graph. A pie graph has a separate color/pattern of pie slice for each series. A high-low graph has a separate plot for each series (stock). Elevation graphs, which have no series per se, use colors and patterns to represent values within a rectangular area. For information on how to specify the data represented in the plot area, refer to *Business Data Settings*, *High-Low Data Settings*, *Scientific Data Settings*, and *Elevation Data Settings* in the *Defining Graphs* section of this chapter.

Legend Area

The legend area, when used, appears above, below, or to one side of the plot area. On business, high-low, and scientific graphs, the legend lists the name of each data series and a swatch of the color, line pattern, symbol, etc. used to depict each series in the plot. On elevation graphs, it shows the colors used to represent values in the plot. For information on defining the series names or numeric text that appears in the legend, refer to *Text Settings* in the *Defining Graphs* section of this chapter. For information on setting the border and fill characteristics of the legend area or on how to position the legend area as a whole, refer to *Defining Areas* in the same section.

NOTE: On elevation graphs, the numeric formatting of legend labels is taken from the values on the worksheet. For example, if values plotted on an elevation graph are formatted with three-place precision, the labels in the legend will have the same formatting.

Title Area

The title area, when used, appears at the top of an ANGOSS graph. It can contain up to three 254-character lines either entered directly on the Graph Definition menu or referenced in the current worksheet. For each line of text, a default color, size, and font can be specified. Within a line, any of the

ANGOSS text control characters described in the *Common Definition Items* section of this chapter can be used.

The lines in the title can be justified within the title area either left, right, or centered. The entire title area can be aligned left, right, or centered on the graph background. For information on defining the title, refer to *Defining Titles and Footnotes* in the *Defining Graphs* section of this chapter. For information on setting the border and fill characteristics of the title area or on how to align the title area as a whole, refer to *Defining Areas* in the same section.

Footnote Area

The footnote area, when used, appears at the bottom of an ANGOSS graph. Other than its position and the fact that text for it cannot be specified using the Graph Quick command, its characteristics are identical to those of the title area.

Background Area

The background area is the large rectangular area that serves as a background for the other four areas on most ANGOSS graphs. As with the plot, legend, title, and footnote areas, it has its own independent border and fill settings. The only other setting available for the background area is the margin setting.

The margin setting establishes the distance between all major components on an ANGOSS graph. This includes the distance between area borders and between area borders and contents.

IMPORTANT: When both border *and* fill are turned off for either the plot area or the legend area, the margins inside that area are set to zero and the contents are expanded to fill the empty space. This feature usually facilitates alignment of graph components.

For information on setting the border and fill characteristics of the background area or for setting the graph margins, refer to *Defining the Background* in the *Defining Graphs* section of this chapter.

Common Definition Items

In the process of defining graphs, you are asked by ANGOSS to make certain choices over and over. Text, for instance, whether in the title area or on an axis must be specified in the same way. This section serves to identify these common definition items and help you understand the choices they present.

Worksheet References

Most of the text and numerical data used on an ANGOSS graph is taken from cells in the current worksheet. When you define a graph using the Graph Quick command, the references to these cells are entered for you automatically. Often, however, you encounter situations that require you to enter them manually.

There are two ways to enter worksheet references from a Graph Definition menu. If you already know the name or address of the block, you can type it in manually. In most cases, however, it is easier to mark the block.

To define a block by marking, place the Definition Menu cursor in the field where the reference is needed and press **F6**. When your worksheet appears, move the highlighter to one corner of the block and press **F2** to drop anchor. Then move the highlighter to the cell at the opposite corner of the block and press **Enter**. (If the block is for a series information table, you are asked to specify row-order or column order.) The Graph Definition menu reappears and the marked block is entered in the selected field.

NOTE: Sometimes, such as in the series information table, you are required to enter multiple worksheet references. If the blocks to be marked are arranged in a single contiguous group on the worksheet, just place the Graph Definition menu cursor in the first field of the table, press **F6**, and mark the cells for the entire table. ANGOSS will fill in the whole table for you.

Colors

Color is one of the choices you must make throughout the Graph Definition menus. The 16 colors available in ANGOSS are listed in Table 7-1. To specify a color on a Graph Definition menu, type its number and press **Enter**. If you have a color display and do not remember the number of the color you want, press **F6**. The numbers 0-15 are displayed across the bottom of the screen, each in the color it represents.

Table 7-1. Colors available in ANGOSS.

No.	Color	No.	Color
0	black	8	dark gray
1	dark blue	9	blue
2	dark green	10	green
3	dark cyan	11	cyan

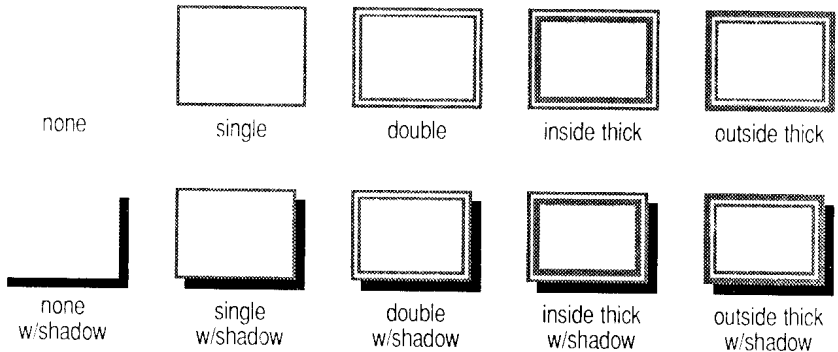
No.	Color	No.	Color
4	dark red	12	red
5	dark magenta	13	magenta
6	brown	14	yellow
7	gray	15	white

Line and Fill Patterns

Many of the lines and filled areas on a graph can have patterns applied to them. It is often clearer, for example, to differentiate series on a line graph with patterns rather than with colors, especially when using a black-and-white printer.

The seven line patterns and 14 fill patterns available in ANGOSS are illustrated in Figure 7-3. To specify a line or fill pattern on a Graph Definition menu, type its number and press **Enter**. If you do not remember the number of the pattern, press **F6**. A prompter appears listing the patterns by name and number. Move the pointer to the pattern you want and press **Enter**. The number of the pattern is then copied to the selected field.

Figure 7-4. Border types for areas on ANGOSS graphs.



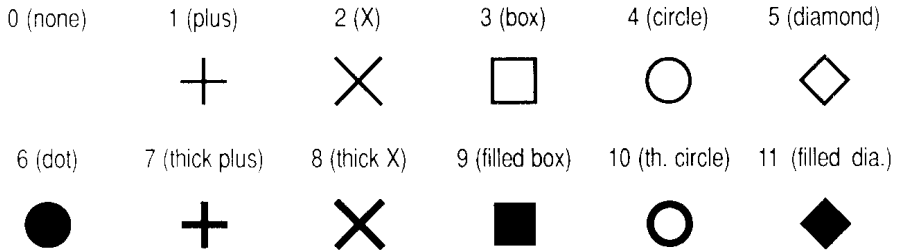
Symbols

On Xy, polar, and 2d line graphs you can use symbols to mark data points. This is useful when data points must be marked precisely or when special attention must be drawn to them.

NOTE: When symbols are used to mark the data points on a line graph and the line pattern for all series is set to zero (invisible), the result is what is sometimes called a scatter graph.

Figure 7-5 illustrates the 12 symbols available in ANGOSS for marking data points. To specify a symbol, type its number and press **Enter**. If you do not remember the number, press **F6**. A prompter appears listing the symbols by name and number. Move the pointer to the symbol you want and press **Enter**. The number is copied to the selected field.

Figure 7-5. Symbols used on ANGOSS graphs.



Fonts

When you specify text in the plot area, title area, or footnote area you must choose one of ANGOSS' filled-area fonts, which are illustrated in Figure 7-6. To specify a font, type its number and press **Enter**. If you do not remember the number, press **F6** to display a prompter listing the fonts by name and number. Move the pointer to the font you want and press **Enter**. ANGOSS copies the number to the selected field. For a complete listing of all the characters in ANGOSS' filled-area fonts, refer to Appendix B in *ANGOSS Software System*.

Character and Line Sizes

Text height and line width on Graph Definition menus are expressed in points. A point is a unit of typographical measurement approximately equal to $1/72$ of an inch. A two-point line, therefore, is one that is $2/72$ or .028 inches wide.

Measurement of text is a little more complicated. Parts of characters in every font extend below the baseline of the font and above the tops of most capital letters. These are called "descenders" and "ascenders," respectively. The point size you specify is the measurement from the top of the ascender to the bottom of the descender *plus* a small amount of space above and below to prevent lines from touching each other.

NOTE: Because ascenders, descenders, and built-in blank space vary with the design of a font, point size alone is a poor predictor of the size of actual printed characters. Note that while all of the fonts in Figure 7-6 are printed at the same point size, the height of capital letters varies somewhat from font to font.

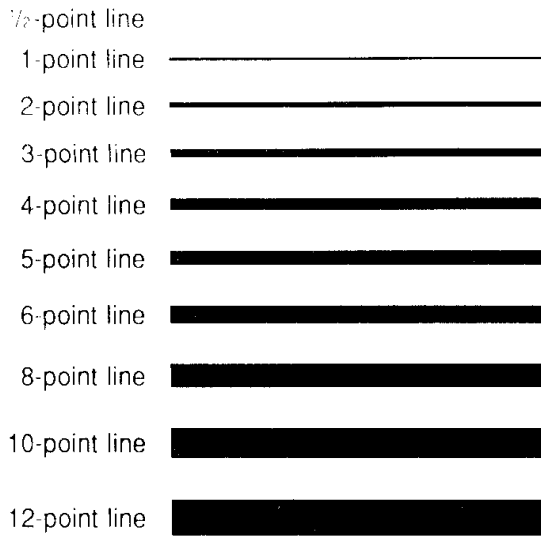
Text is restricted to even point sizes. Line widths can be expressed fractionally, to the hundredth of a point. Figure 7-7 illustrates a number of character sizes commonly used on graphs. Figure 7-8 illustrates a variety of line widths. To specify a point size, type the size, including decimal point, if any, and press **Enter**.

IMPORTANT: Line and character sizes are based on full-size landscape printouts. When the entire graph is printed at other sizes, point sizes are scaled proportionately.

Figure 7-7. Character sizes commonly used on ANGOSS graphs. (Sizes are not limited to those shown.)

10-point type
12-point type
14-point type
16-point type
18-point type
24-point type
36-point type
48-point type
60-point typ
72-point ty
99-poin

Figure 7-8. Typical line widths. (Lines may be expressed fractionally, to the hundredth of a point.)



Text Control Characters

ANGOSS text control characters allow you to change certain attributes in the middle of a text string. Using text control characters you might underline a certain word, insert a bullet, or cause part of a line to appear in italics. The following line, for example, causes the word "not" to be underlined:

All that glitters is %_not%N gold!

Text control characters can be used in any worksheet cell or Graph Definition menu field that contains text that appears on a graph. This includes titles, footnotes, series names, and division names. Their effect is limited to the current line only. They do not carry over into succeeding lines of a title, footnote, text graph, etc. Table 7-2 contains a list of available text control characters.

Table 7-2. Text control characters available on ANGOSS graphs.

Text Control Characters	Effect
% - or % _	Turn on underline
% =	Turn on double underline
% s	Turn on subscript
% S	Turn on superscript
% N or % n	Cancel the previous underline, double underline, subscript, or superscript
% C[n] or % c[n]	Change to color [n], where n is the color number.
% F[n] or % f[n]	Change to font [n], where n is the font number. See figure 7-6.
% B[n] or % b[n]	Insert bullet
% %	Insert percent sign

NOTE: Bullets inserted using text control characters are actually characters from ANGOSS' Dingbat1 filled-area font. For a complete list of the characters in this font refer to Appendix B in *ANGOSS Software System*.

Defining Graphs

All of the information used to define a graph comes either from the current worksheet or from the information stored in a definition file. This section describes how to create graph definition files by using the Graph Quick command and by making entries on the six Graph Definition menus.

Creating Quick Graphs

The fastest way to define a graph is by using the Graph Quick command. This command allows you to specify a graph type, mark a specially arranged block of worksheet cells, and view a graph immediately based on the information in the block and the preferences set with the Graph Set-Default command.

To create a graph using the Graph Quick command, select Graph Quick from the Spreadsheet menu. Five options appear representing the five classes of graphs that reference worksheet data: Business, High-Low, Scientific, Elevation, and Text. The sixth class, composite graphs, is based on existing CGM/GMF files.

The Business, Scientific, and Elevation classes have multiple graph types within the class. If you select one of these, you must also select a type. Refer to Figure 7-1 for illustrations of the graph types available in each class.

When you have selected the graph class and type, you are prompted for the worksheet data to be used in the graph. Type or mark to the cell reference and press **Enter** to display the graph on the screen. When you are finished viewing the graph, press any key to return to the worksheet.

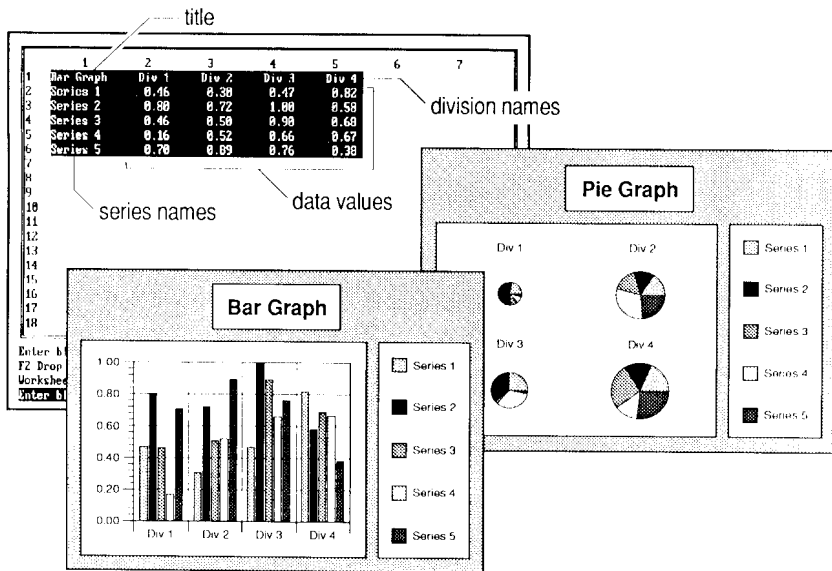
Arranging Data for Quick Graphs

The Graph Quick command assumes that your worksheet data is arranged in a specific manner. In general, the title is placed in the top left corner of the block. If series are arranged in rows (row order), series names should be in a column under the title and division names in a row to the right of the title. If series are arranged in columns (column order), these two positions are reversed. If the block is for an elevation graph, which has a simple matrix of values instead of a group of data series, the cells below the title contain row names and those to the right of the title contain column names.

NOTE: If any part of the data block is missing, ANGOSS attempts to interpret the block in the best manner possible, usually substituting numbers for missing components.

The following illustrations show typical data layouts for each class of graph that can be defined with Graph Quick.

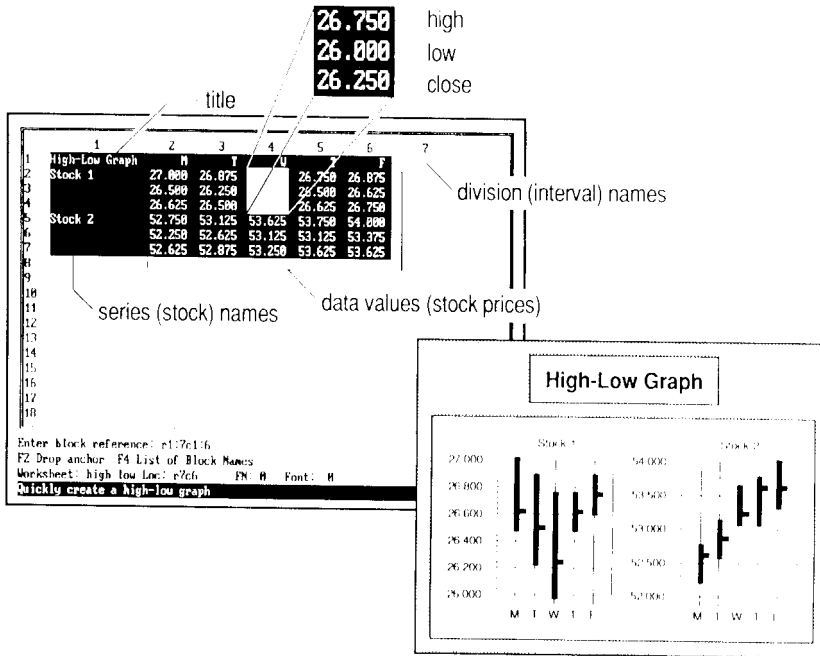
Figure 7-9. Typical data arrangement for business graphs created with the Graph Quick command.



The data block for business graphs can include series names, division names, and a title, as well as a block of values. For blocks arranged in row order, as they are in the above illustration, the title is in the upper left corner. Division names are arranged in a row to the right of the title and series names are in a column below it. The rest of the block must be numeric values.

If any textual element is missing, ANGOSS attempts to interpret the data block appropriately. For instance, if there are labels in the first column but none along the top of a row order block, ANGOSS interprets the labels as series names and assumes you did not intend to specify division names or a title.

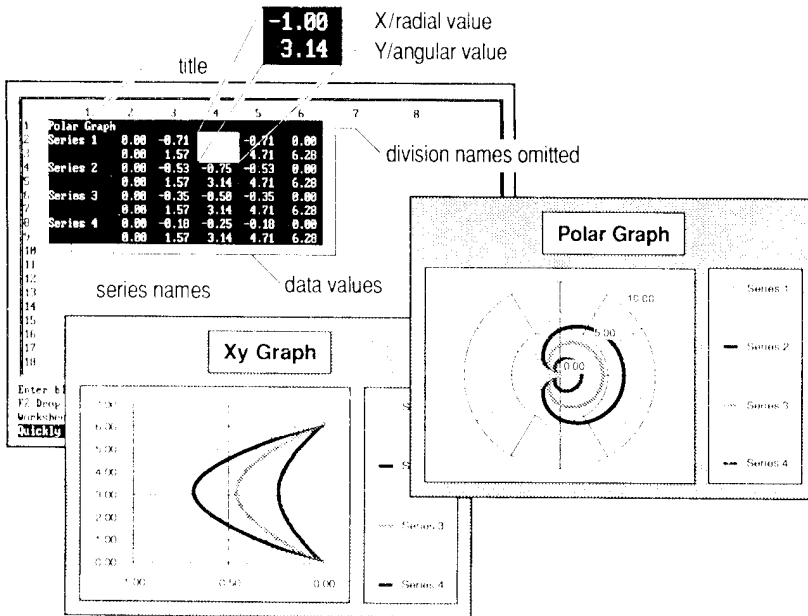
Figure 7-10. Typical data arrangement for high-low graphs created with the Graph Quick command.



On a high-low graph, each series results in a separate plot representing an individual index or security. Divisions have three values per series: the high price, the low price, and the closing price for the covered interval. For a row order block like the one above, the title is in the upper left corner with division names to the right and series names below.

Notice that there are two blank cells below each series name. These allow space for the three series values per division. The series name must be in the first cell for the series, aligned with the "high" values. In each division, the second series cell must contain the "low" value and the third series cell the "closing" value. As with business graphs, if one or more textual element is missing, ANGOSS attempts to interpret the data block appropriately, filling in missing labels with numbers.

Figure 7-11. Typical data arrangement for scientific graphs created with the Graph Quick command.

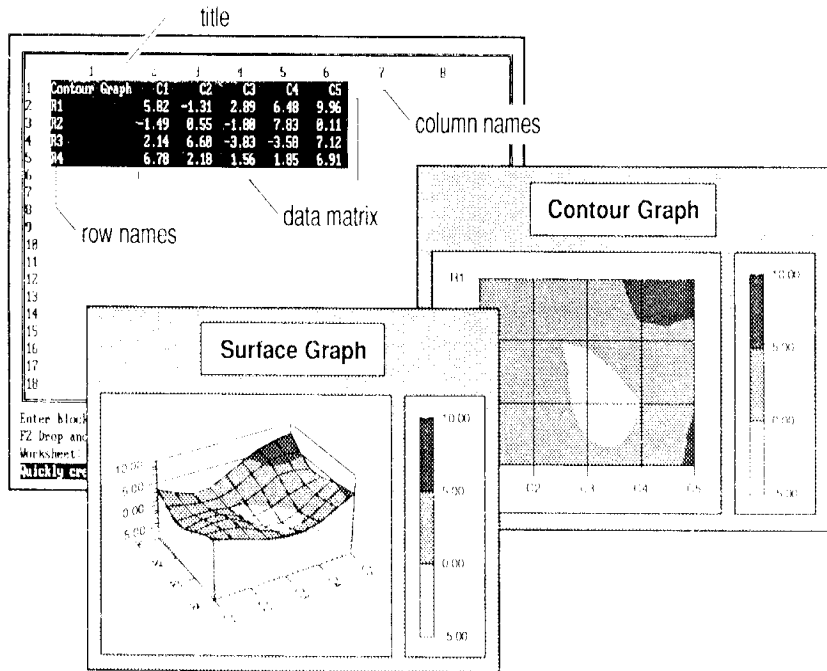


Divisions on scientific graphs have two values per series. On Xy graphs, these are the X and Y coordinates for each series item. On polar graphs, they are the item's radial and angular components. For a block arranged in row order, like the one above, the title is in the upper left corner with series names below it. Because division names do not appear on scientific graphs, the cells that normally contain them are left blank.

The blank cell below each series name allows space for the two values associated with each series. The series name must be in the first cell for the series, aligned with the X or radial values. In each division, the second series cell must contain the Y or angular component of the series item. If any textual element is missing, ANGOSS attempts to interpret the data block appropriately, filling in missing labels with numbers.

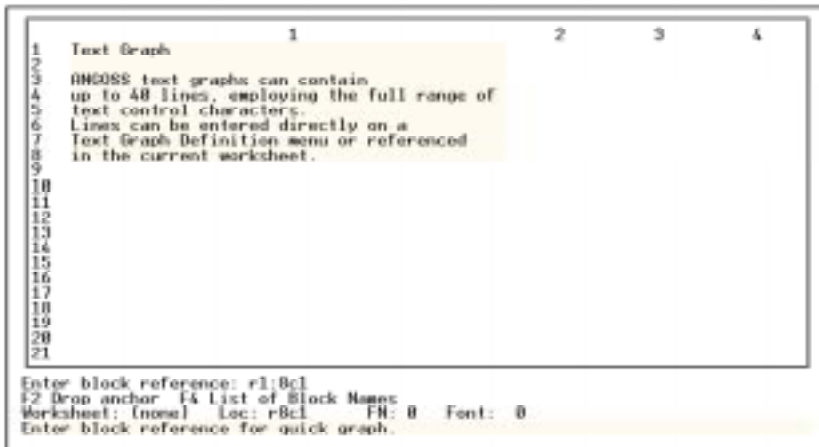
IMPORTANT: The angular component of each series item in a polar graph must be expressed in radians.

Figure 7-12. Typical data arrangement for elevation graphs created with the Graph Quick command.



The data for elevation graphs is laid out on the worksheet in the same manner as that for business graphs. Unlike business graphs, however, the values in the block are not divided into series but treated as a single two-dimensional matrix of values. As a result, you do not have to specify row or column order for elevation graphs. The labels down the left side of the block are called row names. Those across the top are called column names.

Figure 7-13. Typical data arrangement for text graphs created with the Graph Quick command.



The data block for a text graph is very simple. It consists of a one-dimensional array of cells, each representing a line of text on the graph. Cells containing text may include embedded text control characters, which are described in the *Common Definition Items* section of this chapter. Cells containing values are converted to text strings and displayed using the cell's numeric formatting.

Generating a Graph Definition File from a Quick Graph

Each time you generate a quick graph, a new version of a file named quick.gdq is created. This file records the cell reference last used to create a quick graph. While quick.gdq itself cannot be viewed or printed, by editing it on a Graph Definition menu, you can combine the reference it contains with the current default settings to create a complete graph definition file. If you do not create a graph definition file from quick.gdq, the information it contains is overwritten the next time the Graph Quick command is used.

To create a graph definition file based on quick.gdq, select Graph Define from the Spreadsheet menu. Then select the graph class that corresponds with the last quick graph you generated. When the file prompter appears, select quick.gdq and press **Enter**. A definition menu appears, complete with default settings established with the Graph Set-Default command and cell references from quick.gdq.

Edit the settings, if necessary, using the techniques described in this section, then press **F10** to exit and save. If you changed the entry in the Filename field (recommended), the file is saved under that name. Otherwise, it is saved as "quick," with the extension for the graph class you selected.

IMPORTANT: While quick.gdq can be used to create a definition file for a class of graph other than the one for which it was created, the result is usually meaningless. It is important therefore to remember the class of graph for which quick.gdq was last updated and use it to create a definition file for that class only.

Making Entries on a Graph Definition Menu

Graph Definition menus provide you with detailed control over almost every part of an ANGOSS graph. By making entries on a Graph Definition menu, you can change the background of the title, center the lines in the footnote, hide the legend, or change the color used to draw a specific axis. The list of items you can change is so extensive, in fact, that the menus normally are collapsed into a sort of index that reflects the structure of the graphs themselves. To expand a section of the menu for editing, move the cursor to the line containing the title of the section (e.g., 3d Settings) and press **Spacebar** until the word Edit appears at the end of the line. To collapse the menu after editing (which is optional), return to the same title line and press **Spacebar** until the word Hide appears at the end of the line.

NOTE: Collapsing sections is simply a means of organizing a long Graph Definition menu and reducing screen clutter. It has no effect on whether settings remain in effect or whether they are stored in the graph definition file.

Figure 7-14 shows a Graph Definition menu as it might appear for a business graph. Notice that the structure of the menu reflects the way the graphs themselves are organized.

After the filename and graph type entries, all settings are grouped according to the five areas on an ANGOSS graph. The first group of entries is for the plot area, followed by those for the legend, title, footnote, and background areas. For descriptions of each of the areas on a ANGOSS graph, refer to the section titled *Components of a Graph*, earlier in this chapter.

Business, high-low, scientific, and elevations graphs are all based on numerical worksheet data and have Graph Definition menus similar to the one shown in Figure 7-14. Only the settings for the plot area vary from one class to the next. Text and composite graphs are not based on numerical data and have their own unique menus.

Graph Definition menus are accessed by selecting Graph Define on the Spreadsheet menu. When you select Graph Define, six options appear representing the six classes of graphs. Select a class

and the Graph Definition menu for that class appears. When you are finished editing your definition, press **F10** to exit the menu and save the graph definition file. Press **Esc** to abandon editing.

Figure 7-14. Typical Graph Definition menu for a business graph, all sections collapsed.

```

Business Graph Definition
-----
-> Filename: example

Graph Type:
Bar Line Area Step Combination Pie Horizontal Bar 3d Bar
3d-Line 3d-Area 3d-Step 3d-Combination 3d-Pie

Plot Area:
Data Settings ----- [ Hide ]
Text Settings ----- [ Hide ]
General Settings ----- [ Hide ]
Axis Settings:
  Horizontal Axis ----- [ Hide ]
  Vertical Axis ----- [ Hide ]
  Auxiliary Axis ----- [ Hide ]
Plot Interior Settings ----- [ Hide ]
Area Settings ----- [ Hide ]

Legend Area:
Area Settings ----- [ Hide ]

Title Area:
Text Settings ----- [ Hide ]
Area Settings ----- [ Hide ]

Footnote Area:
Text Settings ----- [ Hide ]
Area Settings ----- [ Hide ]

Background Area:
Area Settings ----- [ Hide ]

```

The extension of a graph definition file indicates the class of the graph it contains. Table 7-3 lists the extension associated with each graph class.

Table 7-3. Extensions for graph definition files.

Extension	Graph Class
.gdb	Business
.gdh	High-Low
.gds	Scientific
.gde	Elevation
.gdt	Text
.gdc	Composite

NOTE: The .gdq extension is used only with quick.gdq, which is not a graph definition file per se. It contains only the cell reference used to create the most recent quick graph.

Moving the Cursor on a Graph Definition Menu

Moving around and making entries on a Graph Definition menu is accomplished using specific keys and key combinations. Tables 7-4 through 7-8 list these keys, grouped according to the type of activity being performed.

Table 7-4. Keys for moving among fields on a Graph Definition menu.

Key	Action
Tab or Enter	Move to the next menu field
Shift Tab	Move to the previous menu field
down arrow	Move to the next menu line
up arrow	Move to the previous menu line

Key	Action
Home	Move to the top of the menu window
End	Move to the bottom of the menu window
PgUp	Scroll up one page on the menu
PgDn	Scroll down one page on the menu
Ctrl Home	Move to the top of the menu (useful for Project Processing)
Ctrl End	Move to the bottom of the menu (useful for Project Processing)

Table 7-5. Keys for editing variable length tables on a Graph Definition menu (e.g., data settings for a business graph or text settings for a text graph).

Key	Action
F7	Add a new line to the current table
F8	Delete a line from the current table

Table 7-6. Keys for setting the graph type on a Graph Definition menu.

Key	Action
Spacebar or right arrow	Move highlighter to next graph type
Backspace or left arrow	Move highlighter to previous graph type

Key	Action
Ctrl left arrow	Move highlighter to first graph type (useful for Project Processing)
Ctrl right arrow	Move highlighter to last graph type (useful for Project Processing)

Table 7-7. Keys for working with character entry fields on a Graph Definition menu.

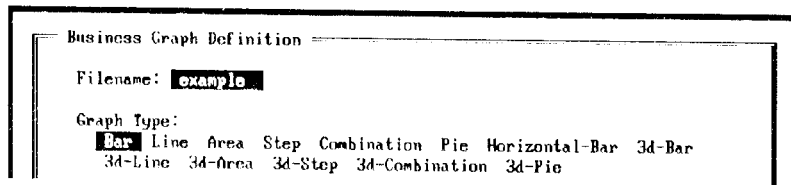
Key	Action
right arrow	Move cursor to next character position
left arrow	Move cursor to previous character position
Ctrl right arrow	Move cursor to last character position
Ctrl left arrow	Move cursor to first character position
Backspace	Delete the character to the left of the cursor
Del	Delete the character at the cursor
Ins	Toggle character insert mode on/off
F2	Edit the current entry
F3	Clear the current character entry field
F5	Mark a worksheet block and retrieve the cell contents as text
F6 (when Available)	Mark a worksheet block or display a list of choices for the current field

Table 7-8. Keys for working with multiple choice fields on a Graph Definition menu.

Key	Action
Spacebar or right arrow	Select next option
Backspace or left arrow	Select previous option
Ctrl left arrow	Select first option (useful for Project Processing)
Ctrl right arrow	Select last option (useful for Project Processing)

Entering the Filename and Graph Type

The first setting on all Graph Definition menus is Filename. If you are defining a business, scientific, or elevation graph, the second setting is Graph Type. Figure 7-15 shows how these settings might appear on for a bar graph definition.

Figure 7-15. Filename and graph type settings on a Business Graph Definition menu.

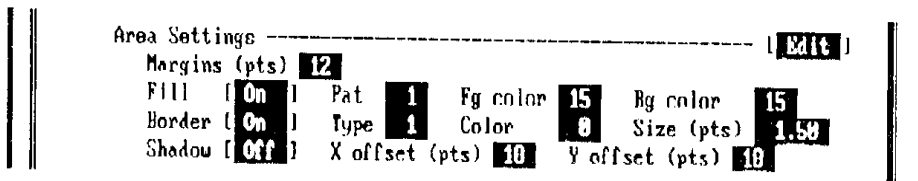
By default the filename setting contains the name you specified with the Graph Define command. Changing the setting allows you to save the definition under a new name. To change the filename and save the definition under a new name, type any legal DOS filename and press **Enter**.

The graph type setting contains options for each of the graph types available with the selected class. When you select a graph type, groups of settings are added or deleted to configure the menu for that type of graph. To select a graph type, press **Spacebar** until the desired graph type is highlighted.

Defining Areas

The five rectangular areas on most ANGOSS graphs (plot area, legend area, title area, footnote area, and background area) share certain characteristics that are independent of area content. All can have fill, all can have a bounding border, and all can have a shadow. Figure 7-16 shows a typical group of area settings. Except for the Margins field, which is available only for the background area, this part of the menu is identical for each of the five areas on a business, high-low, scientific, or elevation graph.

Figure 7-16. Area settings for the background area.



Position. The position setting appears only in the area settings for the legend. It determines the position of the legend in relation to the plot area. There are five options: Left, Right, Top, Bottom, and Off. The first four position the legend left, right, above, or below the plot area, respectively. Off disables the legend entirely. To specify the position of the legend, press **Spacebar** until the desired option is visible.

Alignment. The alignment setting appears only in the title and footnote background settings. It determines the horizontal position of the title or footnote area on the background. There are four options: Left, Right, Center, and Off. The first three align the area at the left, right, or center of the graph, respectively. Off disables the title or footnote entirely. To specify alignment, press **Spacebar** until the desired option is visible.

Margins. The margins setting appears only in the background area settings. It establishes the distance that separates components on a graph. On text graphs, margins provide a frame around the edge of the graph where no text is printed. On composite graphs, they separate CGM/GMF files from each other and from the edge of the CGM background. On all other graphs, margins separate the areas from each other and the components within areas from the area border.

Margins are measured in even points. To set the margins, type a number from 0 to 99 and press **Enter**.

Fill. There are four settings that control the fill for an area. The first is a simple on/off toggle. The second establishes the fill pattern, the third the foreground color, and the fourth the background color.

The relationship between the fill pattern, the foreground color, and the background color is a simple one. The foreground color is the color applied to the fill pattern. Therefore, when you select solid fill (pattern 1), only the foreground color is visible. When you select non-solid fill (patterns 2-13), the background color shows through the "holes" in the pattern. When you select hollow fill (pattern 0), the area is transparent and neither the foreground color nor the background color is visible.

For information on the colors and fill patterns available in ANGOSS Graphics or on how to select them, refer to *Common Definition Items* in this chapter.

Border. There are four border settings for an area. The first is an on/off toggle. The second establishes the type of border; the third, its color; and the fourth, its size (width). For information on colors, border types, line sizes, or how to select them, refer to *Common Definition Items* in this chapter.

Shadow. There are three settings for specifying an area's shadow: an on/off toggle, an X offset, and a Y offset. X offset determines how far in the horizontal direction the shadow is displaced from the area border. Y offset determines displacement in the vertical direction.

X and Y offset are measured in points (72nds of an inch). Legal values are integers from -99 to 99. Negative values for X offset cause displacement to the left; positive values cause displacement to the right. Negative values for Y offset cause displacement upward; positive values cause displacement downward. To specify X or Y offset, type an integer value from -99 to 99 and press **Enter**.

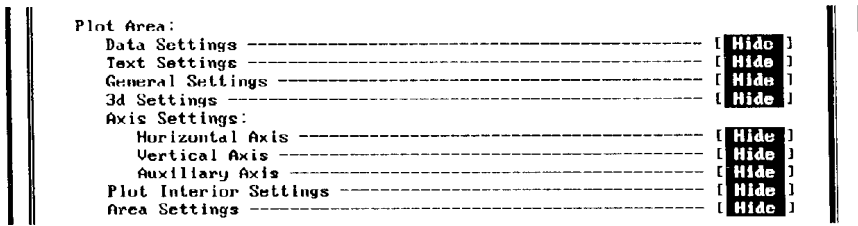
Defining the Plot

The plot area is where the numeric information from your worksheet is represented. There are seven types of settings for the plot area: data settings, text settings, general settings, 3d settings, axis settings, plot interior settings, and area settings. All but the area settings are unique to the plot area of a business, high-low, scientific, or elevation graph. For information on how to specify area settings, refer to *Defining Areas*, earlier in this section.

Not all settings are available for all graph types. Pie graphs, for instance, have no axis or plot interior settings. And 2d graphs, such as bar, high-low, and contour, have no 3d settings. Figure 7-17

illustrates how the Plot Area portion of a Business Graph Definition menu might look for a non-pie 3d graph with all sections collapsed.

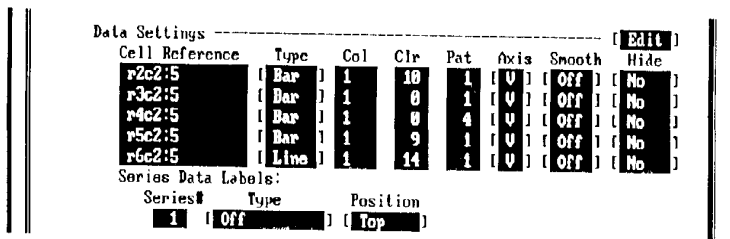
Figure 7-17. Plot Area portion of a Business Graph Definition menu, all sections collapsed.



Data Settings for Business Graphs

The data settings for business graphs are specified in two tables, one for series information and one for series data labels. In each table, a line represents one series. In the series information table, there is a line for every series to be represented on the graph. The table for series data labels is keyed to the series information table. It contains a line for each series that is to have data labels. Both tables can be edited using **F7** and **F8**. Figure 7-18 illustrates how the Data Settings portion of a menu might look for a composite graph.

Figure 7-18. Data settings for a combination (business) graph.



Cell Reference. This setting is in the first column of the series information table for all business graphs. It specifies the block of cells to be used to plot a series. For information on

how to enter a cell reference, refer to *Worksheet References* in the *Common Definition Items* section of this chapter.

Type (graph type). This setting specifies the type of plot used to represent a series on a combination graph. It is a multiple choice setting with four options: Bar, Line, Area, and Step. To change the setting, press **Spacebar** until the desired graph type is displayed.

Col (column). This setting allows you to control the vertical alignment of data points plotted within each division on a combination graph. All series with a column setting of 1, for instance, are plotted in the leftmost column of each division. If only a number is entered for this setting, the series is plotted in the specified column *unstacked*. If the number is followed by the letter S (e.g., "4S"), the series is plotted in the specified column *stacked with any other series assigned to that column*.

Clr (color). This setting specifies the color of the bars, lines, or areas used to represent a series. For information on ANGOSS colors and how to select them, refer to *Common Definition Items*, earlier in this chapter.

Pat (pattern). The pattern setting allows you to specify the line or fill pattern applied to the bars, lines, or areas used to represent a series. For information on these patterns and how to select them, refer to *Common Definition Items*, earlier in this chapter.

Axis. This setting specifies whether a series is plotted with reference to the vertical (normal) axis or the auxiliary axis. It is a multiple choice setting with two options: V and A. If V is selected, the series is plotted against the vertical axis. If A is selected, it is plotted against the auxiliary axis. To change the setting, press **Spacebar** until the desired option is displayed. The column for axis settings appears only on definitions for non-pie 2d graphs.

Smooth (smoothing). This setting determines how data points on line, area, and combination graphs are plotted. If smoothing is off, they are plotted as sharp angles. If it is on, they are plotted as smooth curves. To set smoothing, press **Spacebar** until the desired option is displayed.

Symb (symbol). This setting specifies the symbol, if any, to be used to mark vertices on a 2d line graph. For information on how to specify symbols, refer to *Common Definition Items*, earlier in this chapter.

Explode (exploding). The setting for exploding determines whether the pie pieces used to represent values in a series are separated from the rest of the pie for emphasis. If exploding is off, they are not separated. If it is on, they are separated. To set exploding, press **Spacebar** until the desired option is displayed.

Hide (hiding). This setting allows you to prevent a series from being displayed on a graph. It is a multiple choice setting with three options: No, Yes, and Lgnd. If hiding is set to No, the series is displayed normally. If it is set to Yes, the series is removed from the plot and the legend. If hiding is set to Lgnd, the series is removed from the legend but remains in the plot. This is useful on a combination graph when a series is included primarily to provide a background for other series or to highlight a trend. To set hiding, press **Spacebar** until the desired option is displayed.

Series# (series number). This setting appears in the table for series data labels on 2d graphs and 3d pie graphs. It specifies a series in the series information table for which data labels are to be provided. For instance, if 2 is specified as the series number (and Type is not set to Off), data labels are provided for the second series in the series information table. To specify the series number, type a number from 1 to 16 and press **Enter**.

NOTE: If multiple entries are made for a single series, only the last entry for the series is observed. If two or more lines specify data labels for series 3, for instance, all but the last entry for the series are ignored.

Type. This setting specifies the content of a series data label. It is a multiple choice setting with four options: Off, Series Name, Value, and Percent. If Off is selected, no data label is displayed for the series. If Series Name is selected, the name of the series is displayed. If Value is selected, the value from the worksheet is displayed. And if Percent is specified, the worksheet value, expressed as a percent of scale maximum, is displayed. To set the data label type, press **Spacebar** until the desired option is displayed.

Position. This setting determines where a series data label is displayed in relation to the objects in a plot. It is a multiple choice setting with four options: Top, Bottom, and Center. If Top is selected, for instance, data labels for the series are displayed above the bar, line, area, etc. for each value. To set the data label position, press **Spacebar** until the desired option is displayed.

Data Settings for High-Low Graphs

The data settings for a high-low graph are specified in a single five-column table. Each line in the table represents a different stock, bond, or market index. Settings in the first three columns are cell references. For information on how to enter a cell reference, refer to *Worksheet References* in the *Common Definition Items* section of this chapter. Figure 7-19 shows how the Data Settings portion of a menu might look for the high-low graph in Figure 7-10.

Figure 7-19. Data settings for a high-low graph.

Data Settings					Edit
High	Low	Close	Clr	Hide	
r2c2:6	r3c2:6	r4c2:6	9	No]
r5c2:6	r6c2:6	r7c2:6	12	Yes]

High, Low, and Close. These settings contain references to the high, low, and closing prices for a specific security or index during a specific interval. They might, for instance, contain references for the XYZ Corporation during the week of January 21. In this case, the line representing the XYZ Corporation in the table contains three five-cell references. The first points to the cells with the five daily highs for the week; the second, to the cells with the five daily lows; and the third, to the cells with the five closing prices.

Clr (color). This setting specifies the color used to represent a series (stock). For information on ANGOSS colors and how to select them, refer to *Common Definition Items*, earlier in this chapter.

Hide (hiding). This setting allows you to prevent a series from being displayed on a graph. It is a multiple choice setting with two options: No and Yes. If hiding is set to No, the series (stock) is displayed normally. If it is set to Yes, the series (stock) is removed from the plot and the legend. To set hiding, press **Spacebar** until the desired option is displayed.

Data Settings for Scientific Graphs

The data settings for a scientific graph are specified in a single seven or eight-column table. Each line in the table represents a different series of plotted points. Settings in the first two columns are cell references. For information on how to enter a cell reference, refer to *Worksheet References* in the *Common Definition Items* section of this chapter. Figure 7-20 shows how the Data Settings portion of a menu might look for the Xy graph in Figure 7-11.

Figure 7-20. Data settings for an Xy (scientific) graph.

Data Settings								[Edit]
X	Y	Clr	Pat	Axis	Smooth	Symb	Hide	
r2c2:6	r3c2:6	1	1	[V]	[Off]	0	[No]	
r4c2:6	r5c2:6	4	1	[V]	[Off]	0	[No]	
r6c2:6	r7c2:6	2	1	[V]	[Off]	0	[No]	
r8c2:6	r9c2:6	3	1	[V]	[Off]	0	[No]	

X/Angle. This setting contains a reference to the first coordinate for each point to be plotted in the series. For an Xy graph, it is interpreted as the X coordinate. For a polar graph, it is interpreted as the radial coordinate.

Y/Radius. This setting contains a reference to the second coordinate for each point to be plotted in the series. For an Xy graph, it is interpreted as the Y coordinate. For a polar graph, it is interpreted as the angular coordinate.

Clr (color). This setting specifies the color of the line that connects the plotted points in the series. For information on ANGOSS colors and how to select them, refer to **Common Definition Items**, earlier in this chapter.

Pat (pattern). The pattern setting allows you to specify the pattern applied to the line that connects the plotted points in the series. For information on selecting line patterns, refer to **Common Definition Items**, earlier in this chapter.

Axis. This setting appears only in Xy graph definitions. It specifies whether the Y coordinates in a series are plotted on the vertical (normal) axis or on the auxiliary axis. It is a multiple choice setting with two options: V and A. If V is selected, Y coordinates are plotted against the vertical axis. If A is selected, they are plotted against the auxiliary axis. To change the setting, press **Spacebar** until the desired option is displayed.

Smooth (smoothing). This setting determines whether plotted points are connected by line segments or by a single smooth curve. If smoothing is off, they are connected by line segments.

If it is on, they are connected by a smooth curve. To set smoothing, press **Spacebar** until the desired option is displayed.

Symb (symbol). This setting specifies the symbol, if any, to be used to mark the plotted points in a series. For information on how to specify symbols, refer to *Common Definition Items*, earlier in this chapter.

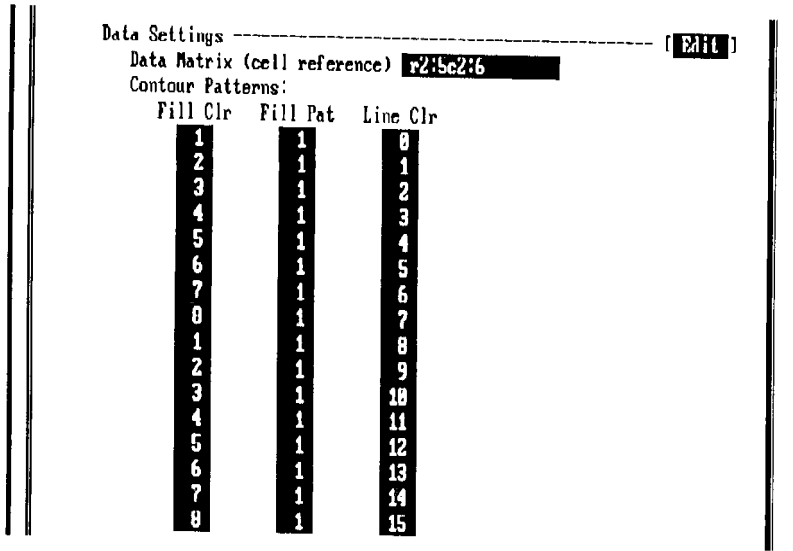
Hide (hiding). This setting allows you to prevent a series from being plotted on a graph. It is a multiple choice setting with two options: No and Yes. If hiding is set to No, the series is plotted normally. If it is set to Yes, the series is removed from the plot and the legend. To set hiding, press **Spacebar** until the desired option is displayed.

Data Settings for Elevation Graphs

The data settings for an elevation graph are different from those of a business, high-low, or scientific graph because the data for an elevation graph is different. An elevation graph is based on a single matrix of values instead of a group of individual series. Because of this, there is no need for a series information table. Instead, there is a field for specifying the reference to the data matrix and a contour color table for specifying the colors used to indicate values.

The contour color table, for example, might indicate that the elevation 5.00 is represented by blue lines or that elevations from 5.00 to 10.00 are represented by diagonally striped green bands. Figure 7-21 shows how the Data Settings portion of a menu might look for an elevation graph.

Figure 7-21. Data settings for an elevation graph.



Data Matrix. This setting specifies the block of cells containing elevation values to be plotted on the graph. For information on how to enter a cell reference, refer to *Worksheet References* in the *Common Definition Items* section of this chapter.

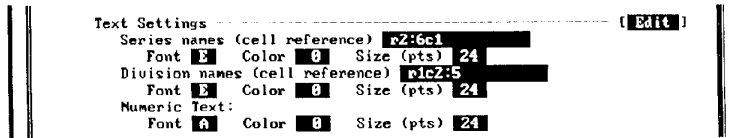
Fill Clr (fill color), Fill Pat (fill pattern), and Line Clr (line color). These settings specify the attributes applied to contour bands and lines. For information on how to select ANGOSS colors and fill patterns, refer to *Common Definition Items*, earlier in this chapter.

Text Settings

The text settings control the content and appearance of all text in the plot and legend areas of a business, high-low, or scientific graph. Figure 7-22 shows how the Text Settings portion of a Graph

Definition menu might look for one of these graphs. The text settings for an elevation graph are similar, with references to row and column names instead of series and division names.

Figure 7-22. Text settings for a business, high-low, or scientific graph.



Series Names, Division Names, Row Names, and Column Names. There are four settings for each group of names. The first is a reference to the names in the current worksheet. The second, third, and fourth specify font, color, and point size, respectively. The settings apply regardless of where the names appear on a graph. For information on how to specify cell references, fonts, colors, or character sizes, refer to the *Common Definition Items* section of this chapter.

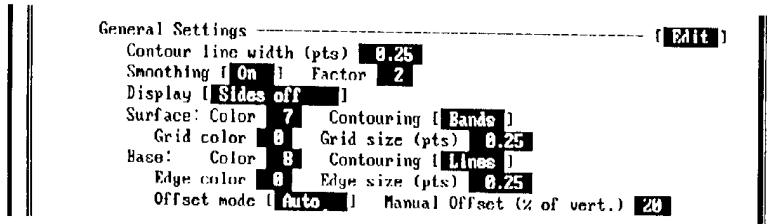
Numeric Text. These settings control all labels that are generated automatically by ANGOSS, including measurement axis labels and labels supplied to replace missing series and division names. There are three settings for numeric text: font, color, and size. For information on how to specify any of these, refer to *Common Definition Items* earlier in this chapter.

NOTE: The numeric formatting of labels on a measurement axis is taken from the values referenced on the worksheet. For example, if values plotted on a bar graph are formatted as currency with two-place precision, the labels on the vertical axis will have the same formatting.

General Settings

General settings are settings that apply to the plot as a whole, rather than to individual series, divisions, or value ranges. The necessary settings vary widely from one graph type to the next. Only those settings that are applicable for the current graph type appear on the definition menu. Figure 7-23 shows how the General Settings portion of a menu might look for a surface graph.

Figure 7-23. General settings for a surface graph.



Series Width, 2d Series Width, and 3d Series Width. These settings determine the width of objects used to represent series values. On 2d bar graphs, 2d series width specifies the width of bars as a percent of available space. A setting of 100% causes them to touch. On 3d business graphs except pie graphs, 3d series width determines the width of all objects in the plot. On high-low graphs, series width specifies the length of the bars that mark closing prices.

Series Line Width. This setting appears on menus for 2d line, 2d combination, high-low, Xy, and polar graphs. It establishes the width of lines used to plot all series on the graph. For information on how to specify line sizes, refer to *Character and Line Sizes* in the *Common Definition Items* section of this chapter.

Contour Line Width. This setting appears only on menus for elevation graphs. It specifies the width of contour lines. Refer to *Character and Line Sizes* in the *Common Definition Items* section of this chapter for information on how to specify line sizes.

2d Edges and 3d Edges. These settings appear on menus for business graphs. The 2d edge setting determines the width of outlines around bars, areas, steps, and pies on a 2d graph. The 3d edge setting serves the same function for objects on a 3d graph. (Edge color is always black.) Refer to *Character and Line Sizes* for information on line sizes and how to specify them.

Starting Angle. This setting determines placement of the first slice on a pie graph. Legal values are integers from 0 to 360. A value of zero puts the edge of the first slice on a horizontal line extending from the center of the pie to the right edge. As the value increases, this line

rotates counterclockwise until at 360 it is again at the zero position. To specify the starting angle, type a value and press **Enter**.

Slice Sorting. This setting determines the sequence of slices on a pie graph. There are three options: Off, Ascending, and Descending. If Off is selected, the sequence of slices is determined by the order in which series are entered on the Graph Definition menu. If Ascending or Descending are selected, slices are arranged according to ascending or descending size. To specify slice sorting, press **Spacebar** until the desired option is displayed.

Weighting. There are two settings for weighting: a multiple choice setting and a cell reference. Together they determine the relative size of each pie (division) on a pie graph.

The multiple choice setting specifies the type of weighting and has three options: Off, By Sum, and By Reference. Off causes all pies to be the same size. By Sum causes them to be sized according to the values they represent, with larger pies representing larger total values. By Reference causes pies to be sized according to a series of worksheet values, with larger values resulting in larger pies. To specify weighting, press **Spacebar** until the desired option is displayed.

If By Reference is selected, you must specify a cell reference for weighting. This should be a block of cells containing one value for each division on your graph. For information on how to specify a cell reference, see *Worksheet References* in the *Common Definition Items* section of this chapter.

Smoothing. These two settings appear on menus for elevation graphs and together determine the smoothness of contour lines and bands. The first is an on/off toggle. To set it, press **Spacebar** until the desired option is visible. The second specifies the smoothing factor. To enter a smoothing factor, type an integer from 0 to 15 and press **Enter**. Higher numbers result in smoother contours and slower rendering. Lower numbers result in more jagged contours and faster rendering. Entering a smoothing factor of zero is the same as using the toggle to turn smoothing off.

Display. This setting determines which parts of an elevation graph are displayed and which are hidden. It has four options: Normal, Sides Off, Axes Off, and Surface Only. If Normal is selected, all components are displayed, including the sides. This means the base and any contours projected onto it are hidden from view.

If Sides Off is selected, the sides of the graph are hidden so the base and its contours are visible. If Axes Off is selected, the axes and plot interior are hidden, leaving only the surface and sides. If Surface Only is selected, all components except the surface and its contours are hidden,

leaving the surface "floating" in space. To set the display type for an elevation graph, press **Spacebar** until the desired option is visible.

Surface. These four settings specify the three-dimensional "surface" for a surface or wireframe graph. The first determines color of the surface itself and affects only surface graphs. Refer to *Colors* in the *Common Definition Items* section of this chapter for information on how to select ANGOSS colors.

The second setting specifies how surface contouring is accomplished. There are three options: Bands, Lines, and Off. If Bands is selected, contours are drawn as solid bands of color. If Lines is selected, they are drawn as lines. If Off is selected, no contours are drawn on the surface. To set contouring, press **Spacebar** until the desired option is displayed.

The third and fourth settings determine the color and size of grid lines on the surface. For information on selecting colors and line sizes, refer to *Common Definition Items* earlier in this chapter.

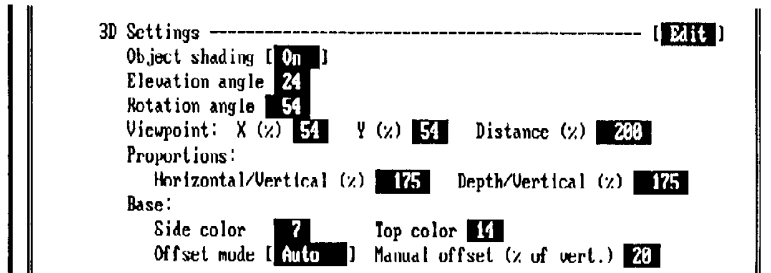
Base. These six settings specify the base for an elevation graph. The first two, Color and Contouring, are identical in operation to their counterparts for the surface (see above). The next two, Edge Color and Edge Size, determine the characteristics of the base outline. See *Common Definition Items* in this chapter for information on how to specify these items.

The last two base settings determine how far below the rest of the graph the base is located. Offset Mode has two settings: Auto and Manual. Auto causes ANGOSS to determine the offset for you. Manual allows you to do it yourself. If you select Manual, you must also specify a manual offset distance expressed as a percent of the vertical axis. To specify manual offset, type an integer from 0 to 99 and press **Enter**.

3d Settings

The 3d settings allow you to "shape" the three-dimensional aspects of elevation and 3d business graphs. Figure 7-24 shows how the 3d Settings portion of a Business Graph Definition menu might look.

Figure 7-24. 3d settings for a 3d bar, 3d line, 3d area, 3d step, or 3d combination graph.



Object Shading. This setting determines whether certain faces of three-dimensional objects are darkened to enhance the illusion of depth. There are two options: On and Off. To set object shading, press **Spacebar** until the desired option is displayed.

Elevation Angle. This setting appears on menus for surface, wireframe, and non-pie 3d business graphs. It determines the height from which the 3d plot is "viewed." To specify the elevation angle, type an integer from 0 to 90 and press **Enter**.

Pie Elevation. This settings appears on menus for 3d pie graphs. It specifies the height from which each 3d pie is "viewed." To specify the pie elevation, type an integer from 0 to 90 and press **Enter**.

Rotation Angle. This setting determines the angle about the base from which a surface, wireframe, or non-pie 3d business graph is "viewed." To specify the rotation angle, type an integer from 0 to 360 and press **Enter**.

Viewpoint. These settings determine the point from which a surface, wireframe, or non-pie 3d business graph is "viewed." There are three settings for establishing the viewpoint: X, Y, and Distance.

X and Y determine the point inside the bounding rectangle of the plot that is in the viewer's direct line of sight. To specify either X or Y, type an integer from 0 to 100 and press **Enter**.

The viewing distance is the distance, as a percent of front-to-back plot size, from which the plot is viewed. To specify the viewing distance, type an integer from 50 to 1001 and press **Enter**. Shorter distances result in a stronger perspective effect. Longer distances result in a weaker perspective effect. A distance of 1001% disables perspective entirely.

Proportions. These two settings determine the shape of the three-dimensional plot. The first, Horizontal/Vertical, allows you to specify the length of the horizontal axis as a percent of the vertical axis. The second, Depth/Vertical, performs the same function for the depth axis. To change either setting, type an integer from 50 to 1000 and press **Enter**.

Base. The base settings allow you to specify the appearance and shape of the base on a non-pie 3d business graph. There are four base settings: Side Color, Top Color, Offset Mode, and Manual Offset. Refer to *Common Definition Items* for information on ANGOSS colors and how to specify them.

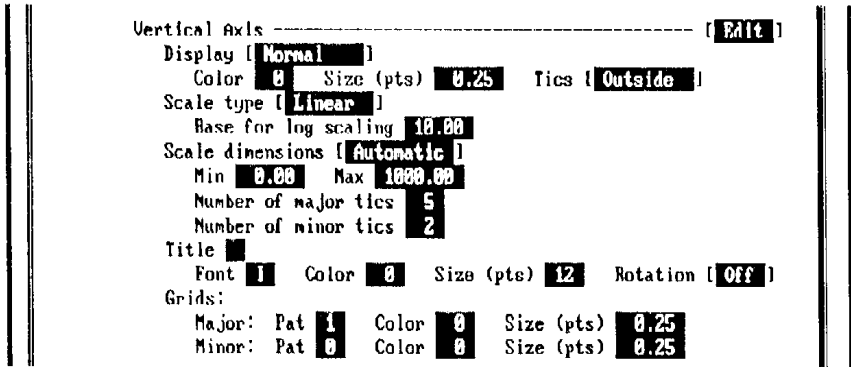
Offset Mode establishes how the "thickness" of the base is determined. There are two options: Auto (automatic) and Manual. If you select Auto, ANGOSS establishes the thickness for you. If you select Manual, you determine the thickness yourself with the Manual Offset setting. To specify the offset mode, press **Spacebar** until the desired option is visible. To specify manual offset, type an integer from 0 to 100 and press **Enter**.

Axis Settings

The axis settings allow you to configure the axes on non-pie business graphs and on high-low, scientific, and elevation graphs. Figure 7-25 shows how the Axis Settings portion of a Graph Definition menu might look for the vertical axis on most business graphs.

NOTE: The numeric formatting of labels on a measurement axis is taken from the values referenced on the worksheet. For example, if values plotted on a bar graph are formatted as currency with two-place precision, the labels on the vertical axis will have the same formatting.

Figure 7-25. Typical axis settings for the vertical axis of a business graph.



Display (axis display). There are four settings for determining the basic display characteristics of an axis. The first sets the display mode; the second, the color; the third, the size; and the fourth, the position of tics. For information on how to specify colors and line sizes, refer to *Common Definition Items* earlier in this chapter.

The setting for display mode has three options: Normal, Line-Only, and Off. Normal displays a line, tics, and an axis title. Line-Only displays a straight line and a title, but no tics. Off displays no line, no tics, and no title. To set the axis display mode, press **Spacebar** until the desired option is visible.

There are four options for tic position: Inside, Centered, Outside, and Off. Inside places the tics inside the plot interior. Outside places them outside the plot interior. Centered puts them centered directly over the axis. Off disables tics completely. To set the tic position, press **Spacebar** until the desired option is displayed.

Scale Type. This setting is available for any axis used for measurement. This includes vertical, auxiliary, and radial axes, as well as all axes on elevation graphs.

There are three options for scale type: Linear, Log, and Percent. They result in linear, logarithmic, and percent scales, respectively. To select a scale type, press **Spacebar** until the desired option appears. If Log is selected, you must enter a log base. To do this type a positive number up to 1000.00. and press **Enter**.

Scale Dimensions. There are five settings for controlling the dimensions of an axis scale. The first is dimensioning mode, for which there are two options: Automatic and Manual. If you select Automatic, ANGOSS configures the scale for you, based on the data. If you select Manual, you must specify scale minimum and maximum and the number of major and minor tics.

Scale minimum and maximum are the numeric labels that mark the lower and upper ends of an axis used for measurement. To specify these, type a number from -999,999,999.00 to 999,999,999.00 and press **Enter**.

NOTE: The value entered for scale minimum must be less than that for scale maximum.

Major tics normally appear at each division, marked value, or series. Minor tics normally appear only at unmarked, intermediate values on axes used for measurement. To specify the number of major or minor tics, type a number from 0 to 99 and press **Enter**.

Title. There are five settings for the axis title: text string, Font, Color, Size, and Rotation. To specify the text string to be used in the title, type the text and press **Enter**. Your string can be up to 64 characters long, and can include any of ANGOSS' text control characters. For information on text control characters or on specifying fonts, colors, or character sizes, refer to *Common Definition Items* earlier in this chapter.

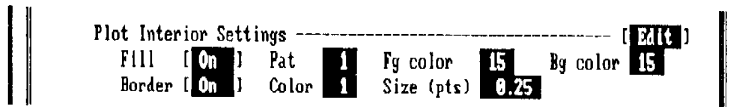
The rotation setting determines whether the axis title is oriented vertically or horizontally. It has two settings: Off and On. If you select Off, the title is oriented horizontally in relation to the graph. If you select On, it is oriented vertically.

Grids. The grid settings allow you to specify attributes of lines that extend from tics through the plot interior. There are three settings each for major and minor grid lines: Pat (pattern), Color, and Size. Refer to *Common Definition Items* for information on how make these settings.

Plot Interior Settings

The plot interior settings control the backdrop behind the plotted data for many graph types. They should not be confused with the area settings, which control the background of the plot area as a whole. For a description of the plot interior refer to *Components of a Graph* earlier in this chapter. Figure 7-26 shows how the Plot Interior portion of a Graph Definition menu might look.

Figure 7-26. Plot interior settings on a Graph Definition menu.



Fill. There are four settings that control the fill for the plot interior: an on/off toggle, a setting for fill pattern, a setting for foreground color, and a setting for background color. For information on selecting colors and fill patterns, refer to *Common Definition Items* in this chapter.

Border. Border settings control the lines that mark edges of the plot interior not covered by axes. There are three border settings: an on/off toggle, a color setting, and a point size. Refer to *Common Definition Items* for information on how to specify colors and line sizes.

Defining the Legend

Colors and symbols displayed in the legend are controlled by plot area settings. Colors and symbols for business, high-low, and scientific graphs are specified in the series information table. Colors for elevation graphs are specified in the contour color table.

Legend labels are controlled by the Text Settings portion of a Graph Definition menu. Attributes for text in business, high-low, and scientific legends are those specified for series names. Attributes for text in elevation legends are those specified for numeric text.

NOTE: The numeric formatting of labels in the legend of an elevation graph is taken from the values referenced on the worksheet. For example, if values plotted on an elevation graph are formatted with three-place precision, the labels in the legend will have the same formatting.

For information on area settings, refer to *Defining Areas* earlier in this section.

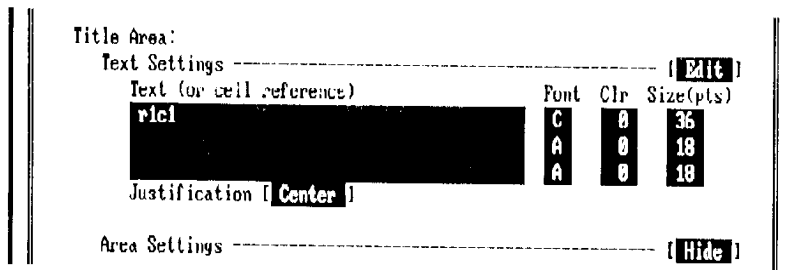
Defining Titles and Footnotes

The title and footnote areas each display up to three lines of text. The text can be entered directly in the Text Settings table on the Graph Definition menu or referenced on the worksheet. The Text Settings table has space for defining three 128-character lines. Blank lines at the end of the title or

footnote are ignored. Figure 7-27 shows the title area settings as they might look for a business, high-low, scientific, or elevation graph.

For information on area settings, refer to *Defining Areas* earlier in this section.

Figure 7-27. Title area settings on a Graph Definition menu. (Settings for footnote area are identical.)



Text. This setting specifies the actual text for a specific line in the title or footnote. It can contain up to 128 characters or, if you prefer, a reference to a cell containing up to 128 characters. In either case, the entire set of ANGOSS text control characters is available for bolding, underlining, changing fonts, etc. For information on entering cell references or using text control characters, refer to *Common Definition Items* earlier in this chapter.

Font, Color, and Size. These settings determine the attributes of the line. Refer to *Common Definition Items* earlier in this chapter for information on these settings.

Justification. This settings specifies the horizontal position of the line *with respect to the longest line* in the title or footnote. There are three options: Left, Right, and Center. If you select Left, the line is aligned flush left with the longest of the three lines. If you select Right, it is aligned flush right. And if you select Center, it is centered in relation to the longest line. Justification has no effect on a single line title or footnote or on the longest line in a title or footnote.

IMPORTANT: The justification setting should not be confused with the alignment setting (see *Defining Areas*). Justification controls the position of lines within the title or footnote area while alignment controls the position of the area itself without regard to how lines are

justified. Thus, to create a footnote in which all lines are left aligned in a block in the lower right corner of the graph, justification is set to Left and alignment is set to Right.

Defining the Background

The background of a graph serves as a backdrop for all other graph components. All settings for the background are included in the area settings. For information on making area settings, refer to *Defining Areas* earlier in this chapter.

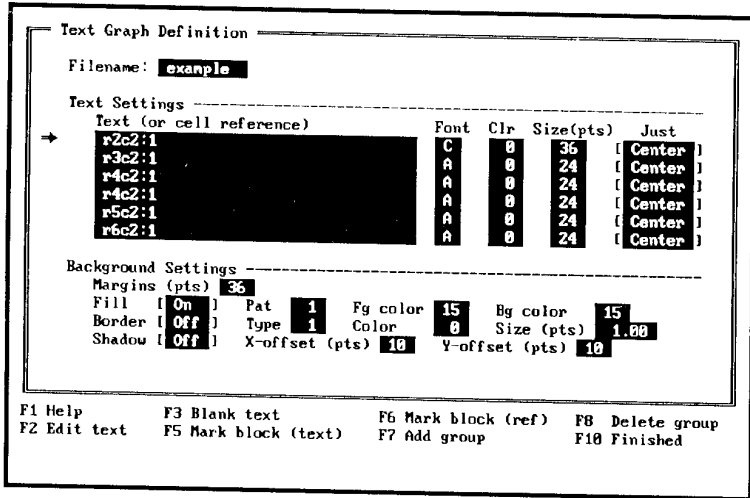
Defining Text Graphs

The settings for text graphs are identical to those for titles and footnotes with the exception that justification can be specified separately for each line. Refer to *Defining Titles and Footnotes* for information on text and justification settings. For information on setting font, color, and point size for each line, refer to *Common Definition Items* earlier in this chapter. For information on the background settings for a text graph, refer to *Defining Areas*.

Up to 40 254-character lines can be included on a text graph. To add a line to the text settings table *after* the current line, press **F7**. To delete the current line, press **F8**. Figure 7-28 shows how the menu might look for a seven line text graph when all text is contained in worksheet cells.

NOTE: Blank lines at the beginning or end of the table are ignored. Blank lines in the middle of the table result in a blank line in the last point size used on the graph.

Figure 7-28. Text Graph Definition menu on which text is referenced in worksheet cells.



Defining Composite Graphs

Composite graphs allow you to combine up to eight metafiles with a CGM background to produce a single composite image. Figure 7-29 shows a menu on which a text graph (qtr1.cgm) is combined with a hollow background bar graph (sales.cgm) superimposed over a world map from a drawing application (world2.cgm).

Figure 7-29. Composite Graph Definition menu.

Composite Graph Definition

Filename: **example**

Metafile Settings

Metafile Name	Location	CGM Bg
c:\smartii\titles\qtr1.cgm	[Top]	[Normal]
d:\pictures\maps\world2.cgm	[Bottom]	[Normal]
c:\smartii\sales\sales.cgm	[Bottom]	[Normal]
	[Full]	[Normal]
	[Full]	[Normal]
	[Full]	[Normal]
	[Full]	[Normal]
	[Full]	[Normal]
	[Full]	[Normal]

CGM Background Settings

Margins (pts) **36**

Fill [On] Color **15**

F1 Help F3 Blank text F10 Finished
 F2 Edit text F6 Available choices

Metafile Name. This setting specifies a metafile to be included in the composite. To enter a metafile name, type the name, including path and .cgm or .gmf extension, and press **Enter**. Up to 80 characters can be included in the metafile name.

NOTE: Metafiles are rendered in the order they are listed in the table. Thus, if a metafile is to appear "behind" another metafile, it must be listed ahead of it in the table.

Location. This setting determines the location and size of the metafile. There are nine options: Full, Left, Right, Top, Bottom, Top Left, Top Right, Bottom Left, and Bottom Right. Full renders the metafile as large as possible, *disregarding the margins setting*. Left, Right, Top, and Bottom render the metafile as large as possible in the specified *half* of the screen or printable area. The last four options render it as large as possible in the specified *quadrant*. To specify the location, press **Spacebar** until the desired option is visible.

CGM Bg (CGM background). This setting specifies whether the CGM background is to be rendered. There are two options: Normal and Transp (transparent). If you select Normal, the background is rendered. If you select Transp, it is omitted and objects behind it are visible. To specify the background, press **Spacebar** until the desired option is displayed.

NOTE: The CGM background should not be confused with the normal background on non-composite graphs. The CGM background is a special background included in composite graph metafiles and some metafiles imported from other applications. It differs from the normal ANGOSS background in that it has no specific size or shape, it cannot include a fill pattern, and it can be disabled when the metafile containing it is used in an ANGOSS composite graph. You can add a CGM background to an ANGOSS metafile by specifying a hollow fill pattern (pattern 0) for the background then making it the only metafile on a composite graph.

Margins, Fill, and Color. For information on setting the margins, refer to *Defining Areas* earlier in this chapter.

Fill. This setting toggles the CGM background on and off. There are two options: On and Off. On causes a CGM background of the specified color to be included in the graph. Off disables the CGM background. To specify the fill, press **Spacebar** until the desired option is visible.

Color. For information on specifying ANGOSS colors, refer to *Colors* in the *Common Definition Items* section of this chapter.

Generating Metafiles

A metafile (CGM file) is an industry standard file for storing graphic images. In order to use a graph in a Word Processor document, composite graph, or third party application, you must first generate a metafile. You cannot generate a metafile from quick.gdq without first generating a graph definition file. For information on how to do this, refer to *Generating a Graph Definition File from a Quick Graph* earlier in this chapter.

To generate a CGM file from a graph definition file or GMF file, select Graph Metafile from the Spreadsheet menu, then select a filename from the prompter and press **Enter**. The prompt `Convert text to polygons?` ANGOSS.CGM files with polygon text are larger and slower to print, but always look the same, even when printed by applications other than ANGOSS. Files with unconverted text print using ANGOSS' filled-area fonts. They are smaller and faster to print, but the text in them looks different when they are used outside of ANGOSS.

NOTE: You can interrupt the generation of a complex metafile by pressing **Esc**.

Viewing, Printing, and Plotting Graphs

Graphs and metafiles can be rendered on the screen or on the currently selected printer or plotter. The process is similar in each case. To view a graph or metafile on the screen, select Graph View. A prompter appears listing all the graph definition files, CGM files, and GMF files in the current directory. Select a filename and press **Enter**. When you are finished viewing the file, press **Esc** to return to the Spreadsheet menu.

To print a graph or metafile, select Graph Print. A prompter appears listing all the graph definition files, CGM files, and GMF files in the current directory. Select a filename and press **Enter**. You are asked whether the file is to be printed in landscape or portrait mode. If you select landscape, the long side of the paper is at the top of the image. If you select portrait, the short side is at the top.

To plot a graph or metafile, select Graph Xy-Plot. A prompter appears listing all the graph definition files, CGM files, and GMF files in the current directory. Select a filename and press **Enter**.

NOTE: You can interrupt the rendering of a complex image by pressing **Esc**. If the image is being rendered on screen, the interruption is immediate. If the image is being rendered to a printer or plotter, you are first asked to confirm the interruption.

Erasing Graphs and Metafiles

The Graph Erase command provides a convenient way to erase unneeded graph definition files and metafiles. To erase a file, select Graph Erase. A prompter appears listing all the graph definition files, CGM files, and GMF files in the current directory. Select a filename and press **Enter**.

NOTE: Graph definition files and metafiles can also be erased using the Tools File Erase command. However, the filenames must be selected from a prompter containing the names of all files in the current directory.

Setting Graph Defaults

Each time you view a quick graph or create a new graph definition file, ANGOSS refers to a set of default settings. You can change these settings to produce a new set of defaults. The new settings are reflected in future quick graphs and graph definition files, remaining in effect until the next time they are changed.

Chapter 7: Using ANGOSS Graphics

To change the default graph definition settings, select Graph Set-Default. Six options appear, reflecting the six classes of ANGOSS graphs. When you select a class, a definition menu appears that is similar to the normal definition menu for the selected class. Edit the settings, then press **F10** to exit and save. For information on how to make an individual setting, refer to instructions for the same setting on a normal graph definition menu. (See *Defining Graphs* earlier in this chapter.)

Chapter 8: ANGOSS Integration

One of the best reasons to use the ANGOSS Software System is its powerful integration capabilities. You can transfer worksheet data contained in ANGOSS Spreadsheet to any other ANGOSS module. ANGOSS Spreadsheet data can be converted to many different file formats, so you can export your worksheet to software packages other than ANGOSS. Likewise, ANGOSS can process files imported from other software packages.

This chapter is organized into two basic sections:

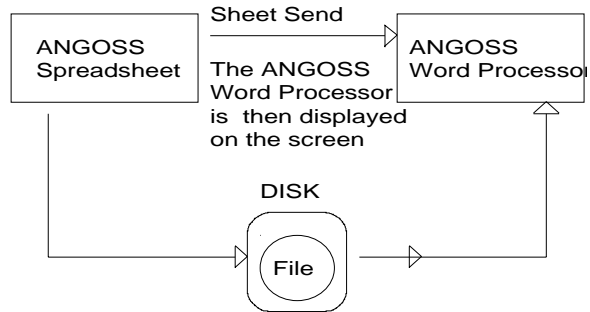
- Integration with Other ANGOSS Modules
- Integration with Other Software

Integration With Other ANGOSS Modules

ANGOSS Spreadsheet offers three commands that allow you to transfer worksheet information between ANGOSS modules: Sheet Send, File Import, and File Export.

The diagram in Figure 8-1 illustrates the difference between integration using the SEND command and the IMPORT and EXPORT commands.

Figure 8-1



Notice that the Sheet Send command transfers the data from the Spreadsheet module and immediately accesses the other module. The File Export command transfers the data from a worksheet to a file that can be used now or later. File Import allows you to use files created outside ANGOSS Spreadsheet.

Sheet Send

The Sheet Send commands allow you to access any other ANGOSS module and transmit worksheet information to it.

Sending to ANGOSS Communications. You can send an entire worksheet or a worksheet block to ANGOSS Communications as a document file, a graphics metafile, an ANGOSS file, or as an ASCII text file.

By executing the Sheet Send Communications Document command, your worksheet data will be sent to ANGOSS Communications in ANGOSS Word Processing document file format for transmission to another terminal. By sending data in document format, you can retain any

special fonts that currently appear in your worksheet. The document format converts your worksheet data into the same format as an ANGOSS Word Processor document file with a .doc file extension.

Executing the Sheet Send Communications Graphics command enables you to send a graph to ANGOSS Communications. Graphs are stored as graphics metafiles. Metafiles are created from Graph Definition files by means of the Graph Generate Metafile command.

Executing the Sheet Send Communications ANGOSS command enables you to send worksheet data in the ANGOSS Data Interchange format. This is a specially formatted ASCII file used for passing information between ANGOSS programs.

The Sheet Send Communications Text command sends worksheet information in a standard ASCII text file format.

NOTE: The Sheet Send Communications commands do not send a worksheet file in a format that retains formula entries. If you wish to use the ANGOSS Communications module to transmit an actual worksheet file to another computer, use the Data Transmit Xmodem command to transmit the worksheet file from disk.

Sending to ANGOSS Database. If you have installed ANGOSS Database, you can send worksheet data to a Database file by executing the Sheet Send Database command. When the command is executed, the Database program is automatically accessed, and the new file is displayed on the screen. A unique name is assigned to the new file.

Sending to ANGOSS Word Processor. If you have installed ANGOSS Word Processor, you can send an entire worksheet, a worksheet block, or a CGM file (computer graph metafile) to be included in a word processing document. Options for the Sheet Send Wordprocessor command include Document, Graphics, or Both.

The document format converts your worksheet data into the same format as an ANGOSS Word Processor document file with a .doc file extension. Once it is converted, your information can be manipulated in ANGOSS Word Processor in the same way as any other document file. Also, any fonts you entered in your worksheet are preserved by using the Document option.

Selecting the Graphics option enables you to send a CGM to ANGOSS Word Processor. CGM files are created from graph definition files using the Graph Metafile command. Once you've sent a graph to ANGOSS Word Processor, you can insert it in any document.

Refer to *ANGOSS Word Processor* for information on using graphs within word processing documents.

The Both option allows you to send both a worksheet or worksheet block and a graph metafile to the Word Processor at the same time.

File Import

The File Import command can be used to read a file created outside ANGOSS Spreadsheet. The file can be a space delimited text file (a file written to a file from another ANGOSS module using that module's File Export command) or a file created by another software package.

To use a file created by another ANGOSS module, a comma-delimited ASCII file, or a flat text file, select File Import Text and enter the filename.

File Export

The File Export command can be used to write your worksheet file to a space delimited text file format that can be read by another ANGOSS module at a later time. File Export can also create files compatible with other software packages.

To create a file to be used by another ANGOSS module, select File Export. Specify whether you want to use a worksheet block or the entire worksheet. Select the WP-Doc option to create a file to be used by ANGOSS Word Processor. Otherwise, select the Smart option.

Worksheets exported to ANGOSS Word Processor will have the .doc extension. Worksheets exported using the Smart option will have the .dat extension.

Integration with Other Software Formats

In addition to integrating with other ANGOSS modules, ANGOSS Spreadsheet is also capable of integrating with several non-ANGOSS file formats, in both importing and exporting capacities.

File Import

ANGOSS Spreadsheet's File Import command can be used to read an ASCII text file, a Lotus 1-2-3 Release 1A or 2 worksheet file (but not a Symphony file), a SYLK (Multiplan) format file, or a DIF (Data Interchange Format) file into your current worksheet window.

To read a file created by another software package, select File Import and the appropriate file type. Then enter the name of the file to be imported.

File Export

The File Export command in ANGOSS Spreadsheet enables you to write all or part of your worksheet to a variety of file formats that can be used by other software packages. You can use the

command to write your ANGOSS worksheet files to DIF files, or ASCII text files, or to format files that can be read by Lotus 1-2-3 Release 1A or 2.

To create a file that can be used by another software package, select File Export. Specify whether to use a worksheet block or the entire worksheet. Then select the appropriate file type, and enter a filename for the file to be created.

If you select the ASCII option, the resulting file is given an ".asc" extension as the default extension. Selecting the Dif option produces a file with a ".dif" extension. Selecting the Text option produces a flat text file with a ".txt" extension. Selecting the 123 option produces a file with a ".wks" extension. Selecting the R2-123 option produces a file with the ".wk1" extension.

To override the default extension, enter both a filename and an extension in response to the prompt.

Chapter 8: ANGOSS Integration

Chapter 9: ANGOSS Spreadsheet Command Reference

This chapter explains the purpose and format of each ANGOSS Spreadsheet command. Menu keywords are presented in this chapter in the same order in which they appear on the ANGOSS Spreadsheet keyword menu.

Four of the keywords, Tools, Help, Remember, and Quit, are applicable to all ANGOSS modules. Discussions of these keywords are general, with details being limited to Spreadsheet usage. For more information on the use of these commands, refer to *ANGOSS Software System* and *Project Processing*.

Basic Concepts

Before you begin, there are several concepts and techniques with which you should be familiar. If you have not used an electronic spreadsheet before, we suggest that you read the first eight chapters of *ANGOSS Spreadsheet* and that you also use the Spreadsheet Tutorial. If you are familiar with electronic spreadsheets, the sections that follow will provide brief descriptions of ANGOSS Spreadsheet concepts and techniques.

Data Entry and Command Modes

ANGOSS has two operating modes. Use Data Entry mode to enter information into the worksheet. Use Command Mode to execute ANGOSS commands. Press **Esc** to switch from one mode to the other. From Data Entry mode, press **/** to execute one command and return to Data Entry.

When you enter ANGOSS Spreadsheet, the program is in Data Entry Mode. If you enter Command Mode (by pressing **Esc** or **/**), you will see the following keyword menu:

```
Sheet Edit File Layout Print Graph Tools Window Help Remember  
Quit
```

Using Commands. To execute a command, select from the keywords and the appropriate keyword options.

To cancel a command while selecting options or answering prompts, press **Esc**. To repeat execution of the previous command, press **F9**. To edit the format of the previous command, press **Alt X**. The revised command will be executed when you press **Enter**.

Quick Keys are specially defined keys that execute certain common commands. They are function keys, such as **F10**, or combinations of keys, such as **Ctrl O**. When using key combinations, hold the first key down while you press the second key. Press **F2** to page through a list of keys, shown in the Control Area of the screen.

Entering Data. While in Data Entry mode, you can enter text, numeric values or formulas into cells. If the first letter of the entry is an alphanumeric character (such as a letter, a space, or quotation marks), ANGOSS considers the entry to be text. If the first character is a number or a currency symbol, the entry is considered to be a numeric value. Use "@" or "#" to enter dates. Use ":" or ";" to enter time.

Formulas and Recalculation. If the first character of an entry is an equal sign (=), the entry is a formula. A formula can contain numbers, cell or block references, ANGOSS functions, parentheses, and operators (such as +, >, or AND). Valid arithmetic operators are as follows:

Operator	Meaning
+	Addition
-	Subtraction
*	Multiplication
/	Division
^	Exponentiation

Many ANGOSS functions also allow the use of relational operators and logical operators. A relational operator expresses a relationship between two items. Logical operators are used to connect and evaluate pairs of expressions. Valid relational and logical operators are as follows:

Operator	Meaning
=	equal to
>	greater than
<	less than
>=	greater than or equal to
<=	less than or equal to
<>	not equal to
!	contains (text)
!!	does not contain (text)
==	compare text, ignoring case
AND	returns TRUE if both logical expressions are true
OR	returns TRUE if either logical expression is true

Refer to *ANGOSS Formula Reference* for additional information on operators and for complete instructions on the use of ANGOSS functions.

To recalculate all of the formulas in the current worksheet, press **Shift F5**. To recalculate only those formulas that need to be recalculated, press **F5**.

You can enter a formula in a cell by typing the necessary values, operators, and cell references. You can also use the pointing technique to mark cells to be used in a formula.

Cell References

Cells are identified by their locations. For example, "r1c1" refers to the cell at the intersection of row 1 and column 1. To indicate a range of cells, use a colon to separate the start and end points. The reference "r1:5c2" means "rows 1 through 5 in column 2." "Rows 1 through 5 in columns 2 through 6" is written "r1:5c2:6."

Naming Cells. You can assign names to cells or blocks of cells. Then, while building a formula or responding to a prompt, you can simply enter the name instead of the reference.

External Worksheets. Formulas and some commands can refer to cells in active worksheets other than the current worksheet. To refer to an external worksheet, enter the filename of the worksheet, followed by a period, followed by the cell or block reference or name.

Examples:

income.r4:18c2

income.qtr1

Absolute and Relative References

An absolute cell reference refers to one particular cell or block of cells. Use brackets to indicate absolute references: r[1]c[1]. A relative cell reference refers to where a cell or block of cells resides in relation to a formula cell. Omit brackets to indicate relative references: r1c1. A combination reference contains both: r[1]c2.

The use of absolute or relative references in a formula has no effect on the calculation of the formula. Absolute and relative references are used only by the Edit Copy command to determine how a formula is to be copied. When you copy an absolute reference, you literally use the same reference. When you copy a relative reference, the reference is adjusted to fit the destination.

For example, if r1c1 contains a rate (15%) and r2:3c1 contain dollar amounts, a percentage formula in r2c2 could be "r[1]c[1]*r2c1." If you copy the formula down to r3c2, you still want to use the rate in r[1]c[1], but you want ANGOSS to adjust the new formula to use the dollar amount from r3c1.

Editing Cells and Formulas

After data has been entered into a cell, the contents of the cell can be revised without retyping the entire entry. To access the Cell Editor and edit the contents of a cell (whether text, value, or formula), press **Alt E**.

The Formula Editor is available for entering or revising formulas, especially large or complex ones. To access the Formula Editor, press **Alt F**.

Moving the Highlighter

To move the highlighter around the worksheet, use the cursor movement keys: **up**, **down**, **left**, and **right arrows**. To move to the top row in the current column, press **Home**. To move to the bottom row of the current column, press **End**. To move the highlighter to r1c1 (or to the first cell not part of a fixed title), use **Ctrl Home**. To move the highlighter to the last row containing data in column 1 (or the first column not part of a fixed title), use **Ctrl End**. You can also use **PgUp** and **PgDn** to move up or down a screen at a time.

To move the highlighter to a specific cell, press **F4**, then **C**, and specify the cell.

Marking Blocks

A cell or a block of cells can be specified when building a formula in Data Entry Mode or when executing a command. At the command prompt `Enter name or block reference:`, you can respond in one of several ways.

- Type the block's name and press **Enter**.
- Select a named block from a prompter listing that will be displayed when you press **F4**.
- Type the block reference (i.e., r4:l2c2:5) and press **Enter**.
- Use the "pointing technique" to mark the block. Move the cursor keys to "point" to the cells that are to be in the block. The highlighter expands, covering the included cells. Press **F2** at any time to specify a new starting point for the definition; this is called "dropping anchor." Press **Enter** to complete the block definition.
- A block can consist of one cell. If the block to be defined is the current cell, just press **Enter**. Otherwise, move the highlighter to the desired cell, press **F2** to drop anchor, then press **Enter**.

You have the same options when building a formula in Data Entry Mode. In addition, **F3** is a toggle key controlling the use of absolute and relative cell references in the formula.

Marking Rows and Columns

Some commands ask you to specify rows or columns. At the prompt `Enter number of rows:`, you can type a number and press **Enter**. Or you can press **down arrow** to expand the

highlighter to cover the number of rows to be included. If you go too far, you can press **up arrow** to decrease the number of rows, but you cannot drop anchor. Press **Enter** to complete the definition.

At the prompt `Enter number of columns:`, you can type a number and press **Enter**. Or you can press **right arrow** to expand the highlighter to cover the number of columns to be included. If you go too far, you can press **left arrow** to decrease the number of columns, but you cannot drop anchor. Press **Enter** to complete the definition.

Definition Menus

Some commands allow you to define settings from a list of options and prompts called a "definition menu." Select an option by positioning the highlighter over it. Respond to a prompt by entering the information in the field next to the prompt. Several keys are available to help you define settings.

- For help, press **F1**.
- To move around the menu, use the cursor movement keys.
- To move the highlighter one option to the right, press either **Spacebar** or **+**. To move the highlighter to the left, press **Backspace** or **-**.
- To edit the contents of a field without retyping the entire entry, press **F2**. You can move the cursor within the field and make necessary changes. Insert Mode can be toggled on or off by pressing **Ins**. Press **Enter** to complete the entry.
- To blank the contents of a field, press **F3**.
- To specify an area of the worksheet, enter a name or a block reference. If you prefer to point to a block or block name, press **F6**. The worksheet appears, allowing you to mark the block or select a block name. When you press **Enter**, the definition menu returns; your selection has been recorded in the field.
- In some cases, pressing **F6** provides a list of available options from which to select.
- To record the settings and leave the definition menu, press **F10**. Press **Esc** to abandon the definition.

Prompter Listings

Many commands provide prompter lists of available files. Select a file by positioning the pointer next to its name and pressing **Enter**. You can also type the name in response to the prompt.

Prompter listings provide other information and options. Refer to *ANGOSS Software System* for additional instructions.

Classifying Commands by Function

This section classifies commands and command groupings by function.

Getting Help

Help commands Furnish help on selected topics and on the current command.
Run Spreadsheet tutorial.

Moving Between Cells, Worksheets, or Windows

Sheet Goto Moves the highlighter through a worksheet or between
worksheets, or from one window to another.

Creating and Modifying Worksheet Data

Command	Action
Edit Blank	Removes data from specified areas of your worksheet, leaving blank cells
Edit Copy	Duplicates the contents (including formulas) of cells.
Edit Delete	Deletes rows, columns, or a block of cells
Edit Edit-Cell	Allows changes to the contents of one cell
Edit Fill	Fills designated area of cells with values incremented or decremented by a specified amount
Edit Hide	Allows areas of the worksheet to be temporarily blocked from view
Edit Unhide	Restores hidden areas to an unhidden status
Edit Insert	Inserts blank columns, rows, or blocks
Edit Move	Relocates data to another area of the worksheet

Command	Action
Edit Sort	Sorts worksheet data
Edit Value-Copy	Copies text, values, or the results of formulas
Sheet Name	Assigns a name to a cell or block of cells

Formatting Worksheet Data

Command	Action
Layout Cell-size	Controls cell height and width
Layout Default	Controls the format for new entries
Layout Format	Changes format of existing value data and presets format for new value entries
Layout Justify	Controls the alignment of existing text and value entries
Layout Worksheet-Options	Provides a definition menu for setting formats for new entries in the current worksheet or future worksheets. Also allows specification of print settings

Auditing Worksheet Data

Commands	Action
Sheet Audit	Highlights various kinds of cells for debugging purposes
Sheet Find	Moves the highlighter to a cell containing a specified type of entry.

Controlling Recalculation

Command	Action
Sheet Calc-Mode	Specifies when recalculation is to be done, and in what order. Allows iterative recalculations
Layout Worksheet- Options	Sets default recalculation order
Tools Preferences Spreadsheet	Sets default recalculation mode

Using Fonts

Layout Set-Font Controls the use of fonts in a worksheet.

Using Matrix Mathematics

Sheet Matrix Allows you to perform matrix mathematics calculations.

Protecting Worksheets

Command	Action
Sheet Lock	Restricts access to cells and formulas.
Sheet Unlock	Removes restricted access to cells
File Password	Attaches or removes a password from a file

Creating Graphs

Command	Action
Graph Quick	Generates a graph quickly and easily. You simply mark a block of data in a worksheet and specify what class of graph you want it to be. The graph is then generated based on the data you have marked and the settings controlled by the Set-Default command.
Graph Define	Allows you to create a graph definition file from scratch or to edit an existing graph definition
Graph View	Displays graphs on screen
Graph Metafile	Creates a CGM (computer graphics metafile) from a graph definition file
Graph Print	Sends a graph definition file or CGM file to the current printer
Graph Xy-Plot	Sends a graph definition file or CGM file to the current plotter.
Graph Erase	Deletes a graph definition file or CGM file
Graph Set-Default	Allows you to set defaults to control many aspects of the appearance of your graphs. These values are used to create graphs with the Graph Quick command, and they appear as default when you create a new graph definition file.

Printing

Command	Action
Print Worksheet	Prints all or part of a worksheet
Print Formulas	Prints a list of formulas

Command	Action
Print Map	Prints a coded map of the worksheet, showing the types of data in each cell
Print Report	Produces data from one or more worksheets in a report format, with optional page headings and footings
Print Options	Defines page size and paper path, optional headings and footings, line spacing and other print settings used by the Print Worksheet command. These settings affect the current worksheet only
Print Preset	Sets defaults of Print Option items for all new worksheets.

Transferring Data

Command	Action
Sheet Send	Integrates worksheets with other ANGOSS modules
File Combine	Adds, subtracts, or copies data from an external worksheet to the current worksheet
File Import	Reads various file formats into the current window to interface with other popular program file formats
File Export	Allows you to write worksheets to files and to convert your files to popular program file formats

Controlling Worksheet Window Display

Command	Action
Window Split	Splits screen horizontally or vertically, creating multiple windows
Window Close	Returns a split screen to its former state
Window Paint	Assign colors to various parts of the worksheet
Window Zoom	Expands and collapses the current window of a split screen
Window Numbers	Toggles the display of column and row numbers
Window Titles	Fixes designated rows or columns in place
Window Border	Toggles the display of the border surrounding your worksheet
Window Link	Connects windows for simultaneous scrolling
Window Unlink	Disconnects linked windows.

Performing File Operations

Command	Action
File Load	Copies a worksheet into memory and displays it in the current window
File Save	Records the current worksheet in a file
File Unload	Deactivates a worksheet and removes it from the current window

Command	Action
File Activate	Loads a worksheet into memory but does not display it in a window
File Newname	Allows you to change the name of the current worksheet.
File Display-Active	Displays a list of active files.
Tools File commands	Provides various operations such as copying and deleting of files

Building and Using Project Files

Remember commands

Creates and executes project processing files.

Sheet Commands

The Sheet commands allow you to audit your worksheets for specific entries or for potential errors, to specify calculation mode and order, to control access to cells and formulas in your worksheets, and to integrate ANGOSS Spreadsheet files with other ANGOSS module files.

Sheet Options

Sheet provides the following options:

Audit. Highlights various kinds of formulas and cells in your worksheets for debugging purposes.

Calc-Mode. Specifies when recalculation is to be done, and in what order. Allows iterative (repetitive) recalculations.

Find. Searches for and moves the highlighter to a cell containing a specified type of entry.

Goto. Moves the highlighter through a worksheet or between worksheets, or from one window to another.

Lock. Restricts access to cells and formulas in your worksheet.

Matrix. Allows you to perform matrix mathematics calculations.

Name. Assigns a name to a cell or block of cells.

Send. Allows you to integrate worksheets with other ANGOSS module files.

Unlock. Removes restricted access to cells in your worksheet.

Sheet Audit

The Sheet Audit options highlight cells that contain various types of entries. Use this command to locate and highlight formulas which reference empty or blank cells, all formulas referencing a specific cell, all cells referenced by a formula, unused formulas, and cells containing references to other worksheets.

You can also use the Sheet Audit command to highlight empty cells that have been predefined as value cells, cells containing circular references, or cells containing data not used anywhere.

Highlighting remains with the worksheet until it is edited or until the Sheet Audit Restore command is executed.

When you select the Sheet Audit command, ANGOSS asks you to indicate the type of cell entries you want to locate and highlight. Select one of the following options.

Sheet Audit Circular

Select the Sheet Audit Circular command to highlight cells containing formulas with circular references. A circular reference occurs when a formula directly or indirectly references its own cell.

When you select Sheet Audit Circular, ANGOSS highlights the first circular reference in the worksheet. To find subsequent circular references, press **F9**. Certain operations, such as entering new formulas and inserting rows or columns, cause ANGOSS to begin at the first reference again when they are performed between highlighting iterations.

Sheet Audit Circular can be executed only when natural order recalculation is used. When row order or column order is used, Sheet Audit Circular causes an error message to appear. If you switch to natural order recalculation prior to auditing for circular references, remember that recalculation is performed after the change, and some values may be zeroed out.

Sheet Audit Empty

Select the Sheet Audit Empty command to highlight any empty worksheet cells that were predefined as value cells using the Layout Format Block command.

Sheet Audit Formulas

Select the Sheet Audit Formulas command to see what kinds of cells are used by the formulas in your worksheet.

By selecting **Blanks**, you instruct ANGOSS to highlight any formula cells referencing blank, unformatted cells. Select **Xternal** to instruct ANGOSS to highlight all formula cells that contain

references to external worksheets. Selecting **Empty** instructs ANGOSS to highlight all formula cells that contain references to preformatted but empty cells.

The Child and Parent options allow you to identify the use of cell references in formulas. Selecting **Parent** highlights formula cells containing references to the current cell. **Child** highlights the cells referenced by the current cell's formula.

For example, suppose that r3c1 contains the formula "r1c1+r2c1." If you position the highlighter at either r1c1 or r1c2 and select the Parent option, r3c1 will be highlighted. If you position the highlighter at r3c1 and select the Child option, r1c1 and r2c1 will be highlighted.

Sheet Audit Formulas **Unused** instructs ANGOSS to highlight cells containing formulas which are not used elsewhere in the worksheet.

Sheet Audit Unused

Select Sheet Audit Unused if you want ANGOSS to highlight data cells that are not referenced elsewhere in your worksheet. When you select this option, ANGOSS asks you to identify the type of data cell to highlight.

You are given the choice of highlighting all the unused cells in your worksheet, only unused text cells, or only unused value cells.

Sheet Audit Restore

Select the Sheet Audit Restore command to restore your worksheet to its unhighlighted state.

Sheet Calc-Mode

The Sheet Calc-Mode command controls worksheet recalculation. You can choose to recalculate formulas automatically or manually. You can specify the recalculation order. You can also specify iterative (repeated) recalculations. In addition, you can view the recalculation settings for the current worksheet.

Options include Automatic, Manual, Display, Calc-Order, and Iterate.

Sheet Calc-Mode Automatic

The Sheet Calc-Mode Automatic and Manual commands control the timing of recalculations. When you choose Automatic, ANGOSS Spreadsheet recalculates formulas as soon as you make changes to the worksheet.

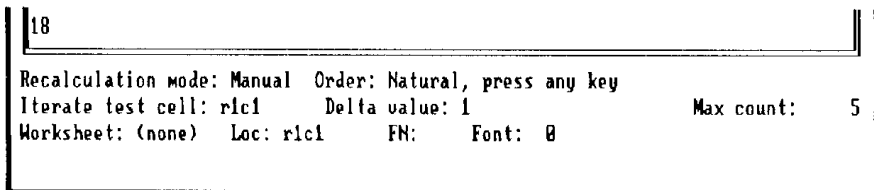
Sheet Calc-Mode Manual

When you select the Manual option, ANGOSS waits until you press the recalculation key, **F5**, before formulas in the worksheet are recalculated. In manual recalculation mode, ANGOSS reminds you that your worksheet should be recalculated by displaying CALC on the Status Line after changes are made.

Sheet Calc-Mode Display

The Sheet Calc-Mode Display command displays the current recalculation mode (either Automatic or Manual) and order (Natural, Row, or Column) in the Control Area of your screen. If you have executed the Sheet Calc-Mode Iterate Count command, the iteration count is also shown. If you have executed the Sheet Iterate Test command, ANGOSS shows the test cell, the delta value, and the maximum iteration count. Figure 9-1 is an example of a screen's Control Area after the Sheet Calc-Mode Display command has been executed.

Figure 9-1



Sheet Calc-Mode Calc-Order

The Sheet Calc-Mode Calc-Order command allows you to control the order in which your worksheet is calculated.

Natural-Order means that formulas are calculated in the order needed, not in the order of placement in the worksheet. **Row-Order** means that all formulas in Row 1 are calculated, then Row 2, etc. **Column-Order** means that the worksheet is recalculated by columns, beginning in Column 1, then moving to Column 2, and so on.

NOTE: Row-Order and Column-Order calculations begin processing in the upper left corner of the worksheet and proceed in the direction indicated. Therefore, if you use Row-Order or

Column-Order, proper placement of values and formulas in the worksheet is important. Unless you have a specific reason for using Row-Order or Column-Order, use Natural-Order recalculation.

Sheet Calc-Mode Iterate

The Iterate option of the Sheet Calc-Mode command is used to set conditions that affect the repetitions ANGOSS performs when recalculating the worksheet. Iteration can be set to meet a specific number of recalculation passes or specific test conditions. When you select the Sheet Calc-Mode Iterate command, ANGOSS prompts you to specify the conditions to establish.

To set the condition to a specific number of recalculations, select **Count** and enter the number of repetitions desired. ANGOSS will automatically recalculate the worksheet the number of times specified each time the worksheet is recalculated, regardless of whether you are performing Automatic or Manual recalculations.

To define a specific test condition, select **Test**. ANGOSS prompts you to enter the cell name or the cell reference of the cell containing the test formula.

ANGOSS asks you to `Enter delta value:`. The "delta value" will be used as the measure of significant difference between the results of one iteration and the next. As long as the difference between the two iterations is greater than the delta value, recalculation continues, up to the number of times specified. When the difference is less than or equal to the delta value, recalculation stops.

ANGOSS then prompts you to `Enter maximum number of iterations:`. Enter the maximum number of times that ANGOSS is to recalculate the formula in the event that the delta value convergence specified in the previous prompt is not attained.

If you find it necessary to stop an iterative recalculation in process, unload the worksheet.

To remove Count or Test recalculation processing from your worksheet, select **Remove**.

Sheet Find

The Sheet Find command instructs ANGOSS to look for and move the highlighter to a cell containing a specified type of worksheet entry.

According to your preference, the program can search a particular block or the entire worksheet to locate formula cells containing errors, empty preformatted cells, highlighted cells, and specific text or value entries. The search is conducted in a forward direction only, beginning at the cell following the current highlighter position, and stops on the first occurrence of the specified cell type or cell entry. You

can continue the search by pressing **F9** or **Alt R**; ANGOSS will then move to the next occurrence of the specified type of cell. When the last occurrence has been found, a message appears in the Control Area of your screen, informing you that no more occurrences exist.

IMPORTANT: ANGOSS searches left to right, row by row, beginning with the cell following the current cell. Cells to the left of or above the current cell will not be searched. If you want to include the whole worksheet in the search area, position the highlighter at r1c1 before executing the Sheet Find command.

When you select the Sheet Find command, ANGOSS prompts you to indicate the section of the worksheet you want to search. If you select **Block**, enter the name or a block reference of the area to be searched. The description of the block, including a block name, can consist of up to 40 characters. If you select **All**, ANGOSS searches from the cell following the current cell to the end of the worksheet.

Sheet Find Calc-Error

The Sheet Find Calc-Error command searches for formula errors. If an error is found, ANGOSS moves the highlighter to the cell and displays an error message in the Control Area of your screen. If no errors are encountered, ANGOSS displays the message `No Error found below current cell`.

NOTE: The Calc-Error option does not find Error 7 which is generated only when a formula refers to a cell containing another error. Correct all other errors and then recalculate to eliminate Error 7.

Sheet Find Empty

Use the Sheet Find Empty command to search for empty cells that have been preformatted as value cells. The highlighter moves to the first cell found.

Sheet Find Highlight

The Sheet Find Highlight command, normally used with a worksheet too large to be displayed on one screen, locates the first occurrence of a cell highlighted by one of the Sheet Audit commands.

Sheet Find Text

The Sheet Find Text command searches for specific text in the worksheet. You are prompted to enter the text string (up to 100 characters) to be located. ANGOSS moves the highlighter to the first occurrence of the specified string, ignoring upper and lower case differences.

NOTE: The Sheet Find Text command searches for text cells, or for formula cells returning text results. Formulas themselves are not searched for with this option.

Sheet Find Value

The Sheet Find Value command allows you to find a specific value in the worksheet. You are prompted to enter the value you want to locate. ANGOSS then moves the highlighter to the first occurrence of the specified value.

Sheet Goto

The Sheet Goto command allows you to move through a single worksheet, between several active worksheets, between windows, or to a new worksheet. By executing Sheet Goto, you can quickly and easily change the current worksheet, current worksheet window, or current highlighter position.

When you execute the Sheet Goto command, ANGOSS offers the following options: Cell, Sheet, Window or Other.

Sheet Goto Cell

To display a different part of the current worksheet, select the Cell option. Enter either a cell reference (e.g., r10c4) or name.

NOTE: You can also enter the name of a reference in an active, external worksheet (e.g., income.total). The worksheet containing the block name is displayed in the current window. If the block name is not found in any of the active worksheets, ANGOSS displays an error message in the Control Area of your screen.

Sheet Goto Sheet

To go to another active worksheet and display it in the current window, select the Sheet option. Type the name of the worksheet at the prompt and press **Enter**. The previously displayed worksheet remains active, even though it is not in the current window.

If you want to create a new worksheet while other worksheets are active, select (none) from the file prompter menu. A blank, unnamed worksheet is displayed. You can also use Sheet Goto Sheet (none) to return to an unnamed worksheet in which you have entered data.

If the worksheet that you want to appear in the current window is not active, execute the File Load command.

Sheet Goto Window

To move the highlighter to a different window on a split screen, select the Window option. Type the window number you want to go to and press **Enter**.

Refer to the instructions for the Window Split and Window Close commands for more information on using windows.

Sheet Goto Other

Select the Other option and press one of the cursor movement keys (i.e., **right, left, up, and down arrows**) to move the highlighter in the direction of the arrow. When the cursor movement keys are used in conjunction with the Sheet Goto command, the keys invoke the following actions:

- If the current cell does not contain data, the highlighter moves in the direction indicated by the cursor movement key until a cell containing data is located. The "filled" cell then becomes the current cell.
- If both the current cell and the adjacent cell in the indicated direction contain data, the highlighter moves in the direction you specified until it finds an empty cell. The last "filled" cell before the empty cell becomes the current cell.
- If the current cell contains an entry but the adjacent cell is empty, the highlighter moves in the direction indicated until it locates another cell that contains an entry. The "filled" cell becomes the current cell.

You can also use the **Home, End, Ctrl left arrow, and Ctrl right arrow** keys with the Sheet Goto Other command to jump to one of the edges of data in your worksheet. Table 9-1 lists the actions and their meanings.

Table 9-1

Key	Action	Meaning
Home	GOTO UPPER-EDGE	The highlighter moves up in the current column to the first row
End	GOTO LOWER-EDGE	The highlighter moves down in the current column to the last row

Key	Action	Meaning
Ctrl right arrow	GOTO RIGHT-EDGE	The highlighter moves right in the current row to the last column
Ctrl left arrow	GOTO LEFT-EDGE	The highlighter moves left in the current row to the first column

Sheet Lock

The Sheet Lock command is used to safeguard cells in the current worksheet by disallowing changes to their contents. Sheet Lock can be used to prevent the inadvertent alteration of your worksheet, or to permanently conceal its formulas.

Locked cells cannot be edited, deleted, blanked, or overwritten by the Edit Blank, Edit Copy, Edit Delete, or Edit Move commands. In addition, no new information can be entered into locked cells. Formulas can be protected so that they cannot be displayed, edited, or printed. Protected formulas can never be unprotected.

The locked status of cells can be temporarily disabled so that changes can be made. Locked cells can be permanently unlocked by using the Sheet Unlock command. Refer to the instructions for Sheet Unlock for more information on unlocking cells.

After you have selected the type of cell to be locked, you can specify a particular area of the worksheet to be affected: **Block**, **Columns**, or **Rows**.

Enter a block name or reference or the number of columns or rows, beginning with the current column or row.

NOTE: When locking a specified number of rows, Sheet Lock operates on the current row and the rows below the current row. When locking a specified number of columns, the command operates on the current column and the columns to the right of the current column.

Select **All** to include the entire worksheet.

The Sheet Lock command offers the following options: Blanks, Formulas, Text, Values, All, Disable, Enable, and Protect.

Blanks. When the Blanks option is selected, all cells containing no data or formulas in the current worksheet are automatically locked. This means that you cannot enter any information into new cells.

Formulas. The Sheet Lock Formulas command preserves selected cells containing formulas. You are asked to specify whether you want to lock a block of cells, certain columns or rows, or all cells containing formulas.

Text. Use the Sheet Lock Text command to lock selected cells containing text entries. You are asked to specify whether you want to lock a block of cells, certain columns or rows, or all cells containing text.

Values. The Sheet Lock Values command locks selected cells containing values. You are asked to specify whether you want to lock a block of cells, certain columns or rows, or all cells containing values.

All. The Sheet Lock All command locks all cells of every type in your worksheet.

Disable. Cell locking can be temporarily suspended by selecting the Sheet Lock Disable command, allowing you to modify any of the locked cells.

Enable. To reactivate cell locking, select the Sheet Lock Enable command. ANGOSS automatically remembers which cells were locked prior to the execution of the Disable option and restores the locked status for those cells.

NOTE: ANGOSS remembers the cells that were locked, not the type of cells. If, in a worksheet with formula cells locked, Sheet Lock Disable is executed, a formula cell is revised to contain text, and then Sheet Lock Enable is executed, the cell will still be locked even though it no longer contains a formula.

Protect. The Sheet Lock Protect command prevents formulas in the current worksheet from being displayed, printed, or edited. Any new formulas entered into a protected worksheet are automatically protected.

The current worksheet must be unmodified before Sheet Lock Protect is executed; therefore, it may be necessary to execute File Save before selecting the Sheet Lock Protect command. When you select the Protect option, you are prompted to verify that you want to protect the worksheet.

IMPORTANT: Formula protection cannot be removed or suspended. When you save a worksheet after executing Sheet Lock Protect, the formulas are permanently concealed. Save the protected version of the worksheet under a new filename and retain the original version in unprotected form for future use or reference.

When the highlighter is positioned on a protected formula cell (in Data Entry Mode), the word PROTECTED, rather than the actual formula, appears in the Control Area of the screen. If you attempt to edit a protected formula, ANGOSS Spreadsheet displays a message to inform you that a protected formula cannot be edited.

Protected formula cells usually recalculate faster and result in a smaller disk file. However, unlike locked formula cells, protected formula cells can be blanked, deleted, or overwritten by the Edit Blank, Edit Copy, Edit Delete or Edit Move commands. To prevent protected formula cells from accidentally being deleted or overwritten, you can also choose to lock these cells.

Sheet Matrix

The Sheet Matrix commands perform a variety of sophisticated calculations. Several of the options are useful in business applications (e.g., the Regression option for performing regression analysis). Other options require familiarity with matrix mathematics or linear algebra.

Matrix Overview

The Aux option of the Sheet Matrix command calculates determinant, rank, and power, and normalizes. The Diagonal option provides sum, product, and copy of the diagonal. The Invert option inverts a matrix. The Multiply option multiplies two matrices.

The N-Solve option of the Sheet Matrix command solves multiple equations with multiple unknowns. The Parallel option provides direct matrix addition, division, multiplication, and subtraction, element by element. The Regression option performs multiple linear regression on values in a specified block.

The Sweep option of the Sheet Matrix command sweeps on one or more pivots. The Transpose option transposes a matrix, converting row data to column data and vice versa. The Upper option converts to row echelon form.

The Sheet Matrix commands deal only with values. Blank cells, text cells, unevaluated formulas, and formulas having text results are considered to have zero value. The exceptions are the Transpose option, where data types are preserved, and the Regression option, which ignores non-numeric data.

In options that return values to an input matrix, non-numeric cells and formula cells are replaced by numeric cells containing the result of the matrix function, except in the Parallel option.

Many matrix options permit the use of the transpose operator. For a named block A, the transpose of A is written as A'. Use the same notation for explicit block references. Thus, write the

Sheet Commands

transpose of r1:7c8:25 as r1:7c8:25' (not r8:25c1:7). You cannot use the transpose operator in commands other than the Sheet Matrix commands. You cannot use the transpose operator in blockmarking. Also, you cannot use the transpose operator to define the following matrix blocks.

- The first block in Sheet Matrix Aux Determinant
- The first block specified in Sheet Matrix Aux Power
- All blocks specified in Sheet Matrix Invert
- The first block specified in Sheet Matrix N-Solve
- The second block specified in Sheet Matrix Parallel
- All blocks specified in Sheet Matrix Upper
- All blocks specified in Sheet Matrix Regression

Source Matrix. Many of the Sheet Matrix commands require you to define a block of the worksheet to be acted upon. The entry can be made manually, or can be selected by block marking.

Result Matrix. Many of the Sheet Matrix commands require you to specify a location for the result. Sometimes a new matrix is created. Its location can be specified by referencing its upper left corner. The dimensions of the matrix are automatically computed.

Ordinarily, a newly created vector matrix is N:1 (i.e., N rows and 1 column). However, the matrix can be created as 1:N by specifying the row. Cells and block references can be entered manually or, for many commands, can be specified by pointing.

Sheet Matrix Aux

When you select the Sheet Matrix Aux command, you can choose the Determinant, Normalize, Power, or Rank option.

Determinant. The Determinant option computes the determinant of a matrix. You are prompted to enter a matrix block, either a name or a block reference, to be used as the source matrix. If the source matrix is not square, the largest sub-matrix, starting in the upper left corner, is used. You are then prompted to enter the location for the result. The result is placed in the cell you specify. The cell to receive the result must not overlap the source matrix.

Normalize. The Normalize option performs either the standard or unit operation on a row or column. Normalize **Standard** is a statistical operation that replaces each value in a row or column with its value after normalization to the statistical normal distribution (i.e., with mean equal to zero and variance equal to one.) The normalization is based on the sample mean and sample variance of the row or column. Normalize **Unit** scales each row or column in the matrix to the unit vector V in N -space such that $SUMSQ(V) = 1$.

IMPORTANT: The Normalize option changes the original data.

After you choose either the Standard option or the Unit option, select either the Column option or the Row option. If **Column** is selected, all columns are normalized independently. If **Row** is selected, all rows are normalized independently.

You are then prompted to enter the length of the column or row. The calculation proceeds after you press **Enter**.

Power. The Power option raises a matrix to a power (i.e., multiplies a matrix by itself (exponent-1) times). You are prompted to enter the matrix block, either as a name or block reference, to be operated on. The matrix must be square.

You are then prompted to enter the exponent or the power to which the matrix is to be raised. The result is placed in the original matrix when you press **Enter**.

IMPORTANT: The Power option changes the original data.

Rank. The Rank option replaces values with their rank, relative to the row or column in which they appear. The largest value receives the value 1, the next largest receives 2, and so on.

Select either **Column** or **Row**. You are then prompted to enter the length of the column or row. The calculation occurs when you press **Enter**.

To change the ranking from descending to ascending, press **F9**. This repeats the rank operation on the ranked data.

IMPORTANT: The Rank option changes the original data.

Sheet Matrix Diagonal

When you select the Sheet Matrix Diagonal command, you can choose the Copy, Product, or Sum option. No overlapping of matrices is permitted in the Diagonal option.

Copy. When you select the Copy option to copy the diagonal of a matrix and produce a new matrix, you are prompted to enter a matrix block. Enter the name or reference of the block whose diagonal is to be copied.

You are then prompted to enter a cell, column vector, or row vector. If you enter a cell or portion of a column (column vector), the new matrix is $N:1$, where N is the number of elements in the diagonal. If you enter a portion of a row (row vector), the new matrix is $1:N$.

Product. When you select the Product option to compute the product of the diagonal elements and place them in a cell, you are prompted to enter a matrix block. Enter the name or reference of the block to be operated on.

You are then prompted to enter the location of the cell to receive the result. The calculation proceeds when you press **Enter**.

Sum. When you select the Sum option to compute the sum of the diagonal and place the result in a cell, you are prompted to enter a matrix block. Enter either the name or block reference of the block to be operated on.

You are then prompted to enter the location for the result. The calculation proceeds when you press **Enter**.

Sheet Matrix Invert

The Sheet Matrix Invert command uses the Gauss-Jordan method to invert an $N:N$ matrix, producing an $N:N$ matrix. The blocks for these two matrices cannot overlap. If the matrix defined is not square, the largest available sub-matrix, starting in the upper left corner, will be used.

You are prompted to enter a name or block reference of a matrix block, which will be the source matrix. The source matrix must be non-singular (i.e., the determinant of the matrix is not zero) If you attempt to invert a singular matrix, the following error message appears:

```
Matrix is singular
```

If the coefficients of the matrix are much less than one, use the Sheet Matrix Parallel command to multiply by a constant. Then retry.

After specifying the source matrix, you are prompted to enter the name or block reference for the block to contain the inverted matrix. Identify the destination block by entering just its upper cell.

Sheet Matrix Multiply

The Sheet Matrix Multiply command performs standard matrix multiplication.

When you select the Multiply option, you will be prompted to enter three matrix blocks. The first matrix block (A) will be multiplied by the second matrix block (B), and the result will be placed in the third matrix block (C). Blocks A and B must be matrix blocks. Block C can be a matrix block or a single cell.

The result matrix cannot overlap either of the other two matrices. Matrix B can equal Matrix A, but only if Matrix A is a square.

The number of columns in Matrix A must equal the number of rows in Matrix B. Otherwise, the following error message appears:

`Dimensional mismatch`

If Matrix A is an M:N matrix, and Matrix B is an N:P matrix, the result matrix is M:P.

Sheet Matrix N-Solve

The Sheet Matrix N-Solve command solves multiple equations with multiple unknowns, using the Gauss-Jordan method of elimination.

When you select the N-Solve option, you are prompted to enter a matrix block. Enter a name or block reference for a block where the numeric coefficients are located in the left section of the matrix and the constants are located in the right-most column.

You are then prompted to enter a cell, column vector, or row vector. Enter a cell, a row, or a column to receive the result. If you specify a cell or a column, the results will displayed down the column. If you specify a row, the results will be displayed across the row.

A unique solution can be computed only if the equations are independent. If the coefficients are too similar in effect on the results, the following error message appears:

`Equations not independent`

Sheet Matrix Parallel

The Sheet Matrix Parallel command allows a matrix block A and a second matrix block (or value or cell) B to be added, subtracted, multiplied, or divided, element by element. If B is defined as a matrix block, its dimensions must be identical to A. Matrix A and Matrix B can be in separate worksheets.

The result is placed in a third matrix block C, which can be a block or a single cell. It is only necessary to specify the location of the upper left corner of matrix block C. The resultant matrix can overlap part or all of either A or B, or can occupy the entire worksheet. Overlapping matrices must have the same cell as the upper left corner.

NOTE: Text and formula cells in the resultant matrix block are not overwritten.

Sheet Commands

When you select the Parallel option of Sheet Matrix, you are prompted to enter a matrix block. Enter the name or block reference of matrix block A.

Select the operation to be performed. The options are Add, Div (divide), Mult (multiply), and Sub (subtract).

Add. If you selected the Add option, ANGOSS adds A and B, placing the result in C. If B is a value or a single cell, the resultant matrix C is the original matrix plus a constant.

Div. If you selected the Div option, ANGOSS divides A by B, placing the result in C. If B is a value or a single cell, the resultant matrix C is the original matrix divided by a constant. The result of any division by zero is zero.

Mult. If you selected the Mult option, ANGOSS multiplies A by B, placing the result in C. If B is a value or a single cell, the resultant matrix C is the original matrix multiplied by a constant.

Sub. If you selected the Sub option, ANGOSS subtracts B from A, placing the result in C. If B is a value or a single cell, the resultant matrix C is the original matrix minus a constant.

You are prompted to enter a matrix block, value, or single cell for matrix B. You are then prompted to enter a matrix block for matrix C.

Sheet Matrix Regression

The Sheet Matrix Regression command performs multiple linear regression on values in a specified block and places the computed regression coefficients in another specified block. An optional report can be placed in another block. Sheet Matrix Regression can operate with up to 14 independent variables.

When you select the Regression option, you are prompted to enter a matrix block. Enter the name or reference for the block containing the values from which the regression coefficients are computed. ANGOSS assumes the dependent variable values are in the leftmost column, and the independent variable values are in the remaining columns. The regression takes as its first case that row in the data block whose item in the leftmost column is a value, and the last case as the last such row in the block.

If the first row of the data block contains text, that text is interpreted as labels of the variables. The text will be included in the report if you choose the Report option.

Any missing value in the data block causes the entire case containing the missing value to be ignored.

No-Report. If you select the No-Report option, you will receive only the regression coefficients.

Report. If you select the Report option, a multiple linear regression report is produced. You are prompted to enter a name or block reference for a block, 6 columns by (21 plus the number of independent variables) rows. ANGOSS will enter the following statistics into this block:

- Analysis of variance table (ANOVA)
- Root of the mean square error (Root MSE)
- Mean of the dependent variable
- Coefficient of variation
- R-square and adjusted R-square values
- The Mean for each variable
- The parameter estimates for each variable (Coefficients entered in the worksheet)
- The standard error estimate for each variable
- The T value of 0 for the test of the null hypothesis (H0)

After you select either Report or No-Report, you are prompted to enter a cell or vector to receive the computed regression coefficients. This vector will be as large as the number of independent variables plus 1, because the number of coefficients resulting from a multiple linear regression includes an intercept coefficient plus one coefficient for each independent variable. If you specify a single cell, that cell defines the upper left cell of the column vectors receiving the computed regression coefficients.

NOTE: If two or more independent variables are identical, the following error message is displayed:

```
Equations not independent
```

Sheet Matrix Sweep

The Sheet Matrix Sweep command modifies a matrix on a pivot when you build matrices to perform regression analysis. The Sweep option is not used in conjunction with the Regression option.

Sheet Commands

When you select the Sweep option, you are prompted to enter a matrix block. Enter the name or block reference for the sweep matrix.

You are then prompted to enter the pivot rows. If a pivot is not specified, the current row is assumed. This allows you to move to another row and press **F9** (repeat) to pivot according to the current row.

Any number of pivots can be specified during a single command. Specify a series of pivots as follows <start-row>:<stop-row>.

The Sheet Matrix Sweep command is reversible. Sweeping twice on the same pivot is the same as not having swept at all. The order of sweeping is unimportant. Sweeping on row i followed by row i' is the same as sweeping on row i' followed by row i.

The inverse of a matrix is created by sweeping on all rows (pivots).

Sheet Matrix Transpose

The Sheet Matrix Transpose command transposes a matrix (converts row data to column data and vice versa). The transposition occurs in the location occupied by the matrix.

When you select the Transpose option of Sheet Matrix, you are prompted to enter a matrix block. Enter the name or reference of the block to be transposed.

The transposition occurs in the location occupied by the specified matrix. If the specified matrix is square, the transposition is straightforward. If the specified matrix is not square, additional columns or rows are included in the transposition to make a square.

Beginning in the upper left cell in the specified matrix, ANGOSS transposes the specified matrix from, for example, a 6-row by 3-column matrix to a 3-row by 6-column matrix. Data in columns 3 through 6, although not specified as part of the matrix, are included in the transposition to provide a destination for all six rows to be transposed.

The remaining cells in the worksheet are unchanged.

A double transpose of the same area restores the matrix to its original condition.

The Sheet Matrix Transpose command is particularly valuable when you need to change from a row to a column format, or vice versa. For example, when you send or receive information from ANGOSS Database, each record is a single row. Each column is a field in a record. The Sheet Matrix Transpose command allows you to change the worksheet to accommodate communication with the Database.

IMPORTANT: Sheet Matrix Transpose does not adjust cell references in formulas.

Sheet Matrix Upper

The Sheet Matrix Upper command converts to upper-triangular (or row echelon) form using standard forward elimination methods.

When you select the Upper option of Sheet Matrix, you are prompted to enter a matrix block. Enter the name or reference of the block to be converted. There is no restriction on the shape of the original matrix. It may be transposed.

You are then prompted to enter a location for the result. Enter a name or reference for the block to receive the resultant matrix. The new matrix cannot overlap the original.

Sheet Name

The Sheet Name command is used to assign a name to any cell or block of cells in a worksheet. Once a name has been assigned to a cell or a block of cells, it can be used in a cell or block reference instead of cell or block coordinates.

When you select Sheet Name, ANGOSS gives you the choice of defining, editing, printing, or undefining a name.

Sheet Name Define

The Define option is used to assign a name to a cell or block of cells. You are prompted to enter the name of the cell or block and a definition for this name.

A name can contain from 1 to 15 characters. It must start with an alphabetic character, an underscore, or a pound sign (#). The name can contain digits but cannot contain blank spaces.

To enter the definition, type the cell or block address, or mark the block. If the definition includes an external reference, precede the external reference with the name of the other worksheet (e.g., sales.r3c4 or qtr1.expenses). The definition can contain up to 35 characters, including cell names and external worksheet references. Named blocks can be used in the definitions of other named blocks. Press **Enter** to record the definition.

Pressing **Enter** without entering a cell or block reference uses the current cell reference as the definition.

Press **F4** to view a list of existing names and their definitions.

Sheet Name Edit

The Edit option of the Sheet Name command is used to edit a previously defined cell or block name, allowing you to change the definition. You are prompted to select the name from the prompt menu. When the definition menu appears, revise the definition as necessary.

Sheet Name Print

The Print option of the Sheet Name command produces an alphabetical list of names defined for the current worksheet. Printing begins immediately after you select the option.

Sheet Name Undefine

The Undefine option of the Sheet Name command removes a name from a cell or block. Once a name is undefined, it is no longer recognized in formulas or commands. If you try to remove a name currently used in a formula, an error message will be issued.

You are prompted to enter the name of the cell or block which you wish to undefine. No prompt menu is shown.

Sheet Send

The Sheet Send command provides you with the ability to integrate ANGOSS Spreadsheet with other ANGOSS modules. Sheet Send allows you to transmit worksheet data and then automatically transfers you to the destination module.

ANGOSS Spreadsheet offers further power and integration capabilities by enabling you to attach a project file to the Sheet Send command. This project file is executed when the worksheet or graph file is transmitted. Refer to *Project Processing* for a complete discussion of ANGOSS integration capabilities using project files.

When you select the Sheet Send command, ANGOSS lists the modules that are available to receive worksheet data. The options are Communications, Database, and Wordprocessor.

IMPORTANT: None of the formats will send a worksheet file in a format that retains formula entries. If you want to use the ANGOSS Communications module to transmit an actual worksheet file, do not use the Sheet Send command. Instead, use ANGOSS Communication's Data Transmit XMODEM command to transmit the worksheet file from the disk.

Sheet Send Communications

If you select the Communications option of the Sheet Send command, you have the option of sending a worksheet block in Document, ANGOSS, or Text format, or a CGM file in Graphics format to the Communications module.

Document. The Document option sends a worksheet block in ANGOSS Word Processing format.

Graphics. The Graphics option sends CGM file.

ANGOSS. The ANGOSS option sends a worksheet block in ANGOSS Data Interchange format, which is a specially formatted ASCII file for transferring information between ANGOSS modules.

Text. The Text option sends a worksheet block in standard ASCII text format.

When executing Sheet Send Communications with the Document, Text, or ANGOSS option, you are prompted to enter a name or a block reference. When selecting the Graphics option, you are prompted to enter the CGM file name.

After you have specified the block or file, you are prompted to enter the project file name for the next application. If you do not want to execute a project file in the receiving module, just press **Enter**.

Sheet Send Database

If you select the Sheet Send Database command, you are sending a worksheet block to the Database module. Each row in the worksheet block becomes a record in the Database module. Each column becomes a field.

You are prompted to enter a name or block reference. You are then asked to enter the project file for the next application. If you do not want to execute a project file in the receiving module, just press **Enter**.

Sheet Send Wordprocessor

If you select Sheet Send Wordprocessor, you can send either a worksheet block or a CGM file or both to the Word Processor module.

Sheet Commands

After you select one of the options, you are asked to specify the worksheet block reference or name, or the name of the CGM file to be sent, or both. You are then asked to enter the name of the project file for the next application. If you do not want to execute a project file in the receiving module, just press **Enter**.

Select from the following options.

Document. The Document option sends a worksheet block. Any special fonts entered into the block will accompany the worksheet to the Word Processor.

Graphics. The Graphics option sends a CGM file to the Word Processor. CGM files are created from graph definition files with the Graph Metafile command.

Both. The Both option allows you to send both a worksheet block and a CGM file to the Word Processor module.

Sheet Unlock

Sheet Unlock is used to permanently unlock cells that have been locked by the Sheet Lock command. Once a Sheet Unlock command has been executed, the specified cell types in the designated area of your worksheet can be edited as desired. You can unlock blank cells only, formula cells only, text cells only, value cells only, or all the locked cells in the worksheet.

Formula protection (Sheet Lock Protect) cannot be removed.

When you select the Sheet Unlock command, ANGOSS prompts you to specify the type of cell you want to unlock: Blanks, Formulas, Values, Text, or All.

If you select either Formulas, Values, or Text as the type of cell to unlock, you can specify the area of the worksheet to be unlocked. Choose **Block**, **Columns**, **Rows**, or **All**. You will be asked to identify the block, columns, or rows to be affected.

When unlocking a specified number of rows, the Sheet Unlock command operates on the current row plus the appropriate number of rows below the current row. For example, if you specify that 3 rows are to be unlocked, the current row plus the next 2 rows are affected. When unlocking a specified number of columns, the command operates on the current column plus the appropriate number of columns to the right of the current column.

Selecting All as the area of the worksheet to be unlocked automatically executes the command.

Unlock Options

Select from the following options.

Blanks. Select the Sheet Unlock Blanks command to unlock any blank cells in your current worksheet.

Formulas. The Sheet Unlock Formulas command unlocks locked formulas in a selected area of your worksheet.

Values. The Sheet Unlock Values command unlocks locked value cells in a selected area of your worksheet.

Text. The Sheet Unlock Text command unlocks any locked text entries in a selected area of your worksheet.

All. To unlock all cells (regardless of type) in your worksheet, execute the Sheet Unlock All command.

Sheet Commands

Edit Commands

The Edit commands allow you to alter your worksheets in a variety of ways. You can copy or move data, insert or delete areas of a worksheet, sort data, or hide certain information in a worksheet. You can also edit a cell's contents or a formula.

Edit Options

The Edit keyword provides the following command options:

Blank. Removes data from specified areas of your worksheet, leaving blank cells.

Copy. Duplicates the contents (including formulas) of specified rows, columns, or blocks of cells.

Delete. Deletes rows, columns, or a block of cells.

Edit-Cell. Allows changes to the contents of one cell.

Fill. Fills designated area of cells with values incremented or decremented by a specified amount.

Hide. Allows areas of the worksheet to be temporarily blocked from view.

Unhide. Restores hidden areas to an unhidden status.

Insert. Inserts blank columns, rows, or blocks.

Move. Relocates data to another area of the worksheet.

Sort. Sorts worksheet data.

Value-Copy. Copies text, values, or the results of formulas from one cell or block to another location.

Edit Blank

The Edit Blank command erases text, values, and formulas from a designated portion of the worksheet. Unlike the Edit Delete command which actually deletes the block, columns, or rows from the worksheet, the Edit Blank command works without collapsing the remaining cells into the blanked area.

Besides removing data from cells, Edit Blank restores the default format and default font to the blanked area.

IMPORTANT: Edit Blank will not blank any cells in an area containing locked cells.

Block. The Edit Blank Block command erases data from a specified group of cells. Enter the name or block reference of the cells you want blanked.

Columns. The Edit Blank Columns command blanks a specified number of columns. You are prompted to enter the number of columns you want blanked. The current column plus the appropriate number of additional columns will be blanked when you press **Enter**.

Rows. The Edit Blank Rows command blanks a specified number of rows. You are prompted to enter the number of rows to be blanked. The total number of specified rows (which includes the current row) will be erased when you press **Enter**.

All. Selecting the Edit Blank All command **immediately** blanks all the data in the worksheet.

Edit Copy

The Edit Copy command duplicates the contents of a single cell or a group of cells to a destination in the same worksheet, or in a different worksheet. You can use Edit Copy to copy text, values, or formulas.

Before copying a formula, determine which, if any, cell references should be copied as absolute references, and which cell references should be copied as relative references. Use the Edit Edit-Cell

command, **Alt E**, or **Alt F** to edit the formula and insert brackets around the absolute references. Then execute the Edit Copy command.

Edit Copy provides several options for defining the area to be copied. You can copy adjacently in two directions (down a number of rows or right a number of columns), or you can copy from one area of a worksheet to any other area.

After you select the area to be copied, you are asked to specify the number of copies, which is the number of times the cells in the designated block are to be duplicated.

The options are Down, Right, and From.

Edit Copy Down

The Edit Copy Down command copies either a single cell or multiple cells to the area immediately beneath the cells being copied. Select either Single-Cell or Row.

Single-Cell. The Single-Cell option will copy the contents of one cell.

Row. If you elect to copy multiple cells, by choosing the Row option, you are asked to enter row length, which is the number of cells to the right that are to be copied.

Edit Copy Right

The Edit Copy Right command copies either a single cell or multiple cells to the immediate right of the cells being copied. Select either Single-Cell or Column.

Single-Cell. The Single-Cell option will copy the contents of one cell.

Column. If you elect to copy multiple cells by choosing the Column option, you are asked to enter column length, which is the number of cells down that are to be copied.

Edit Copy From

The Edit Copy From command copies a block of cells from the current location to any location in the same or a different worksheet. The "copy to" location does not need to be adjacent to the "copy from" location.

Edit Commands

The source block, which can consist of many cells or just one cell, can be copied once or replicated many times. When copying one cell to multiple cells, you can make the destination block as large as you wish.

You are prompted to enter the name or block reference of the area you want to copy. ANGOSS then asks you for the name or the location of the destination. Enter a block name, cell or block address in the same worksheet, or a block name, cell or block address from an active, external worksheet (e.g., sales.r1:10c2:3, or sales.westreg). When the command is executed, the copied data appears in the designated location.

The source and destination blocks can overlap as long as the upper left corners of both coincide.

IMPORTANT: If you copy a block from one location to another, either in the same worksheet or a different one, be certain that the destination cells are empty or contain only data that you no longer need. The Edit Copy command will overwrite existing data in the designated destination block.

Edit Delete

The Edit Delete command actually removes cells from your worksheet, rather than just blanking the contents. Remaining cells collapse into the deleted area.

Formula references in the remaining cells are automatically adjusted to reflect the changes produced by the deletion. When Edit Delete Columns or Edit Delete Rows is selected, the current column or row is included in the deletion.

The options are Block, Columns, and Rows.

Block. The Edit Delete Block command deletes a block of cells. You are prompted for the name of the block or the block reference to delete. Pressing **Enter** without specifying additional cells deletes the current cell only. The cells to the right of the block move to fill the vacant space.

Columns. The Edit Delete Columns command deletes one or more columns. You are prompted for the number of columns (beginning at the current column) to delete. Pressing **Enter** without specifying additional columns deletes the current column only. The columns to the right of the deleted column are pulled into the vacated space.

Rows. The Edit Delete Rows command deletes one or more rows. You are prompted for the number of rows (beginning at the current row) to delete. Pressing **Enter** without specifying

additional rows deletes just the current row. The rows below the deleted row are pulled up into the vacated space.

Edit Edit-Cell

The Edit Edit-Cell command is used to revise formulas, text, or values in the current cell without re-keying the whole entry. When you select Edit Edit-Cell, the ANGOSS Cell Editor is activated. The Cell Editor can edit a cell containing text, values, or formulas up to 240 characters long.

The contents of the cell are displayed on a line in the Control Area of the screen. If the cell contains text, your changes are reflected in the cell as you type. If the cell contains a value or a formula, changes are not reflected in the cell until you press **Enter**.

Table 9-2 lists keys to use in the Cell Editor to change the contents of a cell.

Table 9-2. Cell Editor Keys.

Key	Action
Del	Deletes character at current cursor position
Backspace	Moves cursor left one character, deleting character.
left arrow	Moves cursor left one character
right arrow	Moves cursor right one character
Tab	Moves cursor right five characters
Shift Tab	Moves cursor left five characters
Ctrl left arrow	Moves cursor to beginning of edit line
Ctrl right arrow	Moves cursor to right end of edit line
Ins	Toggles on or off Insert Mode
Enter	Completes editing and records new contents in cell
Esc	Cancel editing without retaining changes.

Formula Editor

If the formula to be edited is larger than 240 characters, ANGOSS' Formula Editor is automatically called. You can also press **Alt F** to access the Formula Editor directly, even if the cell is blank.

Table 9-3 lists the keys that can be used to move around the Formula Editor Window.

Table 9-3. Cursor Movement in the ANGOSS Formula Editor.

Key	Action
left arrow	Moves cursor left one character
right arrow	Moves cursor right one character
Tab	Moves cursor right five characters
Shift Tab	Moves cursor left five characters
Ctrl right arrow	Moves cursor to right end of current line
Ctrl left arrow	Moves cursor to beginning of current line
Ctrl Home	Moves cursor to first character of formula
Ctrl End	Moves cursor to last character of formula
up arrow	Moves cursor up one line
down arrow	Moves cursor down one line
Enter	Moves cursor to first column of next line
Home	Moves cursor to top left corner of Formula Editor Window
End	Moves cursor to last line of formula

In addition, the keys listed in Table 9-4 can be used in the Formula Editor Window to facilitate the formula editing process.

Table 9-4. Editing Keys for Formula Editor Window.

Keys	Action
Del	Deletes character at current cursor position
Backspace	Moves cursor left one character, deleting character
Ins	Toggles Insert Mode on or off.
F1	Accesses ANGOSS Help
F2	Shows lists of additional function keys
F3	Prompts for text or value to find
F4	Prompts for text or value to replace
F5	Calculates formula and displays result in Control Area
F6	Displays worksheet, allowing you to point to a block
F7	Inserts a line. The line contains any text currently in the delete buffer
F8	Deletes a line and places line contents in delete buffer
F9	Repeats previous Find F3 or Replace F4 command
Alt G	Prompts for a line to go to
Alt I	Designates an area where copied or deleted data is to be inserted
Alt C	Designates an area to be copied
Alt P	Prints the formula
Alt D	Designates an area to be deleted
Ctrl Y	Deletes a line; line contents do not go to delete buffer
Alt F2	Clears the Formula Editor Window
Alt F3	Prompts for a filename to read to the current “NL cursor line

Keys	Action
F10	Records editing changes in the current cell and returns to the Worksheet Window
Esc	Cancels editing process and returns to the Worksheet Window

Edit Fill

The Edit Fill command automatically fills a portion of your worksheet with data that is incremented by a number you specify, relieving you of typing the entries manually. You can fill a block of cells or designated columns or rows.

If you want to fill an area with decreasing values, precede the increment value with a minus sign (-).

IMPORTANT: The Edit Fill command does not proceed if there are locked cells in the area designated to be filled.

Block. The Edit Fill Block command fills a specified block of cells with values. You are prompted to enter a block reference, a starting value, and a number by which to increment your starting value. Cells are filled sequentially, beginning in the upper left corner of the block, moving vertically, top to bottom, until all cells in the block are filled.

Columns. The Edit Fill Columns command enters values into a specified number of columns across the current row. You are prompted to enter the number of columns to be filled, a starting value, and a number by which to increment your starting value.

Rows. The Edit Fill Rows command enters values into a specified number of rows down the current column. You are prompted to enter the number of rows to be filled, a starting value, and a number by which to increment your starting value.

Edit Hide

The Edit Hide command conceals the contents of a cell or group of cells in a worksheet. Hidden areas of the worksheet simply appear to be blank. Once you execute the Edit Hide command, the Hide instruction is attached to the worksheet. It can be temporarily disabled, but to remove it completely, you must use Unhide.

Hide status applies only to non-blank cells in the specified area. If you enter data into formerly blank cells in a hidden area, the new entries will not be hidden.

IMPORTANT: When ANGOSS Spreadsheet is in Data Entry Mode, and the cell highlighter is moved to a hidden cell, the contents of the cell are displayed in the Control Area of the screen.

The options are Block, Columns, Rows, All, Disable, and Enable.

Block. The Edit Hide Block command hides a specified block of cells. You are prompted to enter the name or block reference of the cells you want to hide.

Columns. The Edit Hide Columns command hides specified columns of cells. You are prompted to enter the number of columns to hide.

Rows. The Edit Hide Rows command hides specified rows of cells. You are prompted to enter the number of rows to hide.

All. The Edit Hide All command hides all the cells in the worksheet.

Disable. You can temporarily suspend the Hide instruction and display the hidden data on the screen by executing the Edit Hide Disable command.

Enable. Data hidden before the Edit Hide Disable command was executed can be concealed again by executing the Edit Hide Enable command.

Edit Unhide

Edit Unhide permanently removes a Hide instruction inserted by the Edit Hide command. The Edit Hide command conceals the contents of specified cells.

Edit Commands

If you just want to suspend the Hide instruction temporarily but not remove it, use the Edit Hide Disable command. To reactivate a disabled Hide instruction, use the Edit Hide Enable option.

The following options are available with Edit Unhide:

Block. The Edit Unhide Block command removes the Hide instruction from a worksheet block. Enter a name or block reference for the data block you want to unhide.

Columns. The Edit Unhide Columns command removes the Hide instructions from specific hidden columns. Enter the number of columns you want to unhide (beginning with the current column and counting to the right).

Rows. The Edit Unhide Rows command removes the Hide instruction from specific hidden rows. Enter the number of rows you want to unhide (beginning with the current row and counting down).

All. The Edit Unhide All command removes the Hide instruction for the whole worksheet.

Edit Insert

The Edit Insert command inserts blank rows, columns, or blocks into the current worksheet at the current highlighter position. Cell and block references within formulas are automatically adjusted when new blocks, columns, or rows are inserted.

Block. When you select Edit Insert Block, you are prompted to enter a block name or definition for the area to insert. Inserting a block opens up blank cells in the specified block and moves to the right any information that previously occupied that space.

Columns. When you select Edit Insert Columns, you are prompted to enter the number of columns to insert. When columns are inserted, information in and to the right of the current column is moved right to accommodate the new columns.

Rows. When you select Edit Insert Rows, you are prompted to enter the number of rows to insert. When rows are inserted, information in and below the current row is moved down to accommodate the new rows.

Edit Move

The Edit Move command relocates data in specified cells from the current position in the worksheet to a new position. You can move data contained in a block, in one or more columns, or in one or more rows.

When Edit Move Block is executed, data in the destination block will be overwritten by the moved data unless the destination cells are locked.

When Edit Move Columns or Rows is executed, the columns or rows from which the data is moved are deleted. The moved data is inserted in new columns or rows at the designated location, without overwriting existing data.

Block. If you select the Edit Move Block command, enter a name or block reference for the data block you want to move.

You are then asked to enter a name or block reference for the destination location. When the source block consists of multiple cells, it is only necessary to indicate the upper left corner of the destination block. ANGOSS Spreadsheet automatically positions the data in the specified area.

Columns. If you select the Edit Move Columns command, enter the number of columns you want to move (beginning with the current column and counting right), and then the column number where you want the columns of data to appear.

Rows. If you select the Edit Move Rows command, enter the number of rows you want to move (beginning with the current row and counting down); then enter the row number where you want the rows of data to appear.

Edit Sort

The Edit Sort command sorts data in designated areas of your worksheet into ascending or descending order, by rows or by columns. You can specify up to 15 sort levels, including the primary sort key.

Sort Area. When executing the Edit Sort command, you are prompted to enter the name or block reference of the area containing the data to be sorted.

Ascending or Descending. ANGOSS asks you to specify either an ascending or descending sort, which will be the default order unless you specify additional sort orders. Basically, an ascending sort of text organizes the alphabetic data A through Z. A descending sort would be Z through A. An ascending sort of values begins with the lowest value. A descending sort of values begins with the highest value.

NOTE: Rather than being determined by a dictionary-type sort, the actual ordering of characters is based upon the ANGOSS character set. Therefore, foreign characters may appear to be out of sequence.

Row or Column. Select either Row or Column, depending upon how the sort key information is arranged. The sort key is the area containing the rows or columns upon which the sort is based. To sort by data in specified rows, select the Row option. To sort by data in specified columns, select the Column option.

Sort Key. You are then prompted to define the sort key by entering the row or column number(s).

To specify multiple levels of sorts, separate the sort key row or column numbers with spaces. Enter the primary sort key first, followed by the second level, the third level, and so on.

To specify a different order than the default for any sort key, type an "a" (ascending) or "d" (descending) after the row or column number.

Example:

```
Edit Sort r2:20c1:30 ascending using column "1 3 4d"
```

The block, consisting of rows 2 through 20, columns 1 through 30, is sorted, using column 1 (ascending order) as the primary sort key and column 3 (also ascending order) as the secondary sort key. The next level of sorting is based upon column 4 in descending order.

Formulas in the sorted block are automatically adjusted to reflect the correct cell addresses.

Edit Value-Copy

The Edit Value-Copy command copies text and values from one location to another location in the same worksheet or a different worksheet. Edit Value-Copy and Edit Copy are similar in that they both copy data from one location to another. The difference is that the Value-Copy command copies the result of a formula from the copied cell, while the Copy command copies the formula itself.

The source and the destination used for Edit Value-Copy From can be the same cell, providing an easy way to convert a formula to a value.

The Edit Value-Copy command provides several options for defining the area to be copied. You can copy in two directions (down a number of rows or right a number of columns), or you can elect to copy from a block of cells.

After you select the area to be copied, you are asked to specify the number of copies, which is the number of times the cells in the designated block are to be duplicated.

The Edit Value-Copy command options are Down, Right, and From.

Edit Value-Copy Down

The Edit Value-Copy Down command copies either a single cell or multiple cells in a row. The copied data appears below the highlighted cell.

Single-Cell. The Single-Cell option will copy the contents of one cell.

Row. If you select Row, you are prompted to enter the row length, which is the number of cells to the right to be copied.

Edit Value-Copy Right

The Edit Value-Copy Right command copies either a single cell or multiple cells in a column. The copied data appears to the right of the highlighted cell.

Single-Cell. The Single-Cell option will copy the contents of one cell.

Column. If you select Column, you are prompted to enter the column length, which is the number of cells down to be copied.

Edit Value-Copy From

The Edit Value-Copy From command copies a block of cells from the current location to another location in the same or a different worksheet. The source block can consist of many cells or just one cell, and can be duplicated once or many times. The source and destination blocks can overlap as long as their upper left corners are the same.

You are prompted to specify the name or block reference of the data block to be copied.

Edit Commands

ANGOSS then asks you for the name or block reference of the destination location. Enter a block name, a cell or block address in the same worksheet, or a cell or block address or block name referencing an active, external worksheet.

File Commands

The File commands allow you to perform direct file and file accessing operations. These commands provide storage, security, access, and retrieval capabilities for managing and maintaining your worksheet files.

File Options

The File keyword provides the following command options:

Load. Copies a worksheet into memory and displays it in the current window.

Save. Records the current worksheet in a file.

Unload. Deactivates a worksheet and removes it from the current window.

Activate. Loads a worksheet into memory but does not display it in a window.

Newname. Allows you to change the name of your current worksheet.

Display-Active. Displays the files currently loaded in memory.

Combine. Joins two worksheets by adding, subtracting, or copying data from an external worksheet to the current worksheet.

Import. Allows you to read various file formats into your current ANGOSS worksheet and to interface with other popular program file formats.

Export. Allows you to write worksheets to files and to convert your files to popular program file formats.

Password. Attaches or removes a password from a file to restrict access to it.

File Load

The File Load command copies a worksheet into memory and displays the worksheet in the current worksheet window.

When you select File Load, ANGOSS prompts you to enter the name of the worksheet to load. Worksheets stored in your data directory are displayed in a prompter listing. As you point to each worksheet, the Control Area shows the date and time the worksheet was last saved, as well as the size of the worksheet.

You can select a worksheet from the displayed listing, or, if the worksheet you want is not on the directory, you can type the name of the worksheet you want, including the device and path specifications.

You can also press **F5** and specify a new directory path, or press **F4** to instruct ANGOSS to search all directories for a file.

If you enter the name of a file that does not exist, an error message will be generated.

You will be prompted to enter the password if one has been assigned to the selected worksheet. If you respond with the correct password, the worksheet is loaded into memory. If you enter the wrong password, the message `Incorrect password` will be displayed.

File Save

The File Save command copies a specified worksheet (including all changes) to a file, without removing it from memory. Saving the current worksheet does not remove it from the current window. If the worksheet already exists as a file, the new version replaces the old version.

After you select the File Save command, ANGOSS prompts you to enter the name of the worksheet you want to save. If the worksheet is new and you have not yet assigned a name to it, ANGOSS prompts you to enter a name for the unnamed worksheet.

Enter a maximum of 8 characters, consisting of letters, numbers, or underscore characters (_); we recommend that you begin all names with a letter. A worksheet name can contain no blank spaces.

NOTE: Beginning a name with a number could cause an error if the name is used as an external worksheet reference in a formula.

When you save a new worksheet for the first time, the worksheet in the current window is stored under the indicated name, and the status line changes from "none" to reflect the name of the worksheet.

A new worksheet is automatically saved in the current or default directory. An existing worksheet is saved in the directory from which it was loaded, unless you specify otherwise.

Once you have named a worksheet, you do not have to enter the name again when you save it. Pressing **Enter** in response to the prompt for the name saves the worksheet under the same name in the appropriate directory.

You can create a copy of the worksheet by typing a different name in response to the name prompt. If you attempt to save a worksheet under a name already assigned to another worksheet, ANGOSS responds with the message, `Worksheet already exists. Continue? (y/n):`. Answer **y** to overwrite the existing file. Answer **n** to abandon the command.

If you modify a worksheet, you must save it to retain your changes. If you unload the worksheet without saving, your revisions will be lost. ANGOSS retains only the last version saved. If you make modifications to a worksheet and want to keep both the modified version and the original, save the new worksheet under a different name.

File Unload

The File Unload command removes a worksheet from memory. If the worksheet being unloaded is displayed in the worksheet window, File Unload removes it from the window as well as from the active files listing.

If you select the File Unload command when you have multiple worksheets activated, ANGOSS prompts you to enter the name of the worksheet you want to unload. You can unload the current worksheet by simply pressing **Enter**. Or, you can enter the name of any worksheet currently on the active status list. If other files are active, the one most recently loaded will be displayed on the screen.

If you want to deactivate all active worksheets, type "all" when ANGOSS asks for the name of the worksheet. Before the worksheets are unloaded, ANGOSS asks `Unload all files without saving? (y/n)`. If you answer **y**, all active worksheets are unloaded. If you answer **n**, the command is abandoned.

If you have modified the worksheet you want to unload, ANGOSS gives you the option of saving the changes by prompting: `Worksheet has been modified. Save before unloading (y/n)`. If you answer **y**, the revised worksheet is stored, using its current name. If you answer **n**, the revised worksheet is not saved and any changes you have made to it since you loaded or activated it are lost. If you change your mind about unloading, you can press **Esc** to cancel the command.

File Activate

The File Activate command loads a worksheet into memory, without displaying it in the current window.

When you select File Activate, you are prompted to enter the name of the worksheet to be activated. Worksheets stored in your data directory are displayed in a prompter listing. You can select a worksheet from the displayed listing or, if the worksheet you want is not on the directory, you can enter the name of the worksheet you want, including the device and path specifications.

You can also press **F5** and specify a new directory path, or press **F4** to instruct ANGOSS to search all directories for a file.

You will be prompted to enter the password if one has been assigned to the worksheet being activated. The worksheet will not be loaded into memory unless you enter the correct password.

File Activate allows you to put as many worksheets into memory as your operating system will allow. Once a worksheet has been activated, you can reference that worksheet in formulas in other worksheets.

A worksheet loaded into memory via the File Activate command can be displayed in the current window at any time by selecting the Sheet Goto command or pressing **F4**, selecting the Sheet option, and entering the name of the worksheet to be displayed.

File Newname

The File Newname command allows you to change the name of the current worksheet.

When you select File Newname, ANGOSS prompts you to enter the new name you want to assign to the worksheet.

Enter a maximum of eight characters. We recommend that you always begin a name with a letter. No blank spaces are allowed in a worksheet name, but you can use an underscore (`_`) to join characters.

If you enter the name of an existing worksheet for the new name, the following message appears:

Worksheet already exists. Continue? (y/n)

If you answer **y** the name is assigned to the worksheet. If you answer **n** the command is cancelled. Assigning a new name to an active worksheet changes the name of the worksheet in memory

but does not store the worksheet under the new name. Execute the File Save command to save the worksheet using the new name.

File Display-Active

The File Display-Active command displays a list of all your currently active worksheets. A worksheet is activated by executing either the File Load or File Activate command to place the worksheet in memory.

Index of Active Worksheets. After File Display-Active is executed, an alphabetical list of all currently active worksheets appears over the current worksheet window. This list, called the Index of Active Worksheets, contains the names of all your active worksheets, the number of entries and formulas contained in each active worksheet, and the status of each worksheet. The status information indicates whether the worksheet has "save permission" and whether the worksheet has been modified since it was last saved.

The Index of Active Worksheets also shows the path for each worksheet not in the default directory. If the path is too long to fit in the allotted area, the path description is truncated, beginning at the left. An ellipsis indicates that truncation has occurred.

Press any key to remove the active worksheet list from your screen and return to your ANGOSS worksheet.

File Combine

The File Combine command merges the numeric data from an external worksheet with numeric data in the current worksheet by calculating the combined value of specified cells from both worksheets. The resulting values are placed in the current worksheet, beginning at the current position of the highlighter. The external worksheet need not be active.

The File Combine command allows you to select either the Add, Copy, or Subtract option. ANGOSS prompts you to enter the name of the external worksheet, which you can choose from a prompter listing.

ANGOSS then asks you to specify either that the entire external worksheet (by selecting **Worksheet**) or a block of cells from the worksheet (by selecting **Block**) be combined with the current worksheet. If you elect to use a block, ANGOSS prompts you to specify the name or block reference.

File Commands

Because you are referring to an external worksheet, you must type the name or reference to be used; blockmarking is not allowed.

If cells in the destination worksheet are locked, the message `Some cells are locked. Continue? (y/n)` is displayed. If you specify **y** the command continues, avoiding locked cells. If you specify **n** the command is aborted.

The options for the File Combine command are as follows:

File Combine Add

The File Combine Add command adds the values contained in a specified worksheet (or block of the worksheet) to values in the current worksheet. The addition calculations are done cell-by-cell, based upon the position of the highlighter in the current worksheet at the time the command is executed.

File Combine Copy

The File Combine Copy command replaces values in the current worksheet with values from the specified worksheet, rather than adding or subtracting them. File Combine Copy also copies formulas and text. The data from the external worksheet is copied into the current worksheet, beginning at the current cell.

File Combine Subtract

The File Combine Subtract command subtracts the values contained in the specified worksheet (or worksheet block) from values in the current worksheet. The subtraction calculations are done cell-by-cell, and are based upon the position of the highlighter in the current worksheet at the time the command is executed.

File Import

The File Import command lets you read three types of ASCII text files, a Lotus 1-2-3 Release 1A or 2 worksheet file, a SYLK (Symbolic Link) format file, or a DIF (Data Interchange Format) file into the current window. This command provides a powerful interface with many popular program file formats and converts the data received from those files into ANGOSS worksheet files.

File Import reads DIF, SYLK, Text, and 123 files into your worksheet window. The File Import Text command can be used to read a file saved by another ANGOSS module. However, if you simply want to copy one ANGOSS worksheet into another, use the Edit Copy command.

DIF. If you select DIF, enter a complete file specification, including the file extension, if there is one. ANGOSS will then display, in your current worksheet window, the Data Interchange Format (DIF) file you specified.

SYLK. If you select SYLK, enter a complete file specification, including the file extension, if there is one. ANGOSS will then display, in your current worksheet window, the SYLK (Symbolic Link) Format file you specified.

IMPORTANT: The following SYLK functions are not supported by ANGOSS Spreadsheet: WEEKDAY, DELTA, FV, ISREF, ITERANT, LOOKUP, MIRR, NAME, NPER, PMT, PV, RATE, SIGN, and IRR. If formulas containing these functions are encountered by ANGOSS while importing a SYLK file, ANGOSS displays the following message in the Control Area of your screen:

```
Unable to convert formula at (r#c#) - Continue? y/n
```

Answer **y** to continue importing the SYLK file. The specified cell in the ANGOSS worksheet will contain the result of the formula that was stored in the SYLK file, not the formula itself. Answer **n** to abandon importing the SYLK file beyond the cell that contained the unsupported function.

Several of the unsupported functions can be replaced with similar ANGOSS functions.

Text. If you select the Text option, enter a complete file specification, including file extension. After the command is completed, the window will contain a worksheet generated from a flat text file, a standard ASCII text file, or a space delimited format (Smart) file.

"Flat text" is the output commonly derived from "print to disk" options in many software packages. Normally, ".txt" is the default extension for text. "Standard ASCII text" is a popular comma-delimited output format. The extension ".asc" is the normal default for ASCII text. "ANGOSS format" is a space delimited output format. A space delimited or Smart file is usually created by another ANGOSS module, utilizing the originating module's File Export command. The extension ".dat" is the normal default for ANGOSS format files.

Normally, when a text file is imported into your ANGOSS worksheet window, each line of text is placed in a separate row and each word of text (character string) is placed in a separate cell.

123, R2-123. Select the 123 or R2-123 option to read a Lotus 1-2-3 Release 1A or 2 worksheet file, respectively, into the current worksheet window. You are prompted to enter the worksheet name. Once the Lotus worksheet is displayed in your ANGOSS worksheet window, you can edit the file and save it as an ANGOSS worksheet file.

ANGOSS automatically converts formulas, functions, and worksheet formats as it reads a Lotus worksheet file. ANGOSS also checks for names that might be interpreted within the ANGOSS environment as keywords. When a conflicting name is encountered, ANGOSS displays the message `Invalid username (name)`. Enter a replacement name.

File Export

The File Export command enables you to write all or part of a worksheet to a file in a format that can be read by another ANGOSS module. In addition, by selecting a format designed to interface with other program file formats, this command allows you to convert your ANGOSS worksheet files to other formats, establishing a powerful and effective interface with many popular programs.

When you select File Export, ANGOSS asks you to indicate whether you want to export the entire worksheet or only a block of cells to a file. Selecting **Worksheet** exports the entire worksheet based on the widest row. If you select **Block**, enter the block name or reference.

Format options include ASCII, DIF, WP-Doc, Smart, Text, Lotus 1-2-3 (Release 1A), and Lotus 1-2-3 (Release 2). Once you have chosen a format, enter the filename of the file to be created. ANGOSS automatically assigns a default extension based upon the file type. You can override the default by entering an extension with the filename. Include device and path specifications if necessary.

IMPORTANT: When an ANGOSS worksheet is written into either of the Lotus 1-2-3 formats, formulas are converted to the proper format for calculation in 1-2-3. However, a number of functions available in ANGOSS Spreadsheet are not supported in Lotus 1-2-3. Formulas containing these unsupported functions are converted to text entries. Also, because the maximum formula length in Lotus 1-2-3 is 240 characters, any ANGOSS formulas over 240 characters in length are truncated and written as label entries in the 1-2-3 file.

The options are as follows:

ASCII. If you select the ASCII option, ANGOSS writes out the file in a standard ASCII, comma-delimited format suitable for exporting to Microsoft or MicroPro products. The suffix ".asc" is the default extension for ASCII files.

DIF. If you select the DIF option, ANGOSS writes out the file in Data Interchange Format (DIF). DIF files can be shared by many unrelated programs, so worksheet files written in DIF format can be accessed by many other spreadsheet programs. The suffix ".dif" is the default extension for DIF files.

WP-Doc. If you select the WP-Doc option, ANGOSS writes out the file in a format that can be read by the ANGOSS Word Processor. Any special fonts defined for cells are retained in WP-Doc format. The extension ".doc" is the default for ANGOSS Word Processing documents.

Smart. If you select the Smart option, ANGOSS writes out the file in a spaced-delimited format, compatible with other ANGOSS modules. The extension ".dat" is the default extension for ANGOSS format files.

Text. If you select the Text option, ANGOSS creates a standard flat text file (rather than an ASCII file or an ANGOSS text file). The Text format is basically a screen image format, padded with spaces and not delimited. Special fonts are not retained in Text format. The extension ".txt" is the default extension for text format files.

123. If you select the 123 option, ANGOSS creates a file in a format that can be accessed by Lotus 1-2-3, Release 1A. ANGOSS automatically assigns the extension ".wks" to the new file.

R2-123. If you select the R2-123 option, ANGOSS creates a file in a format that can be accessed by Lotus 1-2-3, Release 2. ANGOSS automatically assigns the extension ".wk1" to the new file.

File Password

The File Password command provides worksheet protection by allowing you to assign a password to a worksheet.

COMMENT: The encryption driver is specified in the Tools Preferences Spreadsheet definition menu.

When you attach a password to a worksheet file, the data contained in your worksheet becomes encrypted, preventing people without the required password from reading your worksheet files. In addition, unauthorized users are prevented from seeing your files through other debugging tools.

IMPORTANT: Passwords are case sensitive. For example, if you assign "Test" as a password, you cannot load the worksheet by entering "TEST" or "test."

Options for File Password include Attach and Remove.

File Password Attach

Attach a password to an ANGOSS worksheet by selecting the File Password Attach command. ANGOSS prompts you to enter the password you want. The password will not be displayed as you type it. ANGOSS then asks you to enter the password again. This is to verify that you typed the word correctly the first time.

Passwords can contain from one to sixteen characters, and may contain embedded spaces.

After executing the File Password Attach command, you must then execute the File Save command to save the worksheet and retain the new password.

NOTE: When using the File Load or File Activate commands to convert worksheets from earlier ANGOSS Spreadsheet versions to ANGOSS, use the "save permission" password. A "read-only" password will not allow the worksheet to be loaded. The "save permission" password becomes the new password in ANGOSS.

File Password Remove

Remove a password from an ANGOSS worksheet file by loading the worksheet and selecting the File Password Remove command. The password is removed immediately, but you must then save the worksheet to retain the "no password" status. The worksheet will no longer be encrypted.

Layout Commands

The Layout commands control the presentation of values and text on your worksheets. The height and width of cells can be changed as necessary. Data can be centered in a cell or aligned to the right or left. Values can be displayed with or without currency symbols and commas. They can be displayed as numbers, dates, time, bar symbols, percents, or in scientific notation. A coded map showing the location of the various cell-types in your worksheet can be produced.

In addition, you can define and use up to 64 fonts in your worksheet.

Layout Options

Options for the Layout keyword include the following:

Alter-Shading. This command set allows you to place shaded areas into your worksheet.

Cell-size. Controls the height and width of one or more cells.

Default. Controls the format for new entries.

Format. Changes format of existing value data and presets format for new value entries.

Justify. Controls the alignment of existing text and value entries.

Lines. This command set allows you to outline, grid, and add lines to the top, bottom, and sides of cells in your worksheet.

Set-Font. Controls the use of fonts in a worksheet.

Worksheet-Options. Provides a definition menu for setting the format for new entries in the current worksheet or future worksheets. Also allows specification of print settings.

SHADING

The Shading commands are only available in version 2.6 and higher.

This command set allows you to place shaded areas into your worksheet. Once you have selected LAYOUT ALTER-SHADING, the following command list will appear:

Edit Clear Shade

Lines and shading in your worksheet are not visible on the screen. To actually view lines and shading, print the file to the screen (see *Print Preview* for details) or send it to the printer. However, information about the current cell's attributes is displayed on the status line:

WS: myws Loc: r1c1 FN: 0 Font: 1 Lines: TB Shade: L

The status line above shows that the current cell contains top and bottom line attributes as well as light shading. Notice that it is possible to have multiple line types on a single cell however, duplicate types will have no affect. The characters codes used to represent these attributes are described in the following list:

Shade:

L - Light shading

M - Medium shading

D - Dark shading

.EDIT

The EDIT command opens a screen that displays existing shade attributes in your worksheet. This screen consists of a pointer and two columns: the first column indicates the shade level and the second shows its position in standard spreadsheet coordinates.

You can change the position of any shade level by pointing to it and entering in new coordinates. As an alternative, select the **F6** Button, or key, to block mark cells. Note that when using the keyboard to block mark, you must first press the **F2** key to anchor the starting position. Block marking is completed when enter is pressed (mouse users can click on the ENTER message in the menu area). When you are satisfied with the modifications made, select **F10**.

Note: Shade levels themselves cannot be altered only repositioned.

CLEAR

The CLEAR command will remove shading from cells in a selected area. This can be done by blocking an area or, by selecting ALL, you can remove all shading from your worksheet.

SHADE

First, select one of the three available levels of shading: Light, Medium, or Dark. Following this, select the cells that you wish to shade by either block marking or choosing the ALL option.

Note: When editing ALL attributes, the displayed row and column values will be r9999c999, even though the printed output only shows the shading in the actual worksheet. This feature allows the shaded area to expand or contract when the worksheet's size is changed.

Layout Cell-Size

The Layout Cell-Size command sets the width and height of cells. The default width for cells is 10 characters (72 points). The default height for cells is 12 points. Adjusting cell width or height can produce a more readable worksheet.

Cell width can be measured in characters, points, or inches. Cell height is measured in points or inches. The unit of measure for both of these items is controlled by settings at the Cell-Size prompt on the Worksheet Option menus. This menu can be displayed by the Layout Worksheet-Option commands.

Layout Cell-Size Width

The Layout Cell-Size Width command is used to change the column width of a single column, a group of columns, or all of the columns in a worksheet. If cell-size is measured in characters, width is the maximum number of characters that will be **displayed** in the column. You can specify a column width from 0 to 80 characters. If it is measured in points or inches, width is fixed at the number of points or inches entered. A negative width is not allowed, nor is a width wider than your screen.

When you change the width of a column, the data in the cells remains intact. The width of the cell affects the display and printing of the contents of the cell. If you enter text that requires more characters than the cell width allows, ANGOSS uses the cell to the right to fully display the "long-text" string. However, if the cell to the right of the current cell contains data, display of the long-text string is truncated.

When values requiring more characters than the cell width allows are entered, the value is displayed as a series of asterisks across the width of the cell.

Designating a column width of 0 is another way of "hiding" a column. A column having 0 width is neither displayed on your screen nor printed when the worksheet data is printed. Unlike the Edit Hide command, setting column width to 0 with the Layout Cell-Size Width command "hides" both the column and the column number.

Layout Commands

The cell highlighter does not enter columns having 0 width. To make a 0 width cell the current cell, use the Sheet Goto Cell command to go directly to the "hidden" cell.

NOTE: You cannot define all columns in the worksheet as 0 width columns.

Before you select either the Columns or the All option, ANGOSS prompts you to Enter width:. Type a value representing the number of characters, points, or inches to be used as the cell width.

Columns. If you select the Columns option, ANGOSS prompts you to enter the number of columns to be changed. Press **Enter** to select the current column only. If you enter a value greater than 1, the current column and columns to the right of the current column are changed to reflect the width you entered.

All. The Layout Cell-Size Width All command changes the width of all worksheet columns to the size specified.

Layout Cell-Size Height

The Layout Cell-Size Height command adjusts the height of cells to the setting, in points or inches, you specify. Controlling cell height allows you to space rows for better readability when the worksheet is printed using the Enhanced option of the Print command. Changing cell height will not affect the way cells are printed when using any other option of the Print command, nor will it affect how cells are displayed on your screen.

At the prompt, specify the height to use. Cell height can range from 1 to 300 points, or up to about 4 inches. A cell height of 0 is not valid.

Rows. To change the height of particular rows, select the Rows option. You are asked to enter the number of rows. Type the number, or press **down arrow** or **PgDn** to mark the rows.

All. To change the height of all rows in the worksheet, select the All option.

Layout Default

The Layout Default command controls the default display of all new entries in a particular worksheet. You can specify text and value settings prior to beginning a new worksheet so that all entries in the worksheet conform to those settings.

By executing the Layout Default command, you preset formats for the **current worksheet only**, leaving intact for future worksheets the standard formats you routinely use.

Compared to Worksheet-Options

The Layout Default command offers many of the same settings as the Layout Worksheet-Options menu. The Layout Worksheet-Options New-Sheet menu defines settings that will affect all future worksheets. Use either the Layout Default command or the settings in the Layout Worksheet-Options Current-Sheet definition menu to override the New-Sheet settings for new entries on the current worksheet.

When you select Layout Default, ANGOSS prompts you to specify whether you want to format text or values.

Layout Default Text

The Layout Default Text command sets the default format for new text entries in the current worksheet. You can format text to be left-aligned, centered, or right-aligned. With Layout Default Text, the new alignment format that you specified will not be evident until you enter new text into your worksheet.

Layout Default Values

The Layout Default Values command sets the default format for new value entries. A value can be displayed as a bar representation of a number, as a date, as time, as scientific notation, as currency, as a numeric value, or as a percent.

Many of the Layout Default Values options allow you to specify the following format settings.

- Display of numbers with or without commas, or "thousand separators."
- Presentation of negatives: with a minus sign; enclosed in parentheses; followed by **cr**; or followed by **cr** with positive numbers followed by **db**.
- Display of cells containing only zeros: show the zeros or show blank cells.
- Decimal precision from 0 to 15 decimal places.

In addition, the Layout Default Values commands allow you to define the default alignment for value cells. Select **Left**, **Right**, or **Center**.

The Layout Default Value options are as follows:

Bar. The Bar format displays numeric entries as a series of symbols representing the value. Positive numbers are represented by "+" symbols. Negative numbers are represented by "-" symbols. A value of 0 is displayed as a period. If the cell is not wide enough to display the bar, it is filled with asterisks. Bar cells can be centered, or aligned to the right or left.

Table 9-5

Value	Displayed As
5	+++++
-5	-----
0	.
100	*****

Date. The Date format enables you to define all new value entries in the current worksheet as dates to be presented in a particular date format. The date formats are those you defined in Tools Preferences Global. You will also specify alignment for dates.

When you select the Date option, choose either **Date1**, **Date2**, or **Date3**. Positive integers will be converted to dates in and after 1900. Negative integers will be converted to dates before 1900.

Time. The Layout Default Values Time option allows you to define all new value entries as time entries in AM\PM hour or 24 hour time format. You will also specify alignment for time entries. The fractional portion of any value will be converted to and displayed as time.

E-Notation. If you select the Layout Default Values E-Notation command, all new numeric entries you make will be displayed in scientific notation (i.e., 256 is displayed as 2.56 E+02). Although a numeric entry is displayed in scientific notation within the cell, it is represented as a numeric value in the Control Area.

Currency. The Layout Default Values Currency command allows you to display all new value entries with a currency symbol. The currency symbol used and its location is determined

by settings in Tools Preferences Global. A currency entry is represented as a numeric value in the Control Area when you highlight its cell.

Numeric. The Layout Default Values Numeric command enables you to display all new values as numbers.

Percent. The Layout Default Values Percent command allows you to display all new value entries as percents. For example, the entry ".22" would be displayed as "22%," and ".221" with one decimal place selected would be displayed as "22.1%."

General. The Layout Default Values General command allows you to display all new value entries in a general numeric format. Nonsignificant trailing zeros are suppressed. A value with a large number of positions to the left or right of the decimal is converted to E-Notation, as is a number too large to fit within the cell width.

Layout Format

The Layout Format command changes the display of existing value entries. You can set your Layout Default preferences prior to beginning a new worksheet so that all new entries in that worksheet conform to your format. But to change the appearance of specific cells once data has been entered, you must reformat the cells using the Layout Format command. Layout Format affects values only. Use Layout Justify to reformat text entries.

Preformatting

Value cells are defined for the entire worksheet before any entries are made by executing the Layout Default command. There are times, however, when you know you do not want every cell to be formatted the same way. For example, a worksheet might be formatted as numeric, but the entries on the first row and the total lines should be formatted as currency, displaying the dollar sign.

Specific cells that are to contain value entries (not text entries) can be preformatted before you enter data by selecting Layout Format Block. A block can be one cell or many cells. Preformatting blocks of value cells allows you to set individual formats for specific areas of the worksheet when a single format for the entire worksheet is not adequate.

COMMENT: Only the Block option can be used for preformatting.

The command is entered exactly the same as when reformatting existing value blocks.

NOTE: Preformatting of cells applies only to data entry. If data is placed in cells using the Edit commands, preformatting for those cells is lost.

Layout Format Options

When you select the Layout Format command, ANGOSS asks you to indicate the section of your worksheet you want to reformat: **Block, Columns, Rows, or All**. After selecting an area type, specify the area to be affected. You can then select the type of formatting to be done.

Many of the Layout Format options allow you to specify the following format settings.

- Display of numbers with or without commas, or "thousand separators."
- Presentation of negative numbers: with a minus sign; enclosed in parentheses; followed by **cr**; or followed by **cr** with positive numbers followed by **db**.
- Display of cells containing only zeros: show the zeros or show blank cells.
- Decimal precision from 0 to 15 decimal places.

The available formatting (and preformatting) options are as follows:

Bar. The Bar format displays numeric entries as a series of symbols representing the value. Positive numbers are represented by "+" symbols. Negative numbers are represented by "-" symbols. A value of 0 is displayed as a period. If the cell is not wide enough to display the bar, it is filled with asterisks.

Table 9-6

Value	Displayed As
5	+++++
-5	-----
0	.
100	*****

Date. The Date option of Layout Format enables you to reformat an area for date entries. Select Date format Date1, Date2 or Date3. The date formats are those you specified in Tools Preferences Global. The integer portion of a numeric entry will be displayed as a date. The value 0 is shown as December 31, 1899. Positive integers are shown as dates after December 31, 1899. Negative integers are shown as dates prior to December 31, 1899.

NOTE: A date entry can be reformatted to display the actual number it represents by selecting the Layout Format command with the Numeric option. The numeric value of a date is based upon its relationship to "Day 0," December 31, 1899.

To enter a date (instead of a number to be converted to a date), begin the entry with "@" or "#". Even though the entry is displayed as a date in the cell and in the Control Area, it can be used as a value in calculations.

Time. The Time option of the Layout Format command allows you to format an area for time entries. Specify either AM\PM or 24 hour time format. The fractional portion of a number will be represented as time.

E-Notation. If you select the E-Notation option of the Layout Format command, you are changing the display format of specified cells to scientific notation (i.e., 256 is displayed as 2.56 E+02). Although a numeric entry is displayed in scientific notation within the cell, it is represented as a numeric value in the Control Area when you highlight that cell.

Currency. Selecting the Currency option allows you to display values with a currency symbol. The currency symbol used and the location of the symbol with the number are determined by settings in Tools Preferences Global.

Numeric. Selecting the Numeric option enables you to display values as numbers.

Percent. Choosing the Percent format allows you to display values as percents. For example, ".22" would be displayed as "22%," and ".221" with one decimal place selected would be displayed as "22.1%."

Reset. The Reset option of the Layout Format command enables you to reset cells that are currently displayed in one format to the default value format for the worksheet. This allows you to quickly reestablish the default format, including decimal precision and commas.

General. The General option of the Layout Format command allows you to assign a general numeric format to the designated cells. Nonsignificant trailing zeros are suppressed. A value

with a large number of positions to the left or right of the decimal is converted to E-Notation, as is a number too large to fit within the cell width.

Layout Format Formula-Display

When you select the Layout Format Formula-Display command, ANGOSS prompts you to indicate whether you want to display the formulas in Map format, in Text format, or in Values format. The Values format is the normal worksheet display format and is used to return Map or Text format to normal.

Map. Selecting the Map option of the Layout Format Formula-Display command instructs ANGOSS to display the cell entries in your worksheet as two-character codes, indicating the cell types in your worksheet. The first position of the code describes the formula. The second position refers to the formatting of the cell. Codes are defined with the Tools Preferences Spreadsheet command. See the discussion of assigning map codes in the Tools Preferences Spreadsheet section of *ANGOSS Spreadsheet Command Reference*.

Text. Selecting the Text option of the Layout Format Formula-Display command instructs ANGOSS to display a text version of any formula entries (i.e., r1c1+r10c3) contained in the specified area of your worksheet. If the formula is too long to display in its own cell, it will spill over into the adjacent cell as long as the adjacent cell is empty. If the adjacent cell is not empty, the display of the formula will be truncated.

Values. Selecting the Values option of the Layout Format Formula-Display command instructs ANGOSS to display the calculated results of any formula entries contained in the specified area of the worksheet. After viewing your worksheet in Map or Text format, select the Values option to return to normal worksheet display.

Layout Justify

The Layout Justify command changes the justification (alignment) of existing data only, both text and values. To specify the alignment of data not yet entered, use the Layout Default command.

Once you specify the type of alignment to be performed, you must determine the area to be justified. You can choose from the following options. Select **Block** to align data in a specified cell or block of cells. Select **Rows** or **Columns** to align data in specified rows or columns, respectively. Select **All** to define the alignment of all data in the worksheet.

The types of alignment are as follows:

Left. Use the Left option to align entries to the left.

Right. Use the Right option to align entries to the right.

Center. Use the Center option to center entries in the cell.

Layout Lines

The Lines commands are only available in version 2.6 and higher.

This command set allows you to outline, grid, and add lines to the top, bottom, and sides of cells in your worksheet. Once you have selected LAYOUT LINES, the following command list will appear:

Edit Clear Outline Top Bottom Left Right Grid

Lines and shading in your worksheet are not visible on the screen. To actually view lines and shading, print the file to the screen (see *Print Preview* for details) or send it to the printer. However, information about the current cell's attributes is displayed on the status line:

WS: myws Loc: r1c1 FN: 0 Font: 1 Lines: TB Shade: L

The status line above shows that the current cell contains top and bottom line attributes as well as light shading. Notice that it is possible to have multiple line types on a single cell however, duplicate types will have no affect. The characters codes used to represent these attributes are described in the following list:

Lines:

O - Outline

G - Grid lines around a cell

T - Line on top of cell

L - Line on left of cell

B - Line on bottom of cell

R - Line on right of cell

EDIT

The EDIT command opens a screen that displays existing line attributes in your worksheet. This screen consists of a pointer and two columns: the first column indicates the line type and the second shows its position in standard spreadsheet coordinates.

You can change the position of any line type by pointing to it and entering in new coordinates. As an alternative, select the **F6** Button, or key, to block mark cells. Note that when using the keyboard to block mark, you must first press the **F2** key to anchor the starting position. Block marking is completed when enter is pressed (mouse users can click on the ENTER message in the menu area). When you are satisfied with the modifications made, select **F10**.

Note: Line types themselves cannot be altered only repositioned.

CLEAR

The CLEAR command removes lines from your worksheet. This can be done in two ways: you can clear line attributes from a specified area by block marking or, you can remove all lines from your worksheet.

OUTLINE

The OUTLINE command will place a box around a selected area of your worksheet. This can be achieved by either block marking the cells that you wish to outline or by selecting the ALL option to enclose your entire worksheet.

Note: When editing ALL attributes, the displayed row and column values will be r9999c999, even though the printed output only shows the outline around the actual worksheet. This feature allows the outlined area to expand or contract when the worksheet's size is changed.

TOP

This command will create a line across the top of selected cells in your worksheet. Note that a line across the top of a row of cells and a line along the bottom of the cells above will only produce a single line.

BOTTOM

This command will create a line along the bottom of selected cells in your worksheet. Note that a line along the bottom of a row of cells and a line across the top of the cells below will only produce a single line.

LEFT

This command will create a line along the left side of selected cells in your worksheet. Note that a line along the right and left of adjacent cells will only produce a single line.

RIGHT

This command will create a line along the right side of selected cells in your worksheet. Note that a line along the right and left of adjacent cells will only produce a single line.

GRID

The GRID command completely surrounds selected cells with lines so that it creates a box around each of the cells.

Layout Set-Font

A font is a complete set of characters in a single style and size, such as serif, 12 point. A font can also be a set of boldfaced, underscored, or italicized characters.

You can define and use as many as 64 fonts, numbered from 0 to 63, in a worksheet. Font numbers and definitions are saved with each worksheet; the fonts defined for one worksheet need not be the same as those defined for another worksheet. This feature allows you almost unlimited flexibility in font definition.

The Layout Set-Font commands allow you to control the use of fonts in your worksheets. The Select option allows you to choose the default font for the current worksheet. Once selected, the default font is the font that will be used for all new entries. The Change option allows you to use fonts other than the default for existing data in specific areas of the current worksheet. The Edit options allow you to assign a number to a specific font description (which you can define) for use in the current worksheet or in all future worksheets. The Remove options allow you to delete font descriptions that are not being used.

Font Prompter. When using the Set-Font commands, you will commonly encounter two menus. The first is the Font Prompter menu, showing the current list of fonts with their assigned numbers. Refer to the specific Set-Font command instructions for information on using the Font Prompter.

Font Selector. The second menu, the Font Selector, appears when you indicate that you want to add or change a font description.

Font family, character set, size, and color have submenus that list available options. Press **F6** to view the submenus; select the desired options and press **Enter**. If no submenu appears when you press **F6**, no additional options are available.

Items highlighted in the Font Selector menu are the current settings. Items enclosed in parentheses are not supported by the current printer.

Select Slant, Weight, Modifications, and Baseline Shift settings by highlighting the desired option.

You can also specify foreground and background colors for fonts with the Colors option. You can either type the color numbers in the field, or press **F6** to select from a palette.

Press **F10** to complete the definition.

Layout Set-Font Select

The Layout Set-Font Select command allows you to select a font as the default font for the current worksheet. The Font Prompter shows the font numbers and descriptions that have been defined for the current worksheet. The arrow points to the current default font when the Font Prompter first appears.

Point to the font you want to use as the default and press **Enter**. The font number selected will be the font number used for all new entries in the current worksheet until you specify otherwise. The default font is displayed next to the word "Font:" on the Status Line of the screen.

To add a new font number and description and make it the default font for the current worksheet, point to a font on the list (normally, the one most similar to the desired new font) and press **F6** to invoke the Font Selector menu. To view options for font family, size, or color, position the arrow next to the appropriate item and press **F6** again. Select the other attributes. When you press **F10**, the newly defined font will be attached to the current worksheet as the default font and will be assigned the next available number.

NOTE: If a newly defined font exactly matches an existing font, no new font number will be assigned.

Layout Set-Font Change

The Layout Set-Font Change command allows you to change the font for existing entries in a specified area of the current worksheet.

When you select Layout Set-Font Change, you are asked to identify the type of area to be affected by choosing the Block, Columns, Rows, or All option. You are then prompted to define the area.

After you have specified the area to be changed, the Font Prompter is displayed. The Font Prompter lists the numbers and descriptions of the fonts that have been defined for the current worksheet. The arrow points to the font used by the cell in the upper-left corner of the area. If no data is in the upper-left corner, the default font is indicated. Position the arrow next to the desired font and press **Enter**. The font setting for the area is changed to the font you select.

To add a new font number and description for the current worksheet, point to one of the fonts on the list (normally, the one most similar to the desired new font) and press **F6**. The Font Selector screen will be displayed. Select the appropriate characteristics. When you press **F10**, the font for the specified area will be changed to the newly defined font. It will be assigned the next available number unless it matches an existing font. ANGOSS will not assign a new number for an exact duplicate.

Layout Set-Font Edit

The Layout Set-Font Edit commands allow you to assign specific numbers to the font descriptions of your choice. The Current-Sheet option allows you to modify the fonts for the current worksheet only. The New-Sheet option allows you to redefine the Font Prompter list for new worksheets. In either case, you can define a completely new font number and description, or change the description of an existing font.

Current-Sheet. If you select the Layout Set-Font Edit Current-Sheet command, the Font Prompter, showing fonts attached to the current worksheet, is displayed. To edit an existing font, point to the desired font or enter the font number. When the Font Selector screen appears, you can revise the description as necessary. Press **F10** to complete the change.

Changing a font number's description automatically changes the font used in the worksheet.

To add a new font, point to an existing font and type an unused number. When the Font Selector screen appears, you can select the appropriate characteristics. The font will be saved with the worksheet under the number you assigned.

New-Sheet. The New-Sheet option allows you to define font numbers and descriptions that are to be displayed on the Font Prompter menu for all new worksheets.

"New" worksheets are future worksheets, not worksheets existing at the time the New-Sheet option is used. Thus, the worksheet in the current window at the time the command is executed is not a new worksheet, even if it is blank. After revising the New-Sheet fonts, execute File Unload to obtain a "new" worksheet.

When you select the Layout Set-Font Edit New-Sheet command, the Font Prompter is displayed, showing ANGOSS-defined fonts and additional fonts you have defined for new worksheets through this option.

Font 0 is always the default font for new worksheets. To revise the font to be used as the default, select Font 0 and revise its description.

You can also revise the descriptions of any other font on the Font Prompter menu by selecting its number and revising the description.

To add a new font to the Font Prompter menu for new worksheets, point to an existing font and enter an unused number. When the Font Selector screen appears, select the appropriate characteristics. When you press **F10**, the defined font becomes the default for new worksheets.

Layout Set-Font Remove

The Layout Set-Font Remove commands allow you to delete unused fonts. The Current-Sheet option removes unused fonts from the Font Prompter menu of the current worksheet. The New-Sheet option removes fonts from the list of fonts for new worksheets.

Current-Sheet. When you select the Current-Sheet option, the Font Prompter screen is displayed. The screen shows all the fonts defined for the current worksheet. Unused fonts are marked with an asterisk.

Positioning the arrow next to a font and pressing **Enter** deletes just one font. You can also delete multiple fonts. Enter the font numbers to be deleted, or press **F6** to mark fonts to be deleted. **F6** is a toggle key that marks and unmarks fonts for deletion. Press **F8** to mark all unused fonts for deletion. Press **F10** to complete the command.

You cannot delete a font currently in use in the worksheet nor can you delete Font 0.

New-Sheet. When you select the New-Sheet option, the Font Prompter menu is displayed. The menu shows all fonts available for new worksheets. Since future worksheets do not yet exist, all fonts except Font 0 are marked with an asterisk and are eligible to be deleted.

Position the arrow next to a font and press **Enter** to delete just one font. To delete multiple fonts, type the font numbers, or mark the fonts by pressing **F6**. Press **F8** to delete all fonts marked with an asterisk on the list. Press **F10** to complete the command.

Layout Worksheet-Options

The Layout Worksheet-Options commands display and define formatting options for future entries. You can view and define settings for the current worksheet or for all future worksheets.

After selecting Layout Worksheet-Options, choose either the Current-Sheet option or the New-Sheet option. The current sheet is the worksheet in the current window, even if it has no entries. New sheets are all other future worksheets.

Layout Worksheet-Options Current-Sheet

The Current-Sheet option displays the Current Worksheet Parameters menu, which allows you to view and change the settings for the current worksheet. If the current worksheet is new or has had no changes to its format or print settings, the settings will be the same as shown in the Layout Worksheet-Options New-Sheet menu.

The Layout Default command is equivalent to the format options of the Layout Worksheet-Options Current-Sheet menu. Settings for the current worksheet can be defined through either command. However, the menu method allows you to change specific settings without inadvertently changing others.

When the current worksheet is saved, the format settings are saved with it.

Recalculation Order

Select the order of recalculation for the current worksheet. Natural order means that formulas are calculated in the order that they are needed, not in the order of placement in the worksheet. For example, if r1c1 contains a formula that references r4c3, the value of r4c3 will be calculated first. The formula in r1c1 will use the new value of r4c3 in its calculation.

Row order means that the worksheet is calculated from left to right, by rows. **Column order** means that the worksheet is calculated by columns, beginning in column one, then moving to column two, and so on.

To change the recalculation order for the current sheet only, use the Sheet Calc-Mode Calc-Order command.

Default Value format

The following format settings will be applied to all new values you enter into your worksheet. You can specify whether value entries will be treated as numeric, currency, general, date, time, E-Notation, percent, or bar.

Numeric. If you specify numeric format, you must also specify:

- whether or not commas will be used
- how negative numbers will be displayed
- whether or not zeros will be blanked
- whether the entry will be left, right or center justified
- to what precision the value will be displayed

Currency. If you specify currency format, you must also specify:

- whether or not commas will be used
- how negative numbers will be displayed
- whether or not zeros will be blanked
- whether the entry will be left, right or center justified
- to what precision the value will be displayed

General. If you specify general format, you must also specify whether the entry will be left, right or center justified.

Date. If you specify date format, you must also specify:

- whether the date will be displayed in Date1, Date2, or Date3 format
- whether the entry will be left, right or center justified

NOTE: What formats are actually represented by Date1, Date2, and Date3 are controlled by settings on the Tools Preferences Global definition menu.

Time. If you specify time format, you must also specify:

- whether the entry will be left, right or center justified
- whether the time will be displayed in AM/PM or 24-hour format

E-notation. If you specify E-notation format, you must also specify:

- whether or not zeros will be blanked
- whether the entry will be left, right or center justified
- to what precision the value will be displayed

Percent. If you specify percent format, you must also specify:

- whether or not commas will be used
- how negative numbers will be displayed
- whether or not zeros will be blanked
- whether the entry will be left, right or center justified
- to what precision the value will be displayed

Bar. If you specify bar format, you must also specify whether the entry will be left, right or center justified.

Default text justification. You can specify left, center, or right justification for new text entries.

Cell Size

Cell Size settings allow you to control what type of units is used to measure the size of cells.

Width units. Cell width can be measured in characters, inches or points. Each character is the size of a monospaced 10-cpi character.

NOTE: The default width of 10 characters in the standard font of most printers uses approximately 72 points. However, when converting the measure from characters to points, ANGOSS uses 7 points for one character (or only 70 points for 10 characters.) This can cause unexpected results in printing. Review your worksheet for possible problem areas, and if necessary, print the worksheet using the Enhanced option instead of the Draft option of the Print command.

Height units. Specify the number of points or inches. Changes to row height will be reflected when the worksheet is printed using the Enhanced option of the Print command, but not on the screen display or in any other kind of printing.

Layout Worksheet-Options New-Sheet

The New-Sheet option displays the New Worksheet Parameters menu, which allows you to establish a common format for your worksheets. All new worksheets will be formatted according to the Layout Worksheet-Options New-Sheet menu settings until they are reset through the Layout Default or Layout Worksheet-Options Current-Sheet commands.

The settings on the New-Sheet menu are identical to the Current-Sheet menu with two exceptions. Layout Worksheet-Options New-Sheet also has settings for Default Column Width and Default Column Height.

Default Column Width. Enter the number of units wide each cell in a new worksheet will be. Whether these units are characters, inches or points, is controlled by the previously discussed Cell Size prompts.

Default Row Height. Enter the number of units high each cell in a new worksheet will be. Whether these units are inches or points is controlled by the previously discussed Cell Size prompts.

Print Commands

The Print commands allow you to print information from designated areas of your worksheet or to print the entire worksheet, send the output to a file, printer or to screen, produce reports from your worksheet, and print formula and map versions of your worksheet.

Print Options

Options for the Print command include:

Worksheet. Prints the worksheet, showing calculated results rather than formula definitions. This is the "normal" worksheet printing option.

Formulas. Prints the formulas of a worksheet, rather than the results.

Map. Prints a coded map of the worksheet, showing the types of data in each cell.

Report. Produces data from one or more worksheets in a report format, with optional page headings and footings.

Print Options. Controls the formatting options for printing the current worksheet.

Print Preset. Controls the default formatting options for printing new worksheets. around each of the cells.

Print Preview

Introduction

The Print Previewer enables you to view documents, worksheets, and database reports directly on the screen. This feature allows you to view these items without printing, letting you see what the end results are quickly. Generally, the Print Previewer is selected by following the PRINT commands in each module.

To access to the Print Previewer in each module, refer to the following command listings:

In the Spreadsheet:

print worksheet block *reference* draft copies *number* screen

print worksheet block *reference* enhanced copies *number* screen

print worksheet all draft copies *number* screen

print worksheet all draft copies *number* screen

print report execute "*filename*" draft copies *number* screen

print report execute "*filename*" enhanced copies *number* screen

Print Preview Commands

As previously discussed, the PRINT PREVIEW commands can be executed in the Spreadsheet. Once these commands have been executed, a new screen will appear. This screen will have a graphic view of your document with a command list along the bottom. An explanation of the commands are as follows:

Function Key	Name	Description
F2	Next Menu	Select the next menu in the list

Function Key	Name	Description
F3	Scroll Bars	Toggle the scroll bars On or Off
F5	Prev Page	View the previous page
F6	Next Page	View the next page
F7	Zoom Out	Decrease the magnification
F8	Zoom In	Increase the magnification
F9	Unzoom	Return the magnification to 0 (Full page)
F10	Quit	Exit the Print Previewer

The bottom of the screen shows the displayed section, page number, and magnification level. Magnification levels can be between 0, the full page, and 16.

Selecting **F2** will present a new list of commands. Repeatedly selecting the next menu will cycle through all three available lists. The remaining commands are listed below:

Name	Description
PgUp	Page up
PgDn	Page down
Tab Left	Move the page to the left (shift tab)
Tab Right	Move the page to the right
Up	Shift the page up half the distance as page up
Down	Shift the page right half the distance as page down
Left	Shift the page half to the left
Right	Shift the page half to the right
Home	Move to the top of the present page

Name	Description
End	Move to the bottom of the present page
^Left	Move to the left edge of the page
^Right	Move to the right edge of the page
^Home	Move to the top left edge of the page
^End	Move to the bottom left edge of the page

Print Worksheet

The Print Worksheet command produces a printout of all or part of a worksheet. Headings and labels, numeric entries, and the calculated results of formulas are shown as they appear in the Worksheet Window. The following steps describe how to print data from the current worksheet.

STEP 1: Select Print Worksheet.

STEP 2: Select All to print the entire worksheet, or Block to print only part of the worksheet.

If you select Block, you will then be prompted to mark the part of the worksheet you want to print or enter the block name.

STEP 3: Select Draft or Enhanced printing.

Draft printing produces worksheet data using internal printer fonts and is the fastest method of printing a worksheet. Boldfaced or underscored font attributes can be used. Any ANGOSS-generated, filled-area fonts you have designated in your worksheet will be replaced by the standard font.

Enhanced printing allows the production of various fonts, including ANGOSS-generated, filled-area fonts and more complex printing capabilities. Adjusted cell height, for example, is apparent only when you print with the Enhanced option. Because of its complexity, enhanced printing can be a great deal slower than draft printing.

STEP 4: Enter the number of copies you want printed.

STEP 5: Select Printer to send the data to the current printer, or select Disk to send the data to a disk file.

If you specify Disk, you are prompted to enter a name for the disk file to be created. The file will be assigned the extension .prn unless you specify otherwise.

NOTE: A file that is written to disk will contain printer control codes. These codes allow the file to be printed outside of ANGOSS. At the DOS level, you can print the file by copying it to your printer and it will look just like it was printed from within ANGOSS. However, printer control codes make it difficult to view or edit this file. To create a file containing no printer control codes, select the generic printer descriptor on the Hardware Preferences menu **before** printing the file disk.

Print Formulas

The Print Formulas command prints a listing, by row and column number, of the formulas in a worksheet. The Print Formulas command differs slightly from the Layout Format Formula-Display Text command which actually shows the formulas in their cells rather than listing them. The following steps illustrate how to print a map of the formulas in the current worksheet.

STEP 1: Select Print Formulas.

STEP 2: Select All to print all formulas in the entire worksheet, or Block to print only formulas in part of the worksheet.

If you select Block, you will then be prompted to mark the part of the worksheet you want to print or enter the block name.

STEP 3: Select Printer to send the data to the current printer, or select Disk to send the data to a disk file.

If you specify Disk, you are prompted to enter a name for the disk file to be created. The file will be assigned the extension .prn unless you specify otherwise.

Print Map

The Print Map command prints the worksheet in a coded format showing the types of data in each cell. The following steps illustrate this process.

STEP 1: Select Print Map.

STEP 2: Select All to print the entire worksheet, or Block to print only part of the worksheet.

If you select Block, you will then be prompted to mark the part of the worksheet you want to print or enter the block name.

STEP 3: Select Draft or Enhanced printing.

Draft printing produces worksheet data without special fonts. It uses only the default internal font for your printer and is the fastest method of printing a worksheet. Boldfaced or underscored font attributes can be used.

Enhanced printing allows the production of various fonts, including ANGOSS-generated filled-area fonts, and more complex printing capabilities. Adjusted cell height, for example, is apparent only when you print with the Enhanced option. Because of its complexity, enhanced printing can be a great deal slower than draft printing.

STEP 4: Enter the number of copies you want printed.

STEP 5: Select Printer to send the data to the current printer, or select Disk to send the data to a disk file.

If you specify Disk, you are prompted to enter a name for the disk file to be created. The file will be assigned the extension .prn unless you specify otherwise.

Print Report

The Print Report commands allow you to produce a professional looking report from your worksheet. In addition to the worksheet information, the report can have headings, footings, and page numbers. You can also include information from more than one worksheet on a report.

Print Report Create

To generate a worksheet report, you must first create a report definition file. Once this definition file is set up, it can be executed at any time.

The following steps explain how to define and execute a report.

STEP 1: Take a moment to study your worksheet data and determine how you want it presented.

STEP 2: Select Print Report Create.

STEP 3: Enter a name for the report definition you are about to create.

A report definition filename can consist of up to 8 characters and is assigned the extension .rdf.

STEP 4: Select New or Similar.

Selecting **New** brings up an empty definition menu and you can start your definition from scratch. Select **Similar** to use an existing report definition as a template. When prompted, enter the name of the file to be used as a template.

The Report Definition menu is then displayed. There are four categories of information you will have to specify in this definition:

- Print groups
- Headings
- Footings
- Print options

Print Groups

Print Groups, the major sections of a report, define column headings, labels, and worksheet data to be printed as a unit in a report. A print group is comprised of a report body block (normally, numeric or calculated worksheet data) and optional horizontal and vertical title blocks. Horizontal title blocks correspond to column headings on the worksheet. Vertical title blocks correspond to row labels.

If data from one print group cannot fit on a single page, overflow pages will be produced. The appropriate headings and labels will be repeated on additional pages. **Each print group you define will begin at the top of a new page.**

A report definition must have at least one print group, consisting of at least one body block. The title blocks are optional. If the data and titles from your worksheet will fit well on one report page, cells containing column headings and row labels can simply be included in the body block definition.

Sometimes, however, the information needs to be arranged differently from the way it appears in the worksheet. Or sometimes the information from a body block will not fit on one report page. Title blocks provide headings and labels for rearranged information, or for body blocks that overflow to additional pages.

Specifying Print Groups

For each of the three prompts in a Print Group, `Horizontal Title:`, `Vertical Title:`, and `Body Block:`, you have the option of typing in information or using **F6** to go to the worksheet and mark references.

Horizontal and Vertical Titles. For titles, enter a cell reference, use **F6** to mark a block containing the text from the worksheet, or enter a text string for the titles. References must be either cell references or text entries; they cannot be a combination of the two.

To line up properly on the report, the width of a horizontal title block must match the width of the body block. The length of the vertical title block must also match the length of the body block.

Title blocks can consist of more than one block reference. Use of multiple block references is discussed later in this chapter.

Body Blocks. For body blocks, enter a cell reference, or use **F6** to mark a block on the worksheet. Body blocks can consist of more than one block reference. Use of multiple block references is discussed later in this chapter.

Using Multiple Block References

Multiple block references can be specified for body blocks and title blocks. References to more than one block of worksheet data must be separated by either commas or semicolons. The use of a comma or semicolon determines how the blocks are positioned on the report.

Comma	Blocks are placed one below the other, on the same page if possible
Semicolon	Blocks are placed side by side, on the same page if possible

For examples of how using commas or semicolons affects report layout, refer to *Using Multiple Block References* in *Chapter 6: Printing Worksheets and Reports*. The following steps explain how multiple references are done.

STEP 1: Press F6.

STEP 2: Mark the first block.

Enter a comma or a semicolon, depending on how you want the block positioned. Continue marking blocks in this manner until all necessary blocks are referenced.

STEP 3: Immediately after that cell reference, type a comma or a semicolon, depending on how you want the blocks positioned.

STEP 4: Press F6 again to return to the worksheet.

STEP 5: Continue marking blocks in this manner until all necessary references are included.

Referencing Multiple Worksheets

To use more than one worksheet in a single report definition, precede a block reference with the worksheet name and a period.

Example:

```
qtr1.r1:9c2:4,qtr2.r1:9c2:4
```

The example shown would print a block from the worksheet qtr1 above a block from the worksheet qtr2.

Adding Print Groups

By default, prompts appear to allow three print groups to be specified. The print groups will be printed in the order in which they appear on the definition menu. The report will start with Print Group 1 and print as many pages as necessary to print the data you have specified. Then Print Group 2 will start at the top of a new page and print as many pages as necessary. Then Print Group 3 will be printed.

Additional Print Groups can be defined by adding them with **F7**.

STEP 1: Move the prompter arrow to the Print Group you want the new group to follow.

Remember, the Print Groups will be printed in order, so if you want to insert a new print group between Print Group 1 and 2, position the prompter arrow on Print Group 1. If you want the new group to come at the end of the report, position the prompter arrow on the last Print Group.

STEP 2: Press F7.

A new Print Group will be added directly below the Print Group you were pointing to and all Print Groups will be renumbered accordingly. Any settings in the Print Group were pointing to will be copied into the new print group. You can edit those settings as necessary.

Deleting Print Groups

To remove a Print Group from the Report Definition menu, point to it and press **F8**. The Print Group will be deleted and all other Print Groups will renumber accordingly.

Report Headings and Footings

The report heading, which is optional, is information to be printed at the top of each page of the report. The report footing, which is also optional, is printed at the bottom of each page.

Headings and Footings

You can specify headings or footings to be printed on some or all pages of your report. The first group of settings on the Print Option menu specifies heading information and the second group specifies footing information. The settings used to specify headers and footers are very similar, so they are discussed together here.

Print Heading/Footing On

Specify which pages will have printed headings or footings. You can choose to have the headings or footings printed on:

- all pages
- only the first page
- on all pages except the first page

Blank Lines after Heading/Footing

Enter a number from 0 to 3 to specify the number of blank lines that separate the heading from the first line of report data or the footing from the last line of data.

Use Secondary Heading/Footing

Two types of headings or footings are available: primary and secondary. If you select **No**, the primary heading or footing is printed on all pages. If you specify **Yes**, primary headings or footings are printed on odd-numbered pages, and secondary headings or footings are printed on even-numbered pages.

Primary and Secondary Headings/Footings

A maximum of five lines can be specified for each type of heading or footing. Enter up to 255 characters (including control codes and printable characters) for each line. If the text you want for a heading or footing is on your worksheet, you can press **F6** to mark the cell reference. Heading and Footing entries must be cell references **or** text, not both. If text and cell references are found on the same line, only the text will be printed.

A line is printed if it contains characters or is followed by a line that contains characters. If you leave lines one and two blank, and enter heading information on line three, your heading will consist of two blank lines and one line of text.

Print Control Codes

Print control codes are special character sequences that can be specified in headings or footings. The codes are used to control the alignment of information, or are replaced by current data, such as date, time, or page number. The following table lists the print control codes.

Print Commands

Control Code	Description
%L	Left aligns the text immediately following the control code until a different print control code is encountered, or until the end of the current line
%C	Centers the text immediately following the control code until a different print control code is encountered, or until the end of the current line
%R	Right aligns the text immediately following the control code until a different print control code is encountered, or until the end of the current line
%P	Replaces the control code with the page number
%D	Replaces the control code with the current date
%T	Replaces the control code with the current time
%F	Replaces the control code with the name of the file being printed
%[#]	Specifies a font for the text immediately following the control code.(# must be a valid font number.) The font number must be surrounded by brackets and can be followed by B or U to boldface or underscore text
%S	Replaces the control code with a section number (where "S" is the section number).

NOTE: Since the percent sign (%) is part of all control codes, you must enter %% if you want a percent sign to print in a header or footer.

Control codes can be used in any combination, with more than one control code appearing on a line. Control codes do not appear in the printed report. Do not separate the control codes from literal information with blank spaces unless you want the blank space printed on the report.

Following are examples of two print control code strings that could be entered as headers or footers and an illustration of the results they would achieve.

Example:

```
%L%F%C-%P-%R%D
```

```
filename.ext                -10-                11-14-90
```

%L%F causes the name of the current file to be printed at the left margin. %C-%P- causes the current page number to be centered on the line between two dashes. %R%D causes the current date to be printed at the right margin.

Example:

```
%LQuarterly Report%CACME Shoes%R3rd Quarter
```

```
Quarterly Report          ACME Shoes          3rd Quarter
```

%LQuarterly Report causes the text "Quarterly Report" to be printed at the left margin. %CACME Shoes causes the text ACME Shoes to be centered on the line. %R3rd Quarter causes the text 3rd Quarter to be printed at the right margin.

Primary and secondary headings or footings are allocated equal space on the printed page, even when they are not the same length. The heading or footing requiring the greater number of lines determines the space allocated for both.

Example

The following steps show how to print a heading on every other page.

STEP 1: Select All-pages for the Print Heading On: option.

STEP 2: Specify Yes for the Use secondary heading: option.

STEP 3: Leave either the primary or the secondary heading blank.

Depending on the heading you have left blank, headings will be printed on all even pages or all odd pages only.

Date Style

If you use the %D print control code to insert the current date in a header or footer, you must specify the format in which you want that date printed. Select one of the available date styles. The formats represented by **Date1**, **Date2**, and **Date3** are set on the Global Preferences menu, accessed with the Tools Preferences Global command.

Page Number Style

If you use the %P print control code to insert the current page number in a header or footer you must specify how you want that number printed. Select **Arabic**, **Roman-Small** (lowercase Roman numerals), or **Roman-Caps** (uppercase Roman numerals.)

Lines to Enclose Report

Select **None** to have no lines enclose report data. **Single** or **Double** will place a single or double line below the heading and above the footing, enclosing the data.

Start Page Number

If you use the %P print control code to insert the current page number in a header or footer, you must enter the page number the report will start with.

Spacing

Specify how you want the body of a report printed. Select **Single** to single space data, or **Double** to double space data.

Lines Per Inch

Select **6** or **8** to determine the number of lines per inch that will be printed when you select the Draft option of the Print command.

Draft mode

Select **10**, **12**, **Compressed**, or **Internal-Fonts** to determine which font will be used to print your worksheet when you select the Draft option of the Print Report Execute command. If you select 10-cpi, the worksheet will be printed with your printer's internal 10-cpi font. Selecting 12-cpi will use the printer's internal 12-cpi font. The compressed setting will print the worksheet in the internal compressed font. A compressed font's cpi varies between 15 and 20, depending on the printer.

NOTE: Not all printers will support all three of these options.

If you wish to use any other internal printer font, you must select the **Internal-Fonts** setting. Then ANGOSS picks up the internal fonts you have requested from the worksheet.

Paper Profile

A paper profile is made up of the page size and paper path you want to use to print a file. The paper path tells ANGOSS where the printer will find the paper for this job, and how it will move it through the printer. For example, you can specify the use of a tractor feed, or manual feed; choose between several paper trays; or specify the use of an envelope or single sheet feeder. Page size tells ANGOSS whether you will be printing an 8-1/2-by-11 inch page, an envelope or a custom page size.

This paper profile will control printing of Spreadsheet Reports only. Other Spreadsheet printing features will be controlled by the Paper Profile setting on the Current Print Options menu. Printing in the Word Processor and Database Reports is controlled by Paper Profile settings within each module. Printing from editors, such as the Text-Editor, non-report Database printing, and printing through Project Processing are controlled by the default paper profile on the Hardware Preferences menu.

Detailed information about selecting a page profile is provided in *Chapter 6: Printing Worksheets and Reports*.

Orientation

Select **Portrait** to print the report across the short side of the page. Select **Landscape** to print the report "sideways" across the long side of the page. Landscape printing can only be accomplished if your printer supports it.

Print on Both Sides of the Form

Select **Yes** to print on both sides of the page. This process is sometimes called duplex printing. Select **No** to print on only one side of the page. Duplex printing can only be accomplished if your printer supports it.

Use Secondary Borders

Select **Yes** to be able to set different borders, or margins for even numbered report pages. The size of secondary borders is controlled by settings at the Page Border option. Select **No** if you want odd and even pages to have the same borders.

Page Borders

The Page Border is the margin or amount of white space between the edge of the page and the report data. Some printers, particularly laser printers, have preset "hard margins." Your printer manual should tell you if your printer has hard margins. Your margins must be at least as wide as the printer's hard margins.

Specify a top and bottom margin in inches. Under the `Primary` option, specify left and right margins in inches. These boundaries will apply to all pages if you have specified no secondary boundaries, or odd numbered pages if you have specified secondary boundaries.

If you selected **Yes** for the `Use of secondary pages` you must also specify left and right margins for even pages.

When you have made all necessary changes, press **F10** to leave the Report Definition screen.

Print Report Modify

Print Report Modify allows you to edit a previously defined Report Definition. After executing the command, type in the name of the file you want to edit, or select it from the displayed prompter. The Report Definition menu is then displayed. Make any necessary changes and press **F10** to save the new definition.

Detailed information about each setting on the Report Definition menu is presented in the previous discussion of the Print Report Create command.

Print Report Remove

Print Report Remove deletes a report definition. Enter the name of the report definition file to be deleted. Include the path, if necessary.

Print Report Execute

Print Report Execute prints a report from a report definition file. All worksheets referenced in the report must be active. The following steps explain the process.

STEP 1: Select Print Report Execute.

STEP 2: Enter the name of the report to be executed.

STEP 3: Select Draft or Enhanced printing.

Draft printing produces worksheet data without special fonts. It uses only internal printer fonts for your printer and is the fastest method of printing a worksheet. Boldfaced or underscored fonts can be used.

Enhanced printing allows the production of various fonts and more complex printing capabilities. Adjusted cell height, for example, is apparent only when you print with the Enhanced option. Because of its complexity, enhanced printing can be a great deal slower than draft printing.

STEP 4: Enter the number of copies you want printed.

STEP 5: Select Printer to send the data to the current printer, or select Disk to send the data to a disk file.

If you specify Disk, you are prompted to enter a name for the disk file to be created. The file will be assigned the extension .prn unless you specify otherwise.

NOTE: A file that is written to disk will contain printer control codes. These codes allow the file to be printed outside of ANGOSS. At the DOS level, you can print the file by copying to your printer and it will look just like it was printed from within ANGOSS. However, printer control codes make it difficult to view or edit this file. To create a file that contains no printer control codes, select the generic **before** printing the file to disk.

Print Options

Print Options is used to specify the print option settings for the current section of the current document. Selection of the Print Options command invokes the display of a definition menu containing specification items that control:

- the content and placement of worksheet headings and footings

Print Commands

- date and page number styles
- page size and paper path

Each definition item is discussed in detail below.

Printing Row and Column Numbers

Select **Yes** at each prompt to have column or row numbers printed on your worksheet if you print in draft mode. Select **No** to have no row or column numbers printed.

Lines per inch in draft mode

Specify whether you want your document printed **6** or **8** lines to the inch when you print your worksheet in draft mode. Selecting 8 lines per inch makes the space between each line smaller, allowing more information to be printed in the same space.

Characters per inch in draft mode

Select **10**, **12, Compressed**, or **Internal-Fonts** to determine which font will be used to print your worksheet when you select the Draft option of the Print Report Execute command. If you select 10-cpi, the worksheet will be printed with your printer's internal 10-cpi font. Selecting 12-cpi will use the printer's internal 12-cpi font. The compressed setting will print the worksheet in the internal compressed font. A compressed font's cpi varies between 15 and 20, depending on the printer.

NOTE: Not all printers will support all three of these options.

Paper Profile

A paper profile is made up of the page size and paper path you want to use to print a file. The paper path tells ANGOSS where the printer will find the paper for this job, and how it will move through the printer. For example, you can specify the use of a tractor feed, or manual feed; choose between several paper trays; or specify the use of an envelope or single sheet feeder. Page size tells ANGOSS whether you will be printing an 8-1/2-by-11 inch page, an envelope or a custom page size.

This paper profile will control all Spreadsheet printing, except reports. The Report Definition menu contains a setting for controlling paper profile selection. Printing in the Word Processor and Database Reports is controlled by Paper Profile settings within each module. Printing from editors, such as the Text-Editor, non-report Database printing, and printing through Project Processing are controlled by the default paper profile on the Hardware Preferences menu.

Detailed information about selecting a paper profile is provided in *Chapter 6: Printing Worksheets and Reports*.

Orientation

Select **Portrait** to print the report across the width or horizontal side of the page. Select **Landscape** to print the report "sideways" across the length or vertical side of the page. Landscape printing can only be accomplished if your printer supports it.

Page Borders

The Page Border is the margin or amount of white space between the edge of the page and the report data. Some printers, particularly laser printers, have preset "hard margins." Your printer manual should tell you if your printer has hard margins. Your margins must be at least as wide as the printer's hard margins.

Specify a top, bottom, left and right margin in inches.

When you have made all necessary changes, press **F10** to leave the Report Definition screen.

Print Preset

Print Preset is used to specify the print option settings for all new worksheets. The same definition screen displayed with Print Options is also displayed with Print Preset. See previous discussion of Print Options for detailed information about each setting.

Graph Commands

The Graph commands allow you to generate a variety of useful graphs based on data in an ANGOSS worksheet. In all, 21 distinct types of graphs can be generated, customized, printed, plotted, and exported to other applications.

The Quick Key for the Graph command is **Alt G**.

Options for the Graph command include the following:

Quick. Provides a shortcut method of generating a graph based on default settings and a special block of worksheet data.

Define. Creates a graph definition file, which allows you to specify the graph type, the worksheet data, and any titles, footnotes, colors, fonts, patterns, etc. to be used on the graph.

View. Displays a selected graph or CGM/GMF file on the screen.

Metafile. Generates a CGM file (computer graphics metafile) based on a specified graph definition file.

Print. Prints a specified graph or CGM/GMF file to the currently selected printer.

Xy-Plot. Plots a specified graph or CGM/GMF file to the currently selected plotter.

Erase. Deletes a specified graph definition file or metafile from the current data directory.

Set-Default. Changes default settings for new graph definition files, including those created with the Quick option.

Graph Quick

The Graph Quick command allows you to generate a special graph definition file and view the resulting graph without making entries on a Graph Definition menu. To do this ANGOSS combines the defaults established using the Graph Set-Defaults command with a specially arranged block of worksheet cells.

When you select Graph Quick, five options appear on the menu: Business, High-Low, Scientific, Elevation, and Text. These are the five classes of graphs that reference worksheet data. The sixth class, composite graphs, is based on existing CGM/GMF files.

Three of the five classes, Business, Scientific, and Elevation, have multiple graph types within the class. If you select one of these, you must also select a graph type. When graph class and type are selected, you are prompted to mark the data block to be used in the graph. Mark the block and press **Enter**. The graph appears on the screen. When you are finished viewing the graph, press any key to continue.

NOTE: When you use the Graph Quick command, your worksheet data must be arranged in a specific way. For information on how to arrange data for use with the Graph Quick command, refer to *Using the Quick Option* in the *Defining Graphs* section of *Chapter 7*.

Each time you generate a graph with the Graph Quick command, a special file named quick.gdq is updated. This file contains the cell reference for the block used to create the quick graph. By editing quick.gdq using the Graph Define command, you can create a complete graph definition file. For information on how to edit this file, refer to *Creating Quick Graphs* in the *Defining Graphs* section of *Chapter 7*.

Graph Define

The Graph Define command allows you to create or edit graph definition files. Each graph definition file contains the settings and worksheet references necessary to generate a specific graph. When you select Graph Define, a list of options appears representing the six classes of ANGOSS graphs. Select a class, then enter the name of the file you want to create or edit.

To edit an existing definition, select a filename and press **Enter**. To create a new definition, type a filename at the prompt and press **Enter**. In either case, a Graph Definition menu for the selected class appears. Edit the definition according to the instructions in *Chapter 7: Creating Graphs* then press **F10** to save the changes or **Esc** to abandon them.

Graph View

The Graph View command allows you to preview a graph or CGM/GMF file on the screen. When you select it, a prompter appears listing all graph definition files and CGM/GMF files in the current data directory. Select a file and press **Enter**. The screen is redrawn to show the graph or metafile full-screen. When you are finished viewing the file, press any key to return to the normal Spreadsheet display.

Graph Metafile

The Graph Metafile command allows you to generate a CGM file (computer graphics metafile) based on a graph definition file. CGM files can be used in composite graphs or Word Processor documents, or by other applications that are CGM-compatible.

When you select Graph Metafile, a prompter appears listing the graph definition files in the current data directory. When you select a file and press **Enter**, you are asked whether you want to convert the text into polygons. If you press Y, a CGM file is created in which each string of text is converted to a series of character-shaped polygons. If you answer N, a CGM file is created in which text prints in the fonts resident in the printer.

CGM files with text converted to polygons print more slowly but look the same on all printers. Those without converted text print faster but the text in them varies in appearance from one printer to the next.

Graph Print

The Graph Print command allows you to print graphs and CGM/GMF files full-page on the currently selected printer. When you select this command, a prompter appears, listing the definition files, CGM files, and GMF (ANGOSS version 1.00-1.02) files in the current data directory. Select a file and press **Enter**. Two more options appear: Portrait and Landscape.

Select Portrait to print the file as large as possible with the paper oriented normally. Select Landscape to print it as large as possible with the paper turned sideways.

Graph Xy-Plot

The Graph Xy-Plot command allows you to plot graphs and CGM/GMF files full-page on the currently selected plotter. When you select this command, a prompter appears, listing the definition files, CGM files, and GMF (ANGOSS version 1.00-1.02) files in the current data directory. To begin the plot, select a file and press **Enter**. For information on configuring your plotter, see *ANGOSS Software System*.

Graph Erase

The Graph Erase command allows you to delete definition files and CGM/GMF files from the current data directory. When you select it, a prompter appears listing the definition files, CGM files, and GMF (ANGOSS version 1.00-1.02) files in the current data directory. Select the file(s) to be deleted and press **Enter**.

Graph Set-Default

The Graph Set-Default command allows you to choose the initial settings for newly created graph definition files. When you select it, a menu appears listing the six graph classes: Business, High-Low, Scientific, Elevation, Text, and Composite. Default settings apply to all future definition files of the specified class.

When you select a class, a definition menu similar to the normal one for that class appears. Make entries as you would for a graph definition file, then press **F10** to save and exit the menu. The new settings will be reflected on all new graph definition files for the class.

Tools Commands

The Tools commands provide various file manipulation capabilities. You can copy, erase, print, or rename files. You can manipulate directories. You can set preferences for global, Spreadsheet, or hardware parameters. You can also operate the calculator program.

Only the Tools Preferences Spreadsheet options will be discussed here. Refer to *ANGOSS Software System* for detailed information on using the other Tools commands.

Tools Preferences

The Tools Preferences commands configure default settings for Spreadsheet, global, or hardware variables.

Tools Preferences Spreadsheet

The Tools Preferences Spreadsheet command invokes the Spreadsheet Preferences Menu.

Recalculation. The `Recalculation` option controls whether recalculation of your worksheet is done automatically each time there is a change, or only when **F5** is pressed.

Data Path. The `Data Path` option allows you to define the default path to your worksheets each time you execute the Spreadsheet module.

Project File to Run on Entry. `Project file to run on entry` allows you to execute a project automatically each time you enter ANGOSS Spreadsheet. Enter the complete filename, including path, of the project to be executed.

Automatic Load of Macro File. The `Automatic Load of Macro File` option instructs ANGOSS to load a Spreadsheet macro file each time you access ANGOSS

Spreadsheet. Enter the name of the macro file, including device and path, if necessary, to be loaded.

Automatic Load of Worksheet. The `Automatic Load of Worksheet` option instructs ANGOSS to load a particular worksheet each time you access the Spreadsheet module. Enter the name of the worksheet to be loaded. Include device and path, if necessary.

Encryption Driver. The `Encryption driver to use on new files` setting determines whether ANGOSS' standard encryption driver or an alternate encryption driver will be used to encrypt files.

IMPORTANT: Changing the encryption driver could cause worksheet files to become corrupted and unusable. Do not change the setting unless you are thoroughly familiar with the encryption process.

Map Mode Characters. `Map Mode Characters` controls the characters to be used to indicate various types of cells on a map of your worksheet.

Default settings for map mode characters are as follows:

Formula Character:	."
Left-justified:	l
Right-justified:	r
Centered:	c
Values formatted as General:	G
Fixed-decimal values:	F
Scientific notation values:	S
Currency values:	C
Percentage values:	P
Date:	D

Tools Commands

Time:	T
Histogram:	+
Preformatted blank cells:	b

Text and value cells show formatting information only. Formula cells are depicted with the formula code and a format code. The codes, which can be redefined to suit your needs, are used by the Layout Format Formula-Display Map and Print Map commands.

Window Commands

The Window commands allow you to control the display of your worksheet window and other worksheet elements, and to utilize ANGOSS' multiple windowing features.

Window Options

Window offers the following options:

Split. Splits screen horizontally or vertically, creating multiple windows.

Close. Returns a split screen to its former state.

Zoom. Expands and collapses the current window of a split screen.

Border. Toggles the display of the border surrounding your worksheet.

Numbers. Toggles the display of column and row numbers.

Paint. Assigns colors to various parts of the worksheet.

Titles. Fixes designated rows or columns in place.

Link. Connects windows for simultaneous scrolling.

Unlink. Disconnects linked windows.

Window Split

The Window Split command enables you to split your current window into two windows at the current highlighter position. You can have up to 50 windows open at one time. The minimum window size is one cell (with a width of one character) without row or column numbers or borders.

The message `Window Too Small` means there is not enough room to split the window at the current position. The problem can occur when border and row and column numbers are all displayed. Turn off the display of these items, and try again. Or just move the highlighter and issue the command again.

When you select Window Split, indicate whether you want a horizontal or a vertical split.

Window Close

The Window Close command closes or removes the current window when you are displaying multiple windows. The remaining windows expand to fill the vacated window space. The Window Close command acts only upon the current window.

NOTE: Windows must be rectangular. If closing a window would result in a non-rectangular window, ANGOSS issues an error message telling you that the window cannot be closed. Close a different window first.

When you close a window, the worksheet that was displayed in that window remains active, even though it may not appear on your screen.

Window Zoom

If you have split your screen into multiple windows, you can execute Window Zoom to expand the current window to fill the entire screen. "Zooming" and "unzooming" different windows allow you to see either one specific worksheet or several worksheets in turn.

You can move from one window to another via the Goto command (or pressing **F4**) even if the current window is zoomed.

IMPORTANT: The Window Close command cannot be executed when a window has been expanded by the Zoom command. Also, a zoomed window cannot be split. To return a window to its normal size, execute Window Zoom again.

Window Border

The Window Border command is a toggle command that allows you to turn on or off the border display that surrounds the current window. When the border is toggled off, you can display an additional two rows of worksheet data on the screen. If you are using multiple windows, you can toggle the border display for any of the open windows. The Window Border command acts only upon the border of the current window.

Window Numbers

The Window Numbers command controls the display of column and row numbers in the current worksheet window. ANGOSS prompts you to specify whether you want to affect column or row numbers.

Column. When you select the Window Numbers Column option, the column numbers of the worksheet displayed in the current window will be toggled on or off. When column numbers are toggled off, one additional row of worksheet data is displayed on the screen.

If you are displaying multiple windows and you execute Window Numbers Column to toggle off the display of column numbers in the current worksheet, the window identifier number that ordinarily appears in the upper left corner of the window will also be removed. Toggling off column numbers in several worksheets can remove familiar boundaries that make multiple window work easy.

Row. The Window Numbers Row command is used to toggle on or off the row numbers displayed in the current worksheet window. Depending upon the size of the columns, one or more additional columns of worksheet data may be displayed on the screen.

Window Paint

The Window Paint command allows you to assign different colors to various worksheet parts when the worksheet is displayed on the screen. Saving the worksheet saves the selected colors as well.

COMMENT: Paint windows different colors to mark window boundaries when working without borders, and row and column numbers.

When you select the Window Paint command, ANGOSS allows you to specify whether you want to paint the window border, worksheet cells, worksheet row and column numbers, or the worksheet window itself.

Once you have chosen an option, a palette of available background colors is shown in the Control Area of your screen to help you visualize and select a color. A palette of available foreground colors is then displayed against the color you selected as the background color.

If your hardware does not support the 16 available colors, the 16 colors are mapped to the options available for your hardware.

Window Paint Border

A border consists of a narrow line inside a wider line which surrounds the worksheet. The wider line is the border background. The narrow line is the border foreground. ANGOSS prompts you to enter a number representing background color for the border. ANGOSS then prompts you to select a color for the foreground.

Window Paint Cells

You can choose to paint the cursor (highlighter) and various types of cells. By color coding the different cell types, you can create a colorful, informative "map" of your worksheet.

Select a color for the background, which will be color of the cell itself. Then select a foreground color, which is the color used to display the character contents.

The options are as follows:

Cursor. Choose the Cursor option to select colors for the cell highlighter.

Formula. Choose the Formula option to select the colors to be used for cells containing formulas.

Highlight. Choose the Highlight option to select the colors to be used for cells highlighted by the Sheet Audit commands.

Locked-Cells. Choose the Locked-Cells option to select the colors to be used for locked cells.

Text. Choose the Text option to select the colors to be used for cells containing text.

Value. Choose the Values option to select the colors to be used for cells containing values.

Window Paint Numbers

You can color the row and column numbers of the current worksheet by selecting the Window Paint Numbers command.

Select a color for the row and column number background. The background color can be the same color as the worksheet itself or a contrasting color. Then select a color for the numbers.

Window Paint Window

Paint the worksheet window itself by selecting the Window Paint Window command. All cells except those assigned colors via the Window Paint Cell command are displayed in the window color.

Window Titles

The Window Titles command allows you to freeze one or more rows or columns in place in the worksheet window. Then, regardless of how large the worksheet is, or how you choose to scroll the worksheet data through the window, the rows or columns you have indicated will remain on the screen.

NOTE: You cannot move the highlighter into a fixed title area by using the cursor movement keys. You can enter a fixed title area with the Sheet Goto Cell command.

ANGOSS prompts you to specify whether you want to Fix or Drop a fixed title area on the screen.

Fix. To freeze titles in position in the window, select the Fix option.

If you choose to fix a title, ANGOSS asks you to indicate whether you want to affect rows or columns. ANGOSS then asks you for the number of columns or rows to fix. Columns are fixed beginning with the leftmost column in the window and counting right. Rows are fixed beginning with the uppermost row in the window and counting down.

Drop. You can remove fixed titles in your worksheet by executing the Window Titles Drop command.

Window Link

The Window Link command connects windows so they can be scrolled together at the same rate and in the same direction. When you select the Window Link command, ANGOSS prompts you to enter the identifier numbers of the windows you want to link. Enter the numbers, separated by spaces. The current window does not have to be included in the link for the command to execute.

NOTE: The most current Window Link overrides any previous link. For example, if Windows 1, 2, and 4 are linked and you execute the command: "Worksheet Window Link 3 4 5", window 4 is no longer linked to windows 1 and 2. Window 1, however, remains linked to window 2.

Window Unlink

The Window Unlink command disconnects a group of windows you previously linked using Window Link. When you select the Unlink option, ANGOSS prompts you to enter the window identifier number for the window or windows you want removed from the link. If you want to unlink all linked windows, press **Enter**. If you unlink only some of the windows in the linked group, the remaining windows continue to be linked.

Help Commands

The Help commands invoke the on-line help information that is available.

Help Options

Options for Help include the following:

About-Help. Displays information on how to use ANGOSS' on-line help feature.

Contents. Displays a table of contents for the on-line help.

Index. Displays an index of topics included in the on-line help information.

On-Error. Displays help text for specified error messages.

Tutorial. Invokes the Spreadsheet tutorial.

Help About-Help

The Help About-Help command displays the information explaining how to use ANGOSS' on-line help feature. On-line help includes context-sensitive help information as well as help for program error messages.

Help Contents

The Help Contents command displays a table of contents for ANGOSS' on-line help. Initially, only the first level of headings appears. Press **F4** to display the next level of headings and continue to do so until you reach the heading level you want. Select the topic for which you want help information and

press **Enter**. The help information related to that topic is displayed. To return to the table of contents, press **F4**. To leave help and return to the keyword menu, press **F10**. To get to the Index, press **F3**.

Help Index

The Help Index command displays an index for ANGOSS' on-line help. Initially, only the first level of the index is displayed. To reach the second level, press **F3**. To return to the first level, press **Esc**.

You may search the index for a particular word or phrase, if necessary, by pressing **F7** and entering the string you want to search for. The string cannot be longer than 40 characters. Press **F9** to repeat the search.

When you have selected a topic, the related help information appears. To return to the index, press **F3**. To leave help and return to the keyword menu, press **F10**. If you want to get to the table of contents, press **F4**.

Help On-Error

The Help On-Error command displays help text for specific error messages. At the prompt, enter the number corresponding to the error message and press **Enter**. The appropriate help information is displayed.

Help Tutorial

The Help Tutorial command invokes the tutorial for the Spreadsheet module. You may use the tutorial in a step-by-step process to learn the entire module, or you may use it to learn about one particular aspect of the module.

IMPORTANT: Because ANGOSS Tutorials run within the module they describe, it is important that you unload all active files with the File Unload command before entering the tutorial. When you execute Help Tutorial, you will be prompted to unload all files before continuing.

You are then prompted to enter your name. This is optional; however if you do, the program will keep track of which lessons you have completed.

Help Commands

The Tutorial menu then appears. If you would like a brief lesson in how tutorials work, select `Using Tutorials`. If you want to select a lesson, use the cursor keys to move the prompter arrow to the lesson you want and press **Enter**. You can go through the lessons sequentially, or pick a lesson that interests you.

The rest of the instructions for using the tutorial are included in the on-line information. After you complete a lesson, you are returned to the Tutorial menu.

Remember Commands

The Remember commands allow you to create and run project processing files. Project processing is an automated method of executing a sequence of commands.

Refer to ***Project Processing*** for detailed information on using the Remember commands.

Quit Commands

The Quit commands allow you to leave a module to enter another module or return to the operating system. The Quit options vary depending upon which module you are leaving. Obviously, the module you are leaving does not appear among the Quit options on the screen.

Quit Options

Options for Quit include the following:

Quit. Returns to the operating system.

Main-Menu. Returns to the Main Menu of ANGOSS Software System.

Communications. Leaves the current module and enters ANGOSS Communications module.

Database. Leaves the current module and enters ANGOSS Database module.

Wordprocessor. Leaves the current module and enters ANGOSS Wordprocessor module.

If you have selected the Quit keyword and decide that you do not want to leave ANGOSS Spreadsheet, press **Esc**.

Help Commands

Index

A

- Absolute cell references 4 - 7, 9 - 4
- Accessing
 - on-line help 2 - 4
 - operating system 2 - 14
- Activating worksheets 9 - 56
- Active files, displaying list of 5 - 12
- Aligning footnote and title areas 7 - 44
- Alignment, graphs 7 - 1
- ANGOSS Graphics 7 - 1
- Area graphs 7 - 16
- Area settings, for graphs 7 - 1
- Areas of a graph 7 - 1, 7 - 18
- Arithmetic Operators 3 - 3, 9 - 2
- Auditing
 - circular references 9 - 16
 - empty cells 9 - 16
 - formulas 9 - 16
 - worksheets 4 - 25
- Autohelp Line 2 - 9
- Automatic File Backup 2 - 16
- Automatic Recalculation 3 - 7, 9 - 17
- Axis
 - auxiliary 7 - 1
 - bar graphs 7 - 12
 - components 7 - 20
 - depth 7 - 4
 - display mode 7 - 2
 - horizontal 7 - 6
 - scale dimension 7 - 9
 - scales 7 - 8
 - settings 7 - 58
 - tic marks 7 - 10
 - titles 7 - 2
 - vertical 7 - 11

B

- Background area 7 - 2, 7 - 18, 7 - 21
- Background color 7 - 2
- Background, CGM 7 - 2
- Bar graphs
 - axes 7 - 12
 - legend 7 - 13
 - stacking 7 - 13
- Base in 3d graphs 7 - 2
- Blanking data 4 - 14
- Blanking worksheet areas 9 - 40
- Block
 - deleting 9 - 42
 - inserting 4 - 18
 - marking 9 - 5
 - named 4 - 9
 - naming 9 - 33
 - reference 2 - 6
- Blockmarking
 - in commands 4 - 11
 - in formulas 3 - 5
- Body blocks, positioning 6 - 14, 9 - 90
- Border types, for graphs 7 - 24
- Border window 9 - 112
- Borders
 - graph areas 7 - 2
 - graph border types 7 - 2
 - on printed worksheets 6 - 6
- Building commands 2 - 12, 9 - 1
- Business graphs 7 - 2
 - creating 7 - 46
 - data block for 7 - 33
 - data settings 7 - 46
 - defining 7 - 46
 - editing 7 - 46

C

Calculating sums 3 - 4

Calculation Order

column order 3 - 7

natural order 3 - 7

row order 3 - 7

Cell

address 2 - 6

changing cell size 9 - 65

copying 9 - 40

current 2 - 7

deleting 9 - 42

editing 3 - 2, 4 - 2, 9 - 43

filling 4 - 19

going to 9 - 21

height 9 - 66

hiding 9 - 47

highlighter 2 - 7

locking 9 - 23

naming 9 - 4, 9 - 33

painting 4 - 26

preformatting 3 - 10, 9 - 69

reference 2 - 6

absolute 4 - 7, 9 - 4

combination 4 - 8

relative 4 - 7, 9 - 4

size 3 - 9

size, changing for printing 6 - 9

unhiding 9 - 47

unlock 9 - 36

width 9 - 65

Cell Editor 4 - 3

Cells

locking 5 - 9

unlocking 5 - 9

Centering

graph footnotes 7 - 6

graph titles 7 - 6

CGM background 7 - 2

CGM files 7 - 7

creating 7 - 66

Changing

formats 9 - 69

the default format of a worksheet 3 - 9

Chapter 1 - 1

Characters per inch 6 - 2, 6 - 24

Child references 9 - 17

Circular references 2 - 9, 5 - 15

auditing 9 - 16

Classes of graphs 7 - 5

Closing, windows 5 - 5, 9 - 111

Color

graph background 7 - 2

specifying on a graph 7 - 22

Column names, elevation graphs 7 - 3

Column numbers, printing 6 - 2

Column Order Calculation 3 - 7, 9 - 18

Column order, graph information 7 - 3

Columns

deleting 9 - 42

inserting 4 - 18, 9 - 48

marking 4 - 12

Combination cell reference 4 - 8

Combination graphs 7 - 3, 7 - 16

Combining

worksheet data 9 - 57

worksheets 4 - 14, 5 - 6

Command Mode 2 - 11, 9 - 1

Command reference 9 - 1

Commands

blockmarking in 4 - 11

building 2 - 12

Composite graphs 7 - 3, 7 - 18

creating 7 - 64

defining 7 - 64

editing 7 - 64

positioning elements 7 - 6

- Compressed printing 6 - 2, 6 - 8, 6 - 24
- Contour bands 7 - 3
- Contour color table 7 - 3
- Contour graphs 7 - 18
 - color bands 7 - 3
 - countour lines 7 - 3
- Contour lines 7 - 3
- Control Area 2 - 7
- Copying
 - cell contents 9 - 40
 - data 4 - 13
 - down 9 - 41
 - formulas 9 - 40
 - from another worksheet 4 - 14
 - from one location to another 9 - 41
 - right 9 - 41
 - text or values only 9 - 50
 - to another worksheet 4 - 14
- Creating, worksheets 3 - 1
- Current cell 2 - 7
- Cursor movement, on graph definition menu 7 - 40

D

- Data
 - arranging for quick graphs 7 - 32
 - blanking 4 - 14
 - copying 4 - 13
 - deleting 4 - 14
 - entering 3 - 1, 9 - 2
 - hiding 5 - 11
 - moving 4 - 13, 9 - 49
 - sending 8 - 2
 - sort 4 - 19
 - sorting 9 - 49
 - tracking 4 - 23
 - types
 - formulas 3 - 2

- numeric values 3 - 2
- text 3 - 2
- Data Entry
 - keys for special types of entries 2 - 9
 - moving highlighter in 2 - 10
- Data Entry Mode 2 - 10, 9 - 1
- Data matrix, for elevation graphs 7 - 4
- Date style 6 - 23, 9 - 96
- Dates, entering 3 - 3
- Debugging 4 - 23, 4 - 25, 9 - 16
- Default 9 - 105
 - font 9 - 76
 - formats 9 - 66
- Defaults, settings for graphs 7 - 67, 9 - 105
- Defining, graphs 9 - 103
- Definition files, for graphs 7 - 5
- Definition menus 2 - 12, 9 - 6
- Deleting
 - a report definition 9 - 98
 - blocks 9 - 42
 - cells 9 - 42
 - columns 9 - 42
 - data 4 - 14
 - graphs 9 - 105
 - report definitions 6 - 27
 - rows 9 - 42
- Depth axis, for 3d graphs 7 - 4
- Directories
 - changing 5 - 12
 - displaying 5 - 12
- Display mode, graphics 7 - 2
- Display screen 2 - 5
- Displaying
 - active worksheets 9 - 57
 - calculation mode 9 - 18
 - currently active files 5 - 12
 - files in current directory 5 - 11
 - graphs 9 - 104
 - list of quick keys 2 - 8

- Division names 7 - 4
- Division titles 7 - 4
- Divisions, in graphs 7 - 4
- Documentation, using 1 - 4
- Double spacing reports 6 - 24, 9 - 96
- Draft printing
 - characters per inch 6 - 2, 6 - 24
 - line spacing 6 - 2, 6 - 24
- Duplex printing 6 - 25, 9 - 97

E

- Edit Commands 9 - 39
 - Blank 9 - 40
 - Copy 9 - 40
 - Delete 9 - 42
 - Edit-Cell 9 - 43
 - Fill 9 - 46
 - Hide 9 - 47
 - Insert 9 - 48
 - Move 9 - 49
 - Sort 9 - 49
 - Unhide 9 - 47
 - Value-Copy 9 - 50
- Editing
 - a cell 3 - 2, 4 - 2
 - a font 3 - 12
 - cells 9 - 4, 9 - 43
 - formulas 9 - 4
 - graph definitions 9 - 103
 - report definitions 6 - 27
 - reports 9 - 98
 - worksheets 4 - 1
- Elevation graphs
 - column names 7 - 3
 - countour color table 7 - 3
 - creating 7 - 51
 - data block for 7 - 36
 - data matrix 7 - 4

- data settings 7 - 51
- defining 7 - 51
- editing 7 - 51
- elevation angle 7 - 4
- row names 7 - 8
- Empty cells
 - auditing 9 - 16
 - finding 9 - 20
- Entering
 - data 3 - 1, 9 - 2
 - dates 3 - 3
 - formulas 3 - 3
 - numeric values 3 - 2
 - text 3 - 2
 - times 3 - 3
- Erasing
 - graphs 9 - 105
 - worksheet areas 9 - 40
- Error checking 4 - 25
- Example Files, using 2 - 4
- Executing
 - a print report definition 9 - 99
 - a report 6 - 26
- Exiting, ANGOSS Spreadsheet 2 - 17
- Exploding pie slices 7 - 4
- Exporting
 - files 8 - 4, 9 - 60
 - to non-ANGOSS formats 8 - 4
- Extensions 2 - 15
- External references 4 - 10
- External worksheets, referencing 9 - 4

F

- File Commands 9 - 53
 - Activate 9 - 56
 - Combine 9 - 57
 - Display-Active 9 - 57
 - Export 8 - 4, 9 - 60

- Import 8 - 4, 9 - 58
- Load 9 - 54
- Newname 9 - 56
- Password 9 - 61
- Save 9 - 54
- Unload 9 - 55
- File extensions, for graphs 7 - 5, 7 - 39
- Files
 - automatic backup 2 - 16
 - copying 5 - 12
 - erasing 5 - 12
 - exporting 8 - 4, 9 - 60
 - extensions 2 - 15
 - importing 8 - 4, 9 - 58
- Fill patterns 7 - 23
 - for graphs 7 - 4
- Fill settings, for graph areas 7 - 45
- Filling
 - a cell 4 - 19
 - cells with generated numbers 9 - 46
 - worksheet areas 4 - 18
- Finding
 - a particular type of cell entry 9 - 19
 - empty cells 9 - 20
 - formula errors 9 - 20
 - highlighted cells 9 - 20
 - text strings 9 - 20
 - values 9 - 21
- Fixing, titles 5 - 5, 9 - 114
- Font 9 - 75
 - changing fonts 9 - 76
 - default 3 - 11
 - defining 3 - 11
 - editing 3 - 12
 - editing font definition 9 - 77
 - rasterizing 3 - 13
 - removing 3 - 13
 - removing font definition 9 - 78
 - setting default 9 - 76

- using multiple fonts in a worksheet 3 - 11
- Font Prompter 3 - 11, 9 - 75
- Font Selector 2 - 14, 3 - 11, 9 - 76
- Fonts 3 - 10
 - used in graphs 7 - 4, 7 - 26
- Footing
 - date style 6 - 23, 9 - 96
 - in reports 6 - 20, 9 - 92
 - page number style 6 - 24, 9 - 96
 - positioning 6 - 20, 9 - 93
 - print control codes 6 - 21, 9 - 93
- Footnote area 7 - 18, 7 - 21
 - aligning 7 - 44
 - in graphs 7 - 5
- Footnotes, for graphs 7 - 61
- Foreground color, in graphs 7 - 5
- Formatting
 - changing 3 - 9, 9 - 69
 - changing a worksheet's default 3 - 9
 - default settings 3 - 9
 - for future entries 9 - 79
 - numeric values 3 - 7
 - worksheets 3 - 7
- Formula Editor 3 - 6, 4 - 5
- Formulas 9 - 2
 - auditing 9 - 16
 - blockmarking in 3 - 5
 - copying 9 - 40
 - entering 3 - 3
 - finding errors 9 - 20
 - printing 6 - 27, 9 - 87
 - recalculating 3 - 7
 - using functions in 5 - 13
- Functions 5 - 13

G

- Generating

- .cgm files 9 - 104
- graph metafiles 9 - 104
- numbers 4 - 18
- GMF files 7 - 5, 7 - 7
- Graph area
 - alignment 7 - 44
 - background 7 - 21
 - fill settings 7 - 45
 - footnote 7 - 21
 - legend 7 - 20
 - plot 7 - 19
 - shadows 7 - 45
 - title 7 - 20
- Graph Commands 9 - 102
 - Define 7 - 38, 9 - 103
 - Erase 7 - 67, 9 - 105
 - Metafile 9 - 104
 - Print 7 - 67, 9 - 104
 - Quick 7 - 32, 9 - 103
 - Set-Default 7 - 32, 7 - 38, 7 - 68, 9 - 105
 - View 7 - 67, 9 - 104
 - Xy-Plot 7 - 67, 9 - 105
- Graph defaults 9 - 105
- Graph definition file 7 - 5
 - file extensions 7 - 39
 - making entries into 7 - 38
 - making from quick graph 7 - 37
- Graph Definition menu
 - creating 7 - 38
 - cursor movement 7 - 40
 - editing 7 - 38
 - sections 7 - 38
- Graph footnote, justifying 7 - 6
- Graph titles, justifying 7 - 6
- Graph type, specifying 7 - 43
- Graphs
 - 3d base 7 - 2
 - 3d depth axis 7 - 4
 - 3d settings 7 - 56
 - alignment 7 - 1
 - area borders 7 - 2
 - area graphs 7 - 16
 - area settings 7 - 1, 7 - 44
 - areas 7 - 1, 7 - 18, 7 - 38
 - shadowing 7 - 10
 - arranging data for 7 - 32
 - auxiliary axis 7 - 1
 - axis settings 7 - 58
 - axis titles 7 - 2
 - background area 7 - 2
 - bar graphs 7 - 12
 - border types 7 - 2, 7 - 24
 - classes 7 - 5, 9 - 103
 - business 7 - 2
 - column order 7 - 3
 - combination 7 - 3, 7 - 16
 - components of 7 - 18
 - composite 7 - 3, 7 - 18
 - contour 7 - 18
 - controlling appearance 7 - 38
 - creating 7 - 31
 - creating automatically 7 - 32
 - creating quickly 7 - 8
 - data matrix 7 - 4
 - defined 7 - 5
 - defining 7 - 31, 9 - 103
 - defining automatically 7 - 8
 - definition 7 - 1
 - deleting 9 - 105
 - displaying 9 - 104
 - divisions 7 - 4
 - editing 9 - 103
 - elevation 7 - 4
 - column names 7 - 3
 - enhancing 7 - 38
 - erasing 7 - 67
 - file extensions 7 - 5, 7 - 39

fill pattern 7 - 4
fill patterns 7 - 23
fonts 7 - 4, 7 - 26
footnote area 7 - 5
footnotes 7 - 61
foreground color 7 - 5
gdq file 9 - 103
generating automatically 9 - 103
generating metafiles 7 - 66
grid lines 7 - 6
high-low 7 - 6
high-low graphs 7 - 17
legends 7 - 6, 7 - 61
line graphs 7 - 16
line patterns 7 - 23
line sizes 7 - 28
margins 7 - 7, 7 - 44
metafiles 7 - 7
numeric text 7 - 7
pie graphs 7 - 17
plot area 7 - 7
plot interior 7 - 7
plotting 7 - 67, 9 - 105
polar 7 - 17
polygons 7 - 8
printing 7 - 67, 9 - 104
row order 7 - 8
scientific 7 - 9
selecting a type 7 - 11
selecting graph type 7 - 43
series 7 - 9
setting defaults 7 - 67
smoothing 7 - 10
specifying color 7 - 22
specifying filename 7 - 43
stacking 7 - 10
step 7 - 16
surface 7 - 18
surface grid 7 - 10

symbols 7 - 10, 7 - 25
terminology 7 - 1
text 7 - 10, 7 - 18
text control characters 7 - 30
text height 7 - 28
text settings 7 - 52
title area 7 - 10
titles 7 - 61
types 7 - 5, 7 - 11
viewing 7 - 67
wireframe 7 - 18
worksheet references 7 - 22
xy graphs 7 - 17

Grid lines 7 - 6

H

Hardware preferences 5 - 12

Headings

date style 6 - 23, 9 - 96
in reports 6 - 20, 9 - 92
page number style 6 - 24, 9 - 96
positioning 6 - 20, 9 - 93
print control codes 6 - 21, 9 - 93
secondary 6 - 21

Help

accessing 2 - 4
related topics 2 - 4

Help Commands

About-Help 9 - 116
Contents 9 - 116
Index 9 - 117
On-Error 9 - 117
Tutorial 9 - 117

Hiding

a series on a graph 7 - 6
cells 9 - 47
data 5 - 11

Highlighter, movement in Data Entry Mode

2 - 10
High-low 7 - 6
High-low graphs 7 - 17
 creating 7 - 49
 data block for 7 - 34
 data settings 7 - 49
 editing 7 - 49
high-low graphs
 defining 7 - 49
Horizontal axis 7 - 6

I

IF-THEN-ELSE Function 5 - 13
Importing
 files 9 - 58
 non-ANGOSS file formats 8 - 4
Importing files 8 - 4
Inserting
 blank blocks 9 - 48
 blank columns 9 - 48
 blank rows 9 - 48
 blocks 4 - 18
 columns 4 - 18
 rows 4 - 18
Integration 8 - 1
 with other ANGOSS modules 9 - 34

J

Justification, changing 3 - 9, 4 - 22, 9 - 72
Justifying
 graph footnotes 7 - 6
 graph titles 7 - 6

K

Keywords, selecting 2 - 1

L

Labels
 on graph data 7 - 9
 series data 7 - 9
Landscape printing 6 - 6, 6 - 8
 if printer doesn't support 6 - 10
Layout Commands 9 - 63
 Cell-Size 9 - 65
 Default 9 - 66
 Format 3 - 9, 9 - 69
 Justify 3 - 9, 9 - 72
 Set-Font 9 - 75
 Worksheet-Options 9 - 79
Legend area 7 - 18, 7 - 20
Legends 7 - 6
 bar graph 7 - 13
 on graphs 7 - 61
 position on a graph 7 - 8
 positioning 7 - 44
 text 7 - 9
 text on 7 - 61
Line graphs 7 - 6, 7 - 16
 symbols 7 - 10
Line patterns 7 - 23
Linear scales 7 - 8
Lines per inch 6 - 2, 6 - 24
Linking windows 5 - 5, 9 - 115
Loading worksheets 4 - 2, 9 - 54
Locking cells 5 - 9, 9 - 23
Logarithmic scales 7 - 8
Logical operators 9 - 3

M

Main Menu 2 - 1
Managing worksheets 5 - 1
Manual recalculation 9 - 18

- Map 6 - 28
 - printing 9 - 88
- Margins
 - in graphs 7 - 7, 7 - 44
- Marking
 - blocks 9 - 5
 - columns 4 - 12, 9 - 5
 - rows 4 - 12, 9 - 5
- Matrix mathematics 5 - 15
 - an overview 9 - 25
 - N-Solve 5 - 17
 - Parallel 5 - 16
 - Regression 5 - 19
 - Transpose 5 - 16
- MAX function 5 - 13
- Metafiles 7 - 7
 - erasing 7 - 67
 - generating 7 - 66, 9 - 104
- MIN function 5 - 13
- Minimal recalculation 3 - 7
- Modifying, reports 9 - 98
- Moving
 - between windows 5 - 2, 9 - 22
 - data 4 - 13, 9 - 49
 - to a particular cell 9 - 21
 - to an active worksheet 9 - 21
- Multiple windows 5 - 1

N

- Named block 4 - 9
- Names, of graph divisions 7 - 4
- Naming
 - blocks 9 - 33
 - cells 9 - 4, 9 - 33
 - worksheets 9 - 54
- Natural Order calculation 3 - 7, 9 - 18
- Number, window 9 - 112
- Numeric text, on graphs 7 - 7

- Numeric values
 - entering 3 - 2
 - formatting 3 - 7

O

- On-line help 2 - 4
- Operating modes
 - command mode 2 - 9
 - data entry 2 - 9
- Operating system 2 - 14
- Operators
 - arithmetic 3 - 3
 - logical 9 - 3
 - relational 9 - 3

P

- Page borders 6 - 6
 - report 6 - 25, 9 - 98, 9 - 101
- Page number style 6 - 24, 9 - 96
- Page size 6 - 3, 6 - 25, 9 - 97
- Painting
 - cells 4 - 26
 - parts of the window 9 - 112
- Paper path 6 - 3, 6 - 25, 9 - 97
- Paper profile 6 - 3
 - default 6 - 25, 9 - 97
- Parent references 9 - 17
- Parentheses 3 - 4
- Password protection 5 - 9, 9 - 61
- Percent scales 7 - 8
- Pie graphs 7 - 17
 - exploding slices 7 - 4
 - starting angle 7 - 10
 - weighting 7 - 11
- Plot area 7 - 7, 7 - 18, 7 - 19
 - 3d settings 7 - 45

- area settings 7 - 45
- axis settings 7 - 45
- data settings 7 - 45
- general settings 7 - 45
- plot interior settings 7 - 45
- text settings 7 - 45
- Plot interior 7 - 7, 7 - 19
- Plotting graphs 7 - 67, 9 - 105
- Polar graphs 7 - 17
 - symbols 7 - 10
- Polygons 7 - 8
- Polylines 7 - 8
- Portrait printing 6 - 6
- Positioning
 - elements of a composite graph 7 - 6
 - legend 7 - 44
- Practice Session
 - Chapter 2, 2 - 17
 - Chapter 3, 3 - 15
 - Chapter 4, 4 - 27
 - Chapter 5, 5 - 23
 - Chapter 6, 6 - 29
 - using 1 - 4
- Preferences, spreadsheet 2 - 13
- Preformatting cells 3 - 10, 9 - 69
- Print Commands
 - Formulas 9 - 87
 - Map 9 - 88
 - Report 9 - 88
 - Worksheet 9 - 86
- Print control codes 6 - 21, 9 - 93
- Print group 6 - 12-6 - 13, 9 - 89
 - body blocks 6 - 14, 9 - 90
 - deleting 6 - 20
 - multiple block references 6 - 14, 9 - 90
 - titles 6 - 14, 9 - 90
- Print options 6 - 2, 9 - 79
- Print preset 6 - 2
- Printing 6 - 1
 - a map 9 - 88
 - a report 9 - 88
 - changing cell size 6 - 9
 - column numbers 6 - 2
 - compressed 6 - 2, 6 - 8, 6 - 24
 - draft 6 - 7
 - draft mode
 - characters per inch 6 - 2, 6 - 24
 - lines per inch 6 - 2, 6 - 24
 - duplex 6 - 25, 9 - 97
 - enhanced 6 - 7
 - formulas 6 - 27, 9 - 87
 - graphs 7 - 67, 9 - 104
 - landscape 6 - 6, 6 - 8
 - landscape if printer doesn't support 6 - 10
 - maps of your worksheet 4 - 26
 - portrait 6 - 6
 - reports 6 - 11
 - row numbers 6 - 2
 - to disk 6 - 7
 - worksheet data 9 - 86
 - worksheet map 6 - 28
 - worksheets 6 - 7
- printing 9 - 104
- Producing reports 6 - 11
- Protecting worksheets 5 - 8

Q

- Quick graphs 7 - 8, 9 - 103
 - arranging data for 7 - 32
 - editing 7 - 37
 - making a definition file from 7 - 37
- Quick Key
 - definition 2 - 8
 - displaying list of 2 - 8
- Quick.gdq 7 - 8, 7 - 37
- Quit Commands 9 - 118

R

- Rasterizing fonts 3 - 13
- Recalculating 9 - 2
 - automatically 3 - 7
 - formulas 3 - 7
 - minimal recalculation 3 - 7
- Recalculation
 - automatic 9 - 17
 - manual 9 - 18
- References
 - child 9 - 17
 - circular 5 - 15
 - parent 9 - 17
 - to external worksheets 4 - 10
- Referencing, external worksheets 9 - 4
- Reformatting
 - text 4 - 22
 - values 4 - 22
 - worksheets 4 - 22
- Regression analysis 5 - 19, 9 - 30
- Relational operators 9 - 3
- Relative cell references 4 - 7, 9 - 4
- Remember Commands 9 - 118
- Removing, font definitions 3 - 13
- Renaming, worksheets 3 - 14, 9 - 56
- Report definition
 - creating 6 - 11
 - deleting 6 - 27
 - editing 6 - 27
- Reports 6 - 11
 - characters per inch 9 - 96, 9 - 100
 - deleting 9 - 98
 - double spacing 6 - 24, 9 - 96
 - duplex printing 6 - 25, 9 - 97
 - editing 9 - 98
 - editing definition 6 - 27
 - enclosing with lines 6 - 24, 9 - 96
 - executing 6 - 26, 9 - 99

- footings 6 - 20, 9 - 92
- headings 6 - 20, 9 - 92
- lines per inch 9 - 96
- modifying 9 - 98
- page borders 6 - 25, 9 - 98, 9 - 101
- printing 9 - 88
- printing compressed 9 - 96, 9 - 100
- printing landscape 6 - 25, 9 - 97
- printing portrait 6 - 25, 9 - 97
- referencing multiple worksheets 6 - 18, 9 - 91
- removing 9 - 98
- removing definition 6 - 27
- specifying sections 6 - 12, 9 - 89
- start page number 6 - 24, 9 - 96

- Row names, on elevation graphs 7 - 8
- Row numbers, printing 6 - 2
- Row order
 - calculation 3 - 7, 9 - 18
 - graph information 7 - 8
- Rows
 - deleting 9 - 42
 - inserting 4 - 18, 9 - 48
 - marking 4 - 12
- Running AGOSS Spreadsheet 2 - 1

S

- Saving worksheets 3 - 13, 9 - 54
- Scientific graphs 7 - 9
 - creating 7 - 49
 - data block for 7 - 35
 - data settings 7 - 49
 - defining 7 - 49
 - editing 7 - 49
- Searching
 - for a particular file 4 - 2
 - worksheets 4 - 23
- Selecting keywords 2 - 1

Sending

- data 8 - 2, 9 - 34
- to Communications 8 - 2, 9 - 35
- to Database 8 - 3, 9 - 35
- to Word Processor 8 - 3
- to Wordprocessor 9 - 35

Series

- data labels 7 - 9
- graph values 7 - 9
- hiding 7 - 6
- names 7 - 9
- width 7 - 9

Setting graph defaults 9 - 105

Shading graph objects 7 - 9

Shadows, on graph areas 7 - 45

Sheet Commands 9 - 15

- Audit 9 - 16
- Calc-Mode 9 - 17
- Find 9 - 19
- Goto 9 - 21
- Lock 9 - 23
- Matrix 9 - 25
- Name 9 - 33
- Send 9 - 34
- Unlock 9 - 36

Sides, of a surface graph 7 - 5

Sizing cells 3 - 9, 9 - 65

Smoothing 7 - 10

Sorting data 4 - 19, 9 - 49

Splitting windows 5 - 1, 9 - 111

Spreadsheet

- applications 1 - 2
- default settings 9 - 106
- definition 1 - 1
- exiting 2 - 17
- preferences 2 - 13
- running 2 - 1

Stacking 7 - 10

- bar graph 7 - 13

Starting angle, in pie graphs 7 - 10

Status Line 2 - 8

Step graphs 7 - 16

SUM function 3 - 4, 5 - 13

Surface graphs 7 - 18

- sides 7 - 5

Surface grid 7 - 10

Symbols 7 - 10

- for graphs 7 - 25

T

Terminology, graphs 7 - 1

Text

- copying 9 - 50
- default format 9 - 67
- entering 3 - 2
- finding 9 - 20
- on graphs 7 - 52
- reformatting 4 - 22

Text control characters, in graphs 7 - 30

Text graphs 7 - 10, 7 - 18

- creating 7 - 63
- data block for 7 - 37
- defining 7 - 63
- editing 7 - 63

Three-dimensional graphs 7 - 56

- depth axis 7 - 4
- rotation angle 7 - 8
- surface grid 7 - 10
- viewpoint 7 - 11

Tic marks 7 - 10

Times, entering 3 - 3

Title area 7 - 10, 7 - 18, 7 - 20

- aligning 7 - 44

Titles

- axis 7 - 2
- fixing 5 - 5, 9 - 114
- for graphs 7 - 61

- of graph divisions 7 - 4
- Tools Commands, Preferences 9 - 106
- Tutorial, using 2 - 3
- Types of data 3 - 2

U

- Unhiding, cells 9 - 47
- Unlinking windows 5 - 5, 9 - 115
- Unloading worksheets 3 - 13-3 - 14, 9 - 55
- Unlocking cells 5 - 9, 9 - 36
- Using
 - documentation 1 - 4
 - example files 2 - 4
 - practice sessions 1 - 4
 - tutorials 2 - 3

V

- Values
 - copying 9 - 50
 - default format 9 - 67
 - finding 9 - 21
 - reformatting 4 - 22
- Vertical axis 7 - 11
- Viewing graphs 7 - 67, 9 - 104
- Viewpoint, on three-dimensional graphs 7 - 11

W

- Weighting, pie slices 7 - 11
- Window Commands
 - Border 9 - 112
 - Close 9 - 111
 - Link 9 - 115
 - Numbers 9 - 112

- Paint 9 - 112
- Split 9 - 111
- Titles 9 - 114
- Unlink 9 - 115
- Zoom 9 - 111

Windows

- border 9 - 112
- closing 5 - 5
- linking 5 - 5
- moving between 5 - 2, 9 - 22
- multiple 5 - 1
- splitting 5 - 1
- unlinking 5 - 5
- zoom 5 - 3

Wireframe graphs 7 - 18

Worksheet

- activating 9 - 56
- combining 5 - 6
- creating 3 - 1
- data, arranging for quick graphs 7 - 32
- definition 1 - 2
- displaying list of active files 9 - 57
- editing 4 - 1
- filling 4 - 18
- formatting 3 - 7
- loading 4 - 2, 9 - 54
- managing 5 - 1
- moving between 9 - 21
- parameters 3 - 9
- password protecting 9 - 61
- printing 6 - 7, 9 - 86
- printing a map of 9 - 88
- printing map of 6 - 28
- printing maps of 4 - 26
- protecting 5 - 8
- references for graphs 7 - 22
- reformatting 4 - 22
- rename 9 - 56
- renaming 3 - 14

saving 3 - 13, 9 - 54
searching 4 - 23
unloading 3 - 13-3 - 14, 9 - 55
window 2 - 6

X

XY graphs 7 - 17
symbols 7 - 10

Z

Zooming windows 5 - 3, 9 - 111