≡SCO Professional®

CONFIGURATION GUIDE

The Santa Cruz Operation, Inc.

Table of Contents

Preface

SCO Professional is designed to operate on a wide variety of equipment. However, you need to configure SCO Professional to use your system's terminals, printers, and graphics devices. To accomplish this, you may have to modify a group of environment variables and files by using appropriate SCO Professional and operating system utilities. These environment variables define such aspects as where files are created and stored, what type of terminal you are using, and where the program will search for specific files.

In addition to creating a system-wide environment, you can make individual user environments by modifying your environment variables and customizing your command sequences. Individual users or groups of users can also set up their own equipment parameters, independent of system-wide settings.

The *SCO Professional Configuration Guide* was written for the system administrator and others with an interest in configuration issues. This guide provides the information necessary to configure your system's terminals, printers, and graphics devices for successful use with SCO Professional.

This guide assumes that SCO Professional is already installed. If it is not, refer to the *SCO Professional Installation Notes* for information on installing the program.

Contents of This Guide

This guide familiarizes you with the SCO Professional configuration files, which control such aspects of SCO Professional as media, device names, function key mapping, and graphics configuration. Most configuration files can be altered by using an appropriate SCO Professional utility; others must be edited by using a text editor. The following configuration files and utilities are used to configure your system, and they are discussed in detail in this guide:

Configuration Files		
Filename	Purpose	Modifiable?
cmds.pro	Maps commands to user-defined keys.	Yes
drivers	Driver type file.	Yes
fkeys.pro	Maps functions keys.	Yes
graph.pro	Defines hardware graphics capabilities.	Yes
macro.pro	Maps macro names to user-defined keys.	Yes
terminfo	Defines terminal capabilities.	Yes

Configuration Utilities	
Utility Name	Modifies These Files
tconfig	cmds.pro, fkeys.pro, graph.pro, macro.pro
pconfig	printer (pcap) files
Any text editor	drivers, terminfo, pcap files

These files and utilities are discussed in the following chapters:

- Chapter 1, "UNIX Configuration Overview," provides an overview of the major SCO Professional configuration issues, including terminal, printer, and graphics device configuration.

- Chapter 2, "Creating a Custom Environment," describes how to alter environment variables to specify the location of various files, define search paths, and customize an individual user's environment.

■ Chapter 3, "Defining Terminal Capabilities," shows you how SCO Professional uses information from a terminfo file to access your terminal's capabilities. It also explains terminfo format and shows you how to add functionality and control color to get the most out of your terminal.

■ Chapter 4, "Setting Up Your Printers and Graphics Devices," introduces the **pconfig** utility, which is used to generate definition files for each of the printers and graphics devices you intend to use with SCO Professional. It also explains how to edit the *drivers* file to make graphics driver options available to SCO Professional.

■ Chapter 5, "Configuring Character Graphics," details how to read and edit the files that control how graphics characters are printed by your printers.

■ Chapter 6, "Troubleshooting Configuration Issues," provides answers to many of the commonly posed questions about configuration issues.

■ Chapter 7, "International Formats," explains the SCO Professional features that make it possible to use the program in locales with different languages, extended character sets, and various formats for dates, times, and punctuation.

■ Appendix A, "SCO Professional System Files," lists all SCO Professional files, including executable files, configuration files, program files, utilities, and environment variables.

■ Appendix B, "SCO Professional Graphics Drivers," lists the graphics drivers supported by SCO Professional, along with their associated options.

Other SCO Professional Guides

There are five other guides included in the set of SCO Professional documentation. Each guide has a different purpose and addresses a different audience:

- The *SCO Professional Tutorial* contains basic information for beginners. New spreadsheet users can read the tutorial as a general introduction to SCO Professional.

- The *SCO Professional Quick Access Guide* contains brief descriptions of most SCO Professional commands and how to use them. It also lists all available keystrokes, macro commands, and built-in functions in an easily accessible format. This guide can benefit all users of the program, experienced or not.

- The *SCO Professional User's Guide* explains how to use SCO Professional, including all aspects of the worksheet as well as the Professional Manager. This guide is intended for all users of the program.

- The *SCO Professional Installation Notes* describe the procedure for installing SCO Professional on your system. These notes are written specifically for system administrators.

- The *SCO Professional Release Notes* describe new features, special requirements, and limitations of the current version of the program. These notes are written specifically for system administrators.

Chapter 1

UNIX Configuration Overview

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UNIX Configuration Overview

SCO Professional is an integrated spreadsheet, graphics, and database program, featuring full file compatibility with Lotus® 1-2-3®, Release 2. SCO Professional provides a cost-effective, reliable spreadsheet for the UNIX® operating system environment, ensuring a minimal loss of time and no loss of data when moving from Lotus 1-2-3 and a DOS® platform.

This chapter provides an overview of the major SCO Professional configuration issues, including terminal, printer, and graphics device configuration. While this chapter offers a useful summary of the requirements of an SCO Professional system administrator, its primary focus is the administrator who is new to the UNIX operating system.

This chapter contains the following sections:

- "Introduction to UNIX Configuration" summarizes the various issues that are involved in configuring SCO Professional.

- "Differences between DOS and the UNIX System" discusses the methods available for importing worksheet files between DOS and UNIX environments and the differences in areas like filenames, file permissions, and so on, that exist between the DOS and UNIX operating systems.

Introduction to UNIX Configuration

As the system administrator for SCO Professional, there are a few configuration issues to consider before your users begin running the program. These issues are unique to running an application in a UNIX environment and may be unfamiliar to you if your previous experience was limited to DOS.

Specifically, this section explains how to:

- use environment variables,

- configure terminals,

- specify colors for the SCO Professional screen display,

- add terminal functionality,

- configure printers and graphics devices, and

- specify international formats.

Each of these configuration issues are introduced and briefly described in the following sections. The following sections also include references to the locations in this guide where each of these issues are covered in detail.

Using Environment Variables

You can customize SCO Professional to operate in a wide variety of environments, based on both your system's hardware capabilities and your users' needs. SCO Professional uses environment variables to customize its operation.

SCO Professional uses several environment variables, including PROLIB, PROPATH, SCOLIB, BACKUPDIR, PRINTSCR, and TMPDIR.

PROLIB specifies the directory that contains the default library of SCO Professional's program files, utilities, and strings files. By default, this variable is set to */usr/lib/pro*. PROPATH specifies the search path for SCO Professional program files. SCOLIB specifies the directory containing default printer and terminal definition files. By default, this variable is set to */usr/lib/sco*. BACKUPDIR specifies where backup copies of SCO Professional files are created and stored. If this variable is not set, a backup directory is created as a subdirectory of the current working directory. PRINTSCR specifies the file or device to which screen dumps are sent when the <Printscreen> key is pressed. TMPDIR specifies the storage location for temporary scratch files created by SCO Professional. If this variable is not set, these files are created in */tmp*.

There are also four related operating system environment variables, HOME, SHELL, TERM, and TERMINFO, that you can set. HOME indicates the user's home directory; SHELL indicates the user's login shell; TERM indicates the type of terminal currently in use; and, TERMINFO determines which terminal capability database SCO Professional uses to specify your terminal's special characteristics.

Each environment variable can be set as the default for the entire system or for an individual user, depending on where the variable is defined. For more information on these environment variables and how to specify them, see Chapter 2, "Creating a Custom Environment."

Configuring Terminals

Different terminals do not necessarily provide the same set of features, and terminals that seem similar do not always produce their features in exactly the same way. The special screen-handling functions of your terminal (such as scrolling the page, deleting lines, moving the cursor, and so forth) and the control codes that are used to implement these features can differ based on the model, or type, of terminal that you are using.

Programs, such as SCO Professional, that make use of your terminal's screen-handling capabilities, need to know about the differences among the terminals that are used to run the program. Also, these programs need some way of interfacing with different terminals so that identical keystrokes produce the same results, regardless of the terminal that you are using.

SCO Professional uses information contained in terminfo files to control the use of the keyboard and screen for each type of terminal that you use. There are many different terminfo files, each listing the capabilities specific to a terminal. To use a terminal with SCO Professional, there must first be a terminfo file for that terminal, located in the *terminfo* directory.

The *terminfo* files are located in */usr/lib/terminfo*. This *terminfo* directory includes 36 subdirectories, one for each letter of the alphabet and one for each digit (0-9). All terminfo files for terminals whose names begin with "A" are stored in the */a* subdirectory, terminfo files whose names begin with "B" are stored in the */b* directory, and so on.

The *terminfo* directory is very useful on several levels. The information contained in the terminfo files is complete and there are files for a great

number of terminals. In all likelihood, most of the terminals that you would want to use when running SCO Professional have terminfo files within the *terminfo* directory. In addition, terminfo files are compiled, so the information in them is quickly accessible by programs. For more specific information on *terminfo*, refer to Chapter 3, "Defining Terminal Capabilities."

If you cannot locate a terminfo file for the terminal that you intend to use, you need to create one before you can run SCO Professional using that terminal. The recommended method for creating a terminfo file is to copy and alter an existing file that provides capabilities similar to the terminal you want to use. Refer to Chapter 3, "Defining Terminal Capabilities," for specific information on creating or altering a terminfo file.

Configuring Colors

If you are running SCO Professional on a color console or a color terminal, you can change the colors that are displayed on the screen. The default color settings for SCO Professional help to distinguish the screen elements. However, you can change these default settings to suit your needs and the needs of your users.

You can change the default colors for all users by using the Professional Manager's color configuration utility as root and then copying your default color file, */usr/lib/pro/procolor*. Or, you can change the default colors on an individual basis by using the Professional Manager's color configuration utility as a user. The color settings you make for your personal use override the system-wide color configuration file settings.

For more information on configuring SCO Professional's default colors, see Chapter 3, "Defining Terminal Capabilities."

Adding Terminal Functionality

Although the contents of the terminfo files are generally very complete, you may encounter situations where a particular keystroke does not work as it is supposed to on a particular terminal. If you encounter this problem and the terminfo file that you are using does not list the required function, SCO Professional provides a utility, **tconfig**, that you can use to add the functionality for your terminal.

1

The **tconfig** utility is located in */usr/lib/pro* and must be run once for each type of terminal that does not work as expected with SCO Professional. This utility alters four configuration files: *cmds.pro*, which maps cursor movement and keyboard commands; *fkeys.pro*, which maps function keys; *graph.pro*, which maps character graphics; and *macro.pro*, which maps macro commands. The **tconfig** utility allows you to add terminal functionality that is not defined in your terminfo files, but you cannot change or delete existing capabilities.

For more information on using the **tconfig** utility, see Chapter 3, "Defining Terminal Capabilities."

Configuring Printers and Graphics Devices

Before your users can print from SCO Professional, you must first set up your system's printers and graphics devices (printers and plotters that produce graphics) to communicate properly with SCO Professional. SCO Professional provides a utility, **pconfig**, that you can use to configure your various printing devices.

The **pconfig** utility is located in */usr/lib/pro* and must be run for each printer and graphics device that SCO Professional will access. When you run this utility, an onscreen form is displayed in which you provide the necessary information for the device you are configuring. When you complete the form, **pconfig** creates a definition file for the device.

Printer and graphics device definition files include information such as device names and descriptions, spooler names, and text, graphics, and landscape printing designations. Each device may be defined by more than one definition file, each file allowing the device to serve a particular purpose. For example, an individual printer can function, by one definition, as a landscape text printer, and, by another definition, as a graphics device.

For more information on using the **pconfig** utility, see Chapter 4, "Setting Up Your Printers and Graphics Devices."

Spooling Programs

One of the selections you can make when running the **pconfig** utility is the spooling program that you want to use with SCO Professional. If your previous printing experience was limited to the DOS environment, the concept of a spooler may be foreign to you.

One of the main differences between printing in the DOS and UNIX environments is that you can have multiple printers attached to a single UNIX operating system. This situation, combined with the fact that you can have many users on the system at any time, makes it impractical for print requests to go directly to printers that are available system-wide. Because users are typically unaware of the actions of each other, the potential for users to send conflicting print requests to the same printer is inevitable. In a situation like this, the first print request to reach the device would be printed. Any print requests received while the printer was in use would be lost.

To prevent the possibility of conflicting print requests, the UNIX operating system uses a spooling program to control and monitor all of the printers serving your system. The spooler takes print jobs as they are requested and places them in a queue, where they wait their turn to be printed. The advantage of this approach is that the spooler manages multiple print jobs from multiple users, distributing the requests to designated printers as they are available. The user is spared the burden of knowing the status of a printing device and the possibility of losing print requests is eliminated.

Generally, the UNIX operating system uses **lp** as its spooling program and the **lp** spooler is a perfectly suitable choice for use with SCO Professional. However, there are other spoolers available (such as **lpr**), and you are free to select one of these other programs when running **pconfig**. For more information on the various spoolers available, see your operating system documentation. Refer to Chapter 4, "Setting Up Your Printers and Graphics Devices," in this guide for more information on selecting a spooler for SCO Professional with **pconfig**.

Switching International Formats

You can switch SCO Professional's entire user interface, including menus, error messages, and prompts, from English to a different language, such as French or German. A system can even contain multiple language sets from which an individual user can choose.

In addition, SCO Professional supports four international date formats, four international time formats, eight punctuation formats, and a currency string that is limited only by what your keyboard supports.

For information on using international settings with SCO Professional, see Chapter 7, "International Formats."

Differences between Lotus 1-2-3 and SCO Professional

Because SCO Professional is compatible with Lotus 1-2-3, Release 2, you may find there are situations where you want to move worksheet files from DOS to the UNIX environment, or vice versa. However, there are a few differences between SCO Professional in a UNIX environment and Lotus 1-2-3 under DOS of which you should be aware. This section provides the information you need for making a smooth transition from Lotus 1-2-3 and DOS to SCO Professional and the UNIX operating system.

Specifically, this section discusses moving files between SCO Professional and Lotus 1-2-3. Also, this section explains the main differences between a DOS and UNIX environment, including:

■ filenames,

■ filename separators in a path,

■ file permissions, and

■ file locking.

Finally, this section provides a list of SCO Professional commands and keystrokes that are not available in Lotus 1-2-3 and a list comparing common DOS commands and their UNIX equivalents.

Moving Files between SCO Professional and Lotus 1-2-3

SCO Professional and Lotus 1-2-3, Release 2, worksheet files (with the filename extension *.wk1*) are compatible with one another. Once transferred, Lotus 1-2-3 *.wk1* files can be used exactly like worksheet files originally created on SCO Professional.

If the Lotus 1-2-3 worksheet files that you want to transfer for use with SCO Professional are located on a floppy diskette or in a DOS partition on your hard disk, you can use the Media-Archive command. The Media-Archive command, available from the Professional Manager, is configured by default to read files from DOS floppies. You can change the command to read files from your DOS partition. You can also use this command to move SCO Professional worksheet files to the DOS partition or to DOS floppies. For specific information on using the Media-Archive command, refer to Chapter 13, "Using the Professional Manager," in the *SCO Professional User's Guide*.

A Note about Size

SCO Professional worksheets have a size capability of 8192 rows by 1024 columns, while Lotus 1-2-3, Release 2, is limited to a size of 8192 rows by 256 columns.

Due to the difference in the maximum number of columns between Lotus 1-2-3 and SCO Professional, you must be careful when transferring files from one application to the other. If you are going to access a Lotus 1-2-3 worksheet file for the first time with SCO Professional, start Professional with the -w flag. This prevents problems caused by relative cell references that wrap around the right side of a 256 column Lotus 1-2-3 worksheet. For more information on the -w flag, see Appendix B of the *SCO Professional User's Guide*.

If you transfer a SCO Professional worksheet with more than 256 columns to a Lotus 1-2-3 file, the data in the columns to the right of the IV column is lost. If there are not too many columns of data to the right of IV, delete blank columns to the left of IV in order to reduce the width of the worksheet to 256 columns. If you reduce the width by this method, both absolute and relative cell references are adjusted correctly.

Transferring Graph Files

Graph files require special handling when they are transferred between Lotus 1-2-3 and SCO Professional. A *.gph* file in SCO Professional serves the same function as a *.pic* file in Lotus 1-2-3. However, *.pic* files are not identical to *.gph* files and cannot be transferred directly to SCO Professional.

To transfer a Lotus 1-2-3 graph to the UNIX environment, you must transfer the *.wkl* file that contains the data for the desired graph, then use the SCO Professional /Graph Save command. This produces the desired *.gph* file. Likewise, if you want to move an SCO Professional graph to DOS, you must transfer the relevant *.wkl* file and then use the Lotus 1-2-3 /Graph Save command to generate a *.pic* file.

Specifying Filenames

While the format of SCO Professional files is compatible with Lotus 1-2-3 files, the naming conventions associated with the two are different. If you are using files from the two different programs interchangeably, you must be aware of these differences.

Naming Lotus 1-2-3 Files

When using Lotus 1-2-3, worksheet filenames can be up to eight characters long (Lotus then adds a DOS extension). The characters you may use are A-Z, 0-9, and period (.). Characters other than these are considered illegal. If you use characters from the alphabet, Lotus 1-2-3 considers lower- and uppercase letters to be the same. For example, the filename *accts3* is interchangeable with the filename *ACCTS3*.

Naming SCO Professional Files

When using SCO Professional, worksheet filenames can be up to 10 charac-
ters long. SCO Professional then adds a period and a three-character
filename extension: *.wkl*, *.gph*, or *.prn*. A punctuation mark, such as a
comma or a period, counts as a character. A filename cannot contain blank
spaces.

When naming SCO Professional files, it is also important to note that certain
characters have special meanings in the UNIX operating system and they
should not be used. Other characters should not be used because they are
confusing or misleading. These characters include:

- The following punctuation marks: ? ! , ; - ~

- The following signs: ^ & * | $ % / \

- The following enclosing marks: ( ) < > { } [ ]

- all quotation marks

SCO Professional and the UNIX operating system differentiate between
lower- and uppercase characters, so *accts3* and *ACCTS3* are interpreted as
different filenames. Additionally, file extensions must be in lowercase
characters or SCO Professional cannot recognize them. You can use the -l
flag when you invoke SCO Professional to overcome this problem, as
explained in the section that follows.

File Naming for Compatibility

If you plan to import Lotus 1-2-3 files for use with SCO Professional, you
do not need to worry about the uppercase filenames and extension names.
When you run SCO Professional, specify the -l flag and all uppercase
filenames are converted to lowercase. For more information on this com-
mand line flag, see Appendix B, "Command Line Flags," in the *SCO Pro-
fessional User's Guide*.

If you plan to transport SCO Professional files to a DOS environment, you
should limit your filenames to eight characters, with no distinction between
upper- and lowercase.

Filename Separators in a Path

When you specify paths in a UNIX system, the slash (/) is used to separate the directory names listed in the path. The backslash (\) serves the same function in paths on a DOS system. The slash is preferred in UNIX pathnames, but to avoid confusion if a backslash is entered due to the DOS convention, SCO Professional accepts the backslash as the equivalent of the slash for a filename separator.

File Permissions

Because the UNIX operating system can be accessed by more than one user, it must provide tools to prevent inspection, alteration, or execution of files by unauthorized users. All files and directories have a set of permissions that control who can read them, edit them, and execute them. Each file has three different sets of permissions: one for the user, one for the user's group, and one for all other users on the system. Each set of permissions can include none, one, or more of the privileges listed in Table 1.1.

Table 1.1 File Permissions

Permission	Description
read	For a file, allows a user to view the contents of the file. For a directory, allows a user to see a list of the files the directory holds. Read permission for a directory does not automatically provide read permission for the files contained in the directory.
write	For a file, allows a user to edit or remove the file. For a directory, allows a user to create files and subdirectories within that directory.
execute	Mainly for files that contain programs or other procedures that tell your system what to do. If the file is a program, it allows the user to run the program.

Permissions are assigned by a file's owner (creator) when the file is created. Any combination of the three privileges is permitted for the three levels of permissions. This allows the file's owner to determine which users can read, write, and execute the file. Note that the super user has read, write, and execute permissions for all files on the system.

See your operating system documentation for a more detailed discussion on file permissions.

Setting umask

You can specify the kind of permissions that you want assigned to any new files created by SCO Professional users through the **umask** setting. The default **umask** setting for most UNIX systems allows only the owner of the file to have write permission. All other users are granted read-only permission. If you wish to allow worksheet files to be both readable and writable by a group of users, add the following line to the top of the file */usr/bin/pro*:

   umask 002

This allows all users in the same group as the file's owner to write to the file. See your operating system documentation for information on setting up groups of users. If you wish to allow any user on the system to write to the file, change the above line to:

   umask 000

For further information, refer to the description of **umask** in your operating system documentation.

Displaying Permission Settings

You can check the current permissions of any file or directory by entering the **ls -l** command at the operating system prompt. The permission settings are indicated by the first 10 characters of the output of the l command, in the following form:

```
drwxrwxrwx
```

The first character indicates whether the entry is a file (-), a directory (d), or a special device (b or c). The remaining nine characters indicate the read, write, and execute permissions in groups of three. Each set of three represents the owner's permissions, group permissions, and all other user permissions, respectively.

An "r" specifies permission to display or read the file; a "w" specifies permission to modify or write the file; and an "x" specifies permission to execute the file. A hyphen (-) in any position indicates that the particular permission is denied.

Changing Permissions

You can change the read, write, and execute permissions for an existing file or directory with the **chmod** command. The **chmod** command has the form:

chmod *instruction filename*

The *instruction* segment of the command indicates which permissions you want to change for which class of users. First specify the group or groups you want to affect: "u" for the owner, "g" for others in the group, "o" for all others on the system, or "a" for all three groups. This is followed by a plus (+) sign if you are adding permissions or a minus (-) sign if you are denying permissions. Finally, specify the type of permissions that you are adding or removing: "r" for read, "w" for write, and "x" for execute.

For example, assume *file1* exists with the following permissions:

    -rw-r--r--

At the operating system prompt, enter the following command to give the file's owner execute permission:

chmod u+x file1

If you want to give the group and other users write permission on *file1*, enter:

chmod go+w file1

To remove write permissions on *file1* for other users on the system, enter:

chmod o-w file1

See your operating system documentation for more information on file permissions.

File Locking

In the UNIX multiuser environment it is possible for two or more users to access the same file simultaneously. For this reason, SCO Professional provides a safety feature called file locking. Any time you begin work on a worksheet file, that file becomes locked; other users cannot modify it. If you try to retrieve a file that another user is working on, SCO Professional responds with an error message, telling you that the file is currently locked. For more information on this feature, see Chapter 2, "Worksheet Basics" in the *SCO Professional User's Guide*.

Unique SCO Professional Commands and Keystrokes

There are several SCO Professional commands and keystrokes that are not available in Lotus 1-2-3, Release 2, of which you should be aware. Tables 1.2 and 1.3 list these commands and keystrokes.

Table 1.2 SCO Professional Commands
Not Found in Lotus 1-2-3

Command	Purpose
/File Combine Link	Links data between two worksheets.
/File Combine Unlink	Unlinks data between two worksheets.
/File Import Parse	Separates data into individual cells.
/File Save Backup	Creates backup copy of file.
/File Type	Transfers spreadsheet types.
/Graph Graph-Transfer Copy	Copies graph to clipboard.
/Graph Graph-Transfer Remove	Removes graph from clipboard.
/Graph Print	Enters Graph Print menu.
/Learn	Enters Macro Learn mode.
/Learn Append	Appends keystrokes to an existing macro.
/Learn Erase	Substitutes new keystrokes in an existing range.
/Learn Create	Specifies a name and range for a macro.
/Print Printer Select	Selects a printer device.
/Quit Save	Saves a file when quitting.
/Range Layout	Sets justification of numeric values as well as text.
/Transfer	Enters the Clipboard menu.
/Transfer Copy	Copies to the Clipboard.
/Transfer Paste	Pastes from the Clipboard.
/Transfer Remove	Removes Clipboard item.
/Window External	Displays two different worksheets simultaneously.
/Window Resident	Displays one worksheet in two windows.

Table 1.3 SCO Professional Keystrokes
Not Found in Lotus 1-2-3

Command	Purpose
^b	Changes preselected range (such as /Data Fill) to current cell.
^d	Deletes to end of line in EDIT mode.
^e	Executes END mode.
^f	Presents a function key menu.
^g	Moves to last cell in specified direction containing data (called the <GoTo> key).
^o	Opens a new row at the current cell pointer.
^t	Moves cursor to cell A-1.
^w	Deletes a word in EDIT mode.
^z	Executes LEARN mode.
!	Invokes a shell escape from any menu.

Common DOS Commands and Their UNIX Equivalents

Table 1.4 lists several commonly used DOS commands and the UNIX commands that you can use to achieve the same or similar results.

Table 1.4 Equivalent Commands

DOS	UNIX System
ATTRIB	**chmod**
CD	**cd**
COPY	**cp**
DEL	**rm**
DIR	**ls** or **ls -la**
MD	**mkdir**
RD	**rmdir**
REN	**mv**
SET	C shell: **setenv** *variable_name* Bourne shell: *variable_name=value*; **export** *variable_name*
TYPE	**cat** and **more**

Note that the DOS *autoexec.bat* file is equivalent to the *.login* file if you are using C shell, and it is equivalent to the *.profile* file if you are using the Bourne shell.

For more information on how to use the UNIX commands listed here, see your operating system documentation.

≡ **Chapter 2**

Creating a Custom Environment

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Creating a Custom Environment

SCO Professional can be customized to operate in a wide variety of environments based on both your system's hardware capabilities and its users' needs. This chapter introduces you to the environment variables used by SCO Professional. These environment variables can be modified to specify where Professional program and worksheet files are located. They also specify the search path Professional uses, and you can use them to create custom environments for individual users.

This chapter contains the following sections:

- "Setting Environment Variables" tells how to specify values for the environment variables of individuals and how to set variables for the entire system.

- "Describing Environment Variables" tells what SCO Professional uses each environment variable for, and what effect a change in the variable has.

The following table lists the six SCO Professional environment variables discussed in this chapter:

SCO Professional Environment Variables	
Variable	**Purpose**
PROLIB	Specifies directory of SCO Professional system files.
PROPATH	Specifies search path for SCO Professional files.
SCOLIB	Specifies directory of printer and terminal files.
BACKUPDIR	Specifies directory to store backup files.
PRINTSCR	Specifies file or device to send screen dumps.
TMPDIR	Specifies directory used to store scratch files.

The following table lists four related operating system environment variables discussed in this chapter:

Related Operating System Environment Variables	
Variable	**Purpose**
HOME	Specifies user's home directory.
SHELL	Specifies user's login shell.
TERM	Specifies user's current terminal type.
TERMINFO	Specifies the terminfo file to use.

Setting Environment Variables

The process for setting a particular user's environment variables (such as PROPATH and HOME) is different from that used to set global, system-wide environment variables (such as PROLIB). The following sections explain these differences.

Individualized Settings

To set your individual environment variable, first determine your login shell. To do this from the operating system command line, type:

2

echo $SHELL

The operating system returns your login shell. If the system returns /bin/sh, you are using the Bourne shell. If the system returns /bin/csh, you are using the Berkeley C shell.

If you are using the Bourne shell, follow this format to change the environment variables:

VARIABLE_NAME=setting; **export** *VARIABLE_NAME*

If you are using the Berkeley C shell, follow this format:

setenv *VARIABLE_NAME setting*

Any environment variable that you want to set for an individual user should be placed in that user's *.profile* (sh users) or *.cshrc* (csh users) file as appropriate. After changing your TERM environment variable, enter the **tset** command to actuate the new settings on your terminal.

System-Wide Settings

To set system-wide environment variables, edit the shell scripts *lusr/bin/pro* and *lusr/bin/procalc* to contain this form at the top of the file:

VARIABLE_NAME=setting; **export** *VARIABLE_NAME*

Repeat this procedure for each environment variable that you want to reflect a non-default value.

The PROLIB Environment Variable

The default library of SCO Professional's program files, utilities, and strings files is in the directory specified by the PROLIB environment variable. The default value of this variable is */usr/lib/pro*. Terminal and printer configuration files are located in the directory specified by SCOLIB, which is discussed later in this chapter. If the default directory for SCO Professional program files is moved to a new location, the PROLIB environment variable must be altered to reflect this change.

To move this library of files to a new location, use the Professional Manager's File-Manager menu or commands from the shell to move them as you would any file. Then edit the shell scripts */usr/bin/pro* and */usr/bin/procalc* to contain the following line:

PROLIB=*new location***; export PROLIB**

Creating Additional Libraries

One or more users may choose to keep separate copies of the SCO Professional library, to customize their prompts and error messages. For example, a user may want to create an error strings file in a second language. Accessing a separate directory allows these users to modify these strings files without affecting other users.

To create a new copy of the library, use the File-Manager utility in the Professional Manager to copy all of the files in the default library specified by the system-wide PROLIB setting into a new directory. Any users wanting to use the alternate library must set the PROLIB variable in their account's *.login* (csh users) or *.profile* (sh users) file to the new location. Then, when they invoke SCO Professional, it uses the files found in the alternate library specified by their PROLIB setting.

2

The PROPATH Environment Variable

A user or group of users may share a group of SCO Professional program files that are scattered among different directories. For example, users may want to access a different language version of the *prostrings* file that has been created elsewhere on the system. To make this possible, each of these users must set the PROPATH environment variable to define which directories, and in which order, SCO Professional searches for this file.

SCO Professional uses a different search order depending on the presence or absence of the PROPATH variable. If PROPATH is set, SCO Professional searches along the PROPATH path; then it looks in the directory defined by PROLIB. If PROPATH is not set, SCO Professional first searches your home directory for these files; then it checks PROLIB. For a listing of all SCO Professional files, see Appendix A, "SCO Professional System Files," of this guide.

To define a search path, set the environment variable PROPATH to the full pathname of the directory (or directories) containing the files that you want SCO Professional to read. Here is a sample PROPATH setting:

```
PROPATH=/usr/lib/hannan:/usr/davew/pro:/usr/lorih/sys:
```

To define this PROPATH setting, Bourne shell users enter:

> **PROPATH=/usr/lib/hannan:/usr/davew/pro:/usr/lorih/sys: ;
> export PROPATH**

C-shell users enter:

> **setenv PROPATH /usr/lib/hannan:/usr/davew/pro:/usr/lorih/sys:**

Creating a Custom Environment

When looking for a file, SCO Professional first looks in the first directory specified by PROPATH. Then it goes on to the next directory specified, and so on. It uses the first correctly named file it finds. If it does not find the file on the specified path, then it looks in the PROLIB directory. Be sure to include your home directory in the path you set, unless you explicitly want to ignore any configuration files stored there.

The SCOLIB Environment Variable

The SCOLIB environment variable (default value is */usr/lib/sco*) specifies the directory containing default printer and terminal definition files. SCO Professional reads the files contained in this directory to determine the printer options (such as sideways printing) and terminal capabilities (such as terminal graphics) of your system's hardware.

Other applications also use the directory specified by SCOLIB, so changes to the default location should be made in conjunction with changes to these applications. To change the SCOLIB setting, follow the procedure outlined for changing PROLIB.

The BACKUPDIR Environment Variable

The BACKUPDIR environment variable specifies where backup copies of SCO Professional files are created and stored. These backup files are created when you specify the Backup command while saving SCO Professional worksheets, graphs, or print files. If you specify a full pathname, for example, */usr/lib/probackup*, the location is absolute and all files are backed up to that location. If you specify a relative pathname, for example, *probackup*, SCO Professional creates a directory of that name underneath the current directory each time you back up a file. If no BACKUPDIR environment variable is set, a backup directory is created as a subdirectory of the current working directory.

SCOProfessional Configuration Guide

The PRINTSCR Environment Variable

Pressing the Printscreen key or invoking the {PRINT} macro during SCO Professional sessions sends an image of the current screen, minus any highlighting, to the file or printer specified by the PRINTSCR environment variable. Any current contents of this file are appended to.

This environment variable must be set, and the Printscreen key defined as shown in the "Adding Function Keys" section of Chapter 3, "Defining Terminal Capabilities," of this guide, before the Printscreen key can function. If the filename is absolute, such as */usr/lib/pfile*, SCO Professional saves the image to that exact location. If the filename is relative, such as *pfile*, SCO Professional saves the image to a file of that name in your current directory. If the filename is a device, the contents of the current screen are printed out on that device.

This environment variable must also be set before you can use the {PRINT} macro command. For more information on this command, see "Manipulating ASCII Files" in Chapter 8, "Using Macros," of the *User's Guide*.

The TMPDIR Environment Variable

The TMPDIR environment variable specifies the storage location for temporary scratch files created by SCO Professional. If no TMPDIR variable is set, these files are created in */tmp*. Set this environment variable if insufficient space is available in */tmp*.

The HOME, SHELL, TERM, and TERMINFO Environment Variables

Each of these system environment variables is used by SCO Professional to determine certain aspects of the SCO Professional environment.

The HOME environment variable indicates the user's home directory. If no explicit directory or path is specified by the user, SCO Professional saves files to the directory specified by HOME. The HOME environment variable is determined by information found in your */etc/passwd* file.

The SHELL environment variable indicates the user's login shell, and affects the format of SCO Professional environment variables.

The TERM environment variable indicates the type of terminal currently in use. SCO Professional reads this variable each time you create configuration files for your terminals.

The TERMINFO environment variable determines which file in the */usr/lib/terminfo* directory SCO Professional uses to assess your terminal's special capabilities.

≣ Chapter 3

Defining Terminal Capabilities

3

Defining Terminal Capabilities

SCO Professional uses information in a TERMINFO FILE to interpret keystrokes from your terminal and to assess your terminal's display capabilities. A wide variety of terminals have terminfo files that apply to them; these files are contained in the */usr/lib/terminfo* directory. Each terminfo file lists the capabilities of a specific type of terminal. It is essential that there be a file in the *terminfo* directory for each type of terminal you use with SCO Professional. This chapter explains what a terminfo file is and how to make sure the terminfo file for your terminal meets the needs of SCO Professional.

This chapter contains the following sections:

- "Describing TERM and terminfo Files" explains the TERM environment variable and terminfo files. It tells where the terminfo files are located and where the source file is for all of the terminfo files.

- "Creating the Optimal terminfo File" explains how to make sure you have a terminfo file that allows your terminal to use SCO Professional to its best advantage. It tells how to determine if a file for your terminal type exists, and how to compile the source file to create terminfo files. It describes how to compare existing terminfo files, how to adapt an old terminfo file for a new terminal, and how to convert a termcap entry and adapt the terminfo file thus created. It also gives guidelines and warnings about writing a terminfo file from scratch.

- "Comparing terminfo and termcap" tells the similarities and differences between the format, syntax, and capability code types of terminfo files and termcap entries. Samples of each kind of capability are shown to demonstrate the comparisons.

■ "Terminal Capabilities Used by Professional" lists the capabilities required and suggested for the use of SCO Professional. It tells what you can do if a suggested capability is not defined in the terminfo file for your terminal type.

■ "Configuring Colors for Professional" explains how to use the color configuration utility to control the color scheme you see when using SCO Professional.

■ "Adding Functions with the tconfig Utility" tells how to augment the capabilities defined in the terminfo file for your terminal to use all the functions offered by SCO Professional.

If you create a terminfo file and encounter error messages when attempting to run SCO Professional, or if you have problems using an existing file, see the "Terminal Issues" section of Chapter 6, "Troubleshooting Configuration Issues."

Describing TERM and terminfo Files

The TERM environment variable specifies the type of terminal currently in use. Your terminal type must have a terminfo file of the name specified by TERM. This file must be in the *lusrlliblterminfo* directory. SCO Professional reads the TERM variable each time you create configuration files for the terminals on your system.

The terminfo files list the capabilities of different terminals. Each terminal type has a specific file that contains one entry only. The file for a Wyse 60, for instance, consists of a single entry that defines what a Wyse 60 can do. Because each terminal type has its own file, one can refer to a terminal's "terminfo file" or its "terminfo entry" interchangeably. In this chapter, the phrase "terminfo file" is used. The files for all of the supported terminal types are collected in the *terminfo* directory.

Terminfo files are in compiled form, so programs can access the information in them quickly. Also, programs can find files quickly because they are organized in a hierarchy of directories that reduces search time to a minimum.

Programs find this hierarchy in the directory *lusrllib/terminfo*. There are subdirectories for the first letters of the names of the different terminal types. The program looks in the appropriate subdirectory for the correct terminfo file.

If, for example, SCO Professional needs to know the screen size of a Wyse 60 terminal so it can display a spreadsheet, it can retrieve this information quickly, in compiled form, from the terminfo file *wy60,* in the *w* subdirectory of the *lusrllib/terminfo* directory. SCO Professional can display your spreadsheet without delay, and without slowing down other processes.

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Although terminfo files allow quick access by the applications that use them, you cannot change or test them easily. To change a terminfo file, you must decompile it, edit it, and recompile it. You cannot test a changed file until you have recompiled it. With these limitations in mind, the creators of terminfo have made the files as complete as possible. The lists of capabilities in each terminfo file are extensive and carefully ordered. SCO Professional performs adequately with the capabilities listed for many supported terminal types.

In addition to the terminfo files, there is also a source file in the *terminfo* directory, called *terminfo.src*. It contains the uncompiled capabilities for all terminal types. Each group of capabilities for a terminal type is referred to as that terminal's "entry." Use **vi** or the editor of your choice to read this source file if you want to search through or compare a number of different entries without decompiling all the different terminfo files.

Creating the Optimal terminfo Entry

To make sure SCO Professional takes advantage of your terminal's capabilities, use the most recently developed terminfo file available for your terminal. In most cases, the terminfo file in the *lusrllib/terminfo* directory supplied with your operating system should provide adequate capabilities for SCO Professional. If your version of the operating system is outdated, you should install the terminfo files included with SCO Professional. See the *SCO Professional Release Notes* and *Installation Notes* for more information.

If your terminal does not perform as expected, first make sure the terminal is configured correctly. If you are using terminal emulation software, terminal problems may be due to incorrect emulation of the terminal type for which you have a terminfo file. Either change your emulation software, or obtain a terminfo file that is suitable for direct use of your terminal, without emulation.

If your terminal is properly configured and you are not using an emulator, you might need to get an improved terminfo file to enhance your terminal's performance. Use the following sections to find or develop a file that is adequate for your use of SCO Professional. Do the procedures in the order shown, trying the simple solutions before attempting the more difficult ones.

Determining if a terminfo File Exists for Your Terminal

If you are not sure whether there is a terminfo file for your terminal type, look in the directory */usr/lib/terminfo*. Look for the file in the subdirectory named with the first letter of your terminal's name. For example, the Wyse 60 terminfo file is in the *w* directory.

If the file is not listed, use an editor such as **vi** to search for the entry in the source file */usr/lib/terminfo/terminfo.src*. If you know the short alias for the name of your terminal type, you can search for it with a vertical bar following the name, and avoid references to the terminal type other than those in the name line. For example, if you are looking for the entry for a Wyse 60 terminal, you can search for the string **wy60|** in the source file.

Compiling an Existing Entry

If the entry for your terminal type exists in the source file but there is no compiled terminfo file in the subdirectory named with the first letter of your terminal's name, use the **tic(C)** utility to compile the source and create your terminfo file. For example, to create a full set of terminfo files from *terminfo.src*, first make sure the source contains all the latest entries in use, then enter:

    tic terminfo.src

Then check again for your terminal's file. If the file now exists, set your TERM environment variable to the terminal type, then test SCO Professional to make sure it is making full use of your terminal's capabilities.

Comparing Two Existing terminfo Files

If more than one terminfo file for your terminal type exists, you can use one of two methods to compare the capabilities. You can compare them in the source code file, or use the **infocmp** utility to compare the compiled files.

If you want to compare the capabilities of several entries, use an editor such as **vi** to search through the capabilities and read the comments in the source file. For example, if you have a Wyse 60 terminal and you want to have a destructive backspace capability and a non-destructive left arrow key, look at the comments before the wy60ak entry in */usr/lib/terminfo.src*. The comments look like this:

```
# Program arrow keys to emit ANSI standard sequences.  Allows
# applications to distinguish between destructive Back Space and
# non-destructive Left Arrow key.
```

By reading these comments you can see that the wy60ak entry provides capabilities for both a destructive backspace and a non-destructive left arrow key. If you want both of these functions while using SCO Professional, your TERM environment variable must specify the *wy60ak* terminfo file rather than the *wy60* file.

If there are two terminfo files for your terminal type and you want to see a concise listing of the differences of capabilities, use the **infocmp** utility. The **infocmp** utility compares two or more terminfo files and displays the capabilities that are different. For example, you can compare a file for a standard Wyse 60 with the file for a Wyse 60 in wide screen mode by entering:

infocmp wy60 wy60-w

The output of **infocmp** should appear as follows:

```
comparing wy60 to wy60-w.
comparing booleans.
comparing numbers.
    cols: 80:132.
    lw: 8:7.
    nlab: 8:16.
    wsl: 80:97.
comparing strings.
    dch1: '\EW$<11>','\EW$<16>'.
    ip: '$<3>','$<5>'.
    rs2: '\EeF$<150>','\EeF$<150>\E';$<150>'.
```

This comparison shows that the main differences between the two terminfo files are the screen width and the capabilities affected by it. For instance, if you start on the fourth line of the comparison, you can see that there are 80 columns on a Wyse 60 and 132 on the wide-screen terminal. Soft labels are 8 columns wide on a Wyse 60 and 7 columns wide on a wide-screen terminal. For descriptions of these and other capabilities you are comparing, see **terminfo(M)** in your operating system's documentation.

If you have a new and an old *terminfo.src* file, and you want to compare the new and old entries for your terminal type, use an editor such as **vi** to change the name of your terminal's entry in the old source file. For instance, you can change the *wy60* name to *wy60o* in the old *terminfo.src* to make it distinct from a new Wyse 60 entry. When you have changed the old entry's name, compile the two *wy60* entries with **tic**. You can then use the **infocmp** utility to compare the *wy60o* and *wy60* terminfo files. If the new capabilities seem to be an improvement, test Professional before removing the *wy60o* file.

Requesting the Latest terminfo Files

If, after trying the above methods, you are still unable to find a terminfo file that provides adequate performance of SCO Professional on your terminal, contact SCO support and request the latest files available for your terminal type.

As new terminfo files for new-terminal types are developed, they are made available to SCO Professional users. If you receive a new file, use the instructions included with it to copy the new file into your *lusr/lib/terminfo* directory. Make sure you update your *terminfo.src* file along with the entry files.

If there are no files available for your terminal type, you can proceed with optimizing an existing file, converting a termcap entry, or writing a new file, as described in the following sections.

Optimizing a terminfo File

There are some situations where it makes sense to adapt an existing terminfo file for your terminal type.

If you have a new model of a terminal, you may be able to modify a terminfo file for an older model of the same brand. You can often create a new file that works adequately for the new model.

To create a new, improved file, use the following procedure.

1. Access the source for the old file in *lusr/lib/terminfo/terminfo.src*.

2. Determine what capabilities you need to add or change for your new terminal.

3. Write a short new terminfo entry. This new entry should have an alias line and capability lines that follow the format of the old file, and it should contain only the new or changed capabilities.

4. Write the capability **use=**_termname_ at the end of the list of capabilities, inserting the name of the old terminal type for _termname_. The new entry uses all of the capabilities of the old one, except those you have added or changed.

5. Compile the source file with the **tic** utility.

6. Change your TERM environment variable to refer to the new terminfo file.

7. Test SCO Professional to make sure the newly defined capabilities work and none of the old capabilities are lost.

For example, if you had a new model Wyse 60 with a visual bell, you could create a new terminfo file with a capability for the visual bell that looked something like this:

```
wy60-vb|wyse60-vb|Wyse 60 Visible bell,
    flash=\E'8$<100/>\E'9, use=wy60,
```

If you compiled this entry, it would create a _wy60-vb_ terminfo file. If you then set your TERM environment variable to _wy60-vb_, your new terminal would flash as well as beep each time you made an error. Other than the flash capability, all other capabilities in the standard _wy60_ terminfo file would be used.

The example shown is deceptively simple. The process of adapting a terminfo file for use with a new model of terminal can be quite complex if more than a few capabilities must be changed or added. Many capabilities are related to others, so changes can have "ripple" effects. Because of these effects, new or custom-made terminfo files are not supported. With this in mind, change as little as possible, and test the terminal locally before placing the new source file and compiled terminfo file in the system _terminfo_ directory.

Converting a termcap entry

If you have a terminal type for which there is no terminfo file, but for which you have a working termcap entry, you can convert the termcap entry. Before converting from termcap to terminfo, though, you should read "Comparing terminfo and termcap" later in this chapter.

Use the **captoinfo**(ADM) utility provided with your operating system. Avoid using a public domain version of this utility; some older versions tend to convert capabilities incorrectly or miss them altogether. Copy the termcap entry you want to convert to a separate file, then use the **captoinfo** utility to create a terminfo source file.

3

Compile the source and move the resultant file to your home directory for local testing. Set your TERMINFO environment variable to use the local terminfo file, then test the file before adding it to the */usr/lib/terminfo* directory. If you do add the file to the system's *terminfo* directory, make sure you add the source to the */usr/lib/terminfo/terminfo.src* file as well.

If, after converting your termcap entry to a terminfo file, you find that you need additional capabilities, decompile the file and add the missing capabilities, following the format and syntax of the existing capabilities. Then recompile and test the improved file. Keep in mind that the converting process is not reversible. Some capabilities may be converted or extrapolated correctly by **captoinfo**, but lost if you try to decompile the resultant terminfo file and recreate a termcap entry with **infocmp**. For help with diagnosing problems, see **captoinfo**(ADM) in your operating system's user's reference.

■ **NOTE:** Some custom-made termcap capabilities do not convert correctly with the **captoinfo** utility.

Writing a terminfo File from Scratch

As indicated earlier in this chapter, it is far easier to use an existing terminfo file than to write a new one for your terminal type. However, if you are familiar with terminal capabilities and the format and syntax used for terminfo files, you can write and compile your own file.

Build the file gradually, testing groups of capabilities by using **vi.** Do this testing on your own terminal, with a local setting of the TERMINFO environment variable. When you have a complete file that works reliably, add it to the */usr/lib/terminfo* directory.

For more information on writing and testing a terminfo file, see the "Preparing Descriptions" section of the **terminfo(M)** manual page in your operating system's documentation, or read the "Writing Entries" chapter of *Termcap and Terminfo* by John Strang, Tim O'Reilly, and Linda Mui (O'Reilly & Associates, Sebastopol, CA, 1988).

Comparing terminfo and termcap

If you are familiar with termcap entries and are using terminfo files for the first time, it is useful to consider the similarities and differences between a terminfo file and a termcap entry for a Wyse 60 terminal. Even if you are not familiar with termcap, you can use this section to become familiar with the line format, syntax, and capability code types used in terminfo files.

Comparing Types of Lines

There are different types of lines in both terminfo and termcap entries. To see the first lines of the Wyse 60 terminfo entry, change to the directory */usr/lib/terminfo* and enter the following command:

    infocmp wy60 | more

The **infocmp** utility decompiles and compares terminfo files. If you list only a single terminal type as an argument, it decompiles the file for that terminal. The first four lines of the Wyse 60 entry should look something like this:

```
wy60|wyse60|Wyse WY-60 with 80 column/24 line screen in wy60 mode,
        am, bw, hs, km, mir, msgr, ul, xon,
        cols#80, lh#1, lines#24, lw#8, nlab#8, wsl#80,
        acsc=0wa_h[jukslrmqnxqzttuyv]wpxv, bel=^G, blink=\EG2,
```

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Your terminfo file for the Wyse 60 may be slightly different if you have a different version of terminfo, but the format of the first four lines should be the same. Two types of lines are shown. The first line is the name line; it lists aliases for the terminal type. Each alias is separated from the others by a vertical bar (|) and the name line ends with a comma. Any of the single-word aliases can be used as a TERM setting; by convention, a short name is listed first, and the full name and a description of the terminal is listed last. The name the user sees upon logging in is usually the short first alias.

Following the name line are three capability lines. These lines define what the terminal can do. Each capability is separated from the next by a comma and a space, and each line ends in a comma, including the last line.

Compare these terminfo lines with the Wyse 60 termcap entry in the */etc/termcap* file. The first four lines should look similar to this sample:

```
# Here is the termcap for a Wyse 60 terminal
w7|wy60|wyse60|Wyse WY-60 with 80 col/24 ln screen:\
    :is=\E'\072\Ee(\EO\Ee6\Ec41\E~4\Ec21\Ed/:\
    :if=/usr/lib/tabset/std:pt:\
```

The first line is a comment line. It begins with a crosshatch sign (#) that causes the operating system to ignore the line. Comment lines can appear at the beginning of uncompiled terminfo entries in the source file as well as at the beginning of termcap entries, but they do not appear if you use **infocmp** to view the capabilities of a compiled terminfo file.

The second line is a name line, very similar to the name line in the terminfo entry, but beginning with a two-character alias. The third and fourth lines

are capability lines that define what the terminal can do. Each capability is separated from the next by a colon, and each line begins and ends with a colon. Every capability line except the last in the entry ends in a backslash.

Comparing Capability Types

In both terminfo and termcap entries, there are three types of capabilities: Boolean, numeric, and string. Each type of capability is represented by a specific type of code name, and each has its own syntax. Terminfo and termcap use the same types of code names and the same syntaxes to distinguish the different types of capabilities. The specific code names can vary from terminfo to termcap, but they are often similar. The three types of capabilities have the following characteristics.

- Boolean capability codes specify whether a capability is present or absent on a given terminal. The existence of a code indicates the non-default value, while the absence of such a code indicates that the default value is in use. For example, the code **am** indicates that a terminal does auto-wraparound, while the absence of the **am** code indicates the default value, or no auto-wraparound. To determine the default status of a Boolean capability, check **terminfo**(M) in your operating system's user's reference.

- Numeric capability codes specify values such as screen width and length. Each capability consists of a name, a crosshatch sign, and an integer. For example, the terminfo capability **cols#80** indicates a terminal with an 80-column screen display.

- String capability codes tell how to issue commands to your particular terminal. A string capability consists of a codified name, an equal sign, and the command sequence. For example, **bel=^G** specifies that the sequence **Ctrl-g** causes the terminal to beep or make some other form of bell noise.

The decompiled listing of a terminfo file you see when you use **infocmp** shows the capabilities in groups according to type. In the Wyse 60 example, the first capability line lists the Boolean capabilities:

```
am, bw, hs, km, mir, msgr, ul, xon,
```

The second capability line is made up of numeric capabilities:

```
cols#80, lh#1, lines#24, lw#8, nlab#8, wsl#80,
```

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The third line is the first of many lines of string capabilities:

```
acsc=0wa_h[jukslrmqnxqzttuyv]wpxv, bel=^G, blink=\EG2,
```

Within each type, the capabilities are listed in alphabetical order so you can find a particular capability quickly. Terminfo also uses longer code names (up to five letters), so you can often figure out the meaning of the name. Each capability is separated by a comma and a space.

Comparing Sample Capabilities

To see the full effect of the differences between terminfo and termcap, compare the following complete samples of entries for the Wyse 60 terminal. The terminfo entry, decompiled from the file */usr/lib/terminfo/w/wy60*, looks like this:

```
wy60|wyse60|Wyse WY-60 with 80 column/24 line screen in wy60 mode,
    am, bw, hs, km, mir, msgr, ul, xon,
    cols#80, lh#1, lines#24, lw#8, nlab#8, wsl#80,
    acsc=0wa_h[jukslrmqnxqzttuyv]wpxv, bel=^G,
    blink=\EG2, cbt=\EI, civis=\E'0, clear=\E*$<100>,
    cnorm=\E'1, cr=\r, cubl=\b, cudl=\n, cufl=\f,
    cup=\Ea%i%p1%dR%p2%dC, cuul=^K, dchl=\EW$<11>,
    dim=\EGp, dll=\ER$<5>, dsl=\Ez(\r, ed=\EY$<100>,
    el=\ET, fsl=\r, home=^^$<2>, ht=\t$<5>, hts=\E1,
    if=/eusr/elib/etabset/estd, il1=\EE$<4>, ind=\n,
    invis=\EG1, ip=$<3>,
    is2=\Ed$\EcD\E'\Er\EH^C\Ed/\EO\Eel\Ed*\E'@\E'9\E'1
    \EZ1+^?\EZ1\,^?\EZ1-^?\EZ1.^?\EZ1\\^?\EZ1q^?\Ec72,
    kHOM=\E{, kbs=\b, kcbt=\EI, kcubl=\b, kcudl=\n,
    kcufl=\f, kcuul=^K, kdchl=\EW, kdll=\ER, ked=\EY,
    kel=\ET, kent=\E7, kf0=^AI\r, kf1=^A@\r,
    kf10=^AI\r, kf11=^AJ\r, kf12=^AK\r, kf13=^AL\r,
    kf14=^AM\r, kf15=^AN\r, kf16=^AO\r, kf2=^AA\r,
    kf3=^AB\r, kf4=^AC\r, kf5=^AD\r, kf6=^AE\r,
    kf7=^AF\r, kf8=^AG\r, kf9=^AH\r, khome=^^,
    kichl=\EQ, kill=\EE, knp=\EK, kpp=\EJ, kprt=\EP,
    krpl=\Er, mc0=\EP, mc4=^T, mc5=^R, nel=\r\n$<3>,
    pfloc=\EZ2%p1%'?'%+%c%p2%s^?,
    pfx=\EZ1%p1%'?'%+%c%p2%s^?,
    pln=\Ez%p1%'/e'%+%c%p2%s\r, prot=\E), rev=\EG4,
    ri=\Ej$<7>, rmacs=\EH^C, rmam=\Ed., rmir=\Er,
    rmln=\EA11, rmso=\EG0, rmul=\EG0, rmxon=\Ec20,
    rsl=\E~!\E~4$<150>, rs2=\EeF$<150>,
    rs3=\EwG\Ee($<150>,
    sgr=%?%p8%t\E)%ee\E(%;%?%p9%t\EH^B%e\EH^C%;\EG%'0'%?%p2
    %p6%|%t%{8}%|%;%?%p1%p3%|%p6%|%t%{4}%|%;%?%p4%t%{2}%|%;
    %?%p1%p5%|%t%{64}%|%;%?%p7%t%{1}%|%;%c,
    sgr0=\E(\EH^C\EG0\EcD, smacs=\EH^B, smam=\Ed/e,
    smir=\Eq, smln=\EA10, smso=\EG4, smul=\EG8,
    smxon=\Ec21, tbc=\E0, tsl=\Ez(, uc=\EG8%p1%c\EG0,
```

The lengthy **is2** and **sgr** capabilities have been reformatted to fit on the printed page, but otherwise, this sample appears as you would see it on your screen.

The termcap entry for the same terminal looks like this:

```
# Here is the termcap for a Wyse 60 terminal
w7|wy60|wyse60|Wyse WY-60 with 80 col/24 ln screen:\
    :is=\E'\072\Ee(\EO\Ee6\Ec41\E~4\Ec21\Ed/:\
    :if=/usr/lib/tabset/std.pt:\
    :G1=\EH3:G2=\EH2:G3=\EH1:G4=\EH5:GD=\EH0:GG#0:\
    :GH=\EH\072:GU=\EH=:GV=\EH6:GR=\EH4:GL=\EH9:\
    :GC=\EH8:GF=\EH7:PU=\EJ:PD=\EK:\
    :al=\EE:am:bs:bt=\EI:cd=\EY:ce=\ET:cl=\E+:\
    :cm=\Ea%i%dR%dC:co#80:dc=\EW:dl=\ER:ei=\Er:\
    :im=\Eq:k0=^AI\r:k1=^A@\r:k2=^AA\r:k3=^AB\r:\
    :k4=^AC\r:k5=^AD\r:k6=^AE\r:k7=^AF\r:k8=^AG\r:\
    :k9=^AH\r:kd=^J:kh=^^:kl=^H:kr=^L:ku=^K:li#24:mi:\
    :nd=^L:se=\EG0:so=\EG4:sg#0:ug#0:ue=\EG0:ul:up=^K:us=\EG8:
```

The terminfo and termcap entry samples shown are typical, but they may not be exactly the same as the entry you have for the Wyse 60 terminal. Your entry may be updated or edited for special applications on your system.

Comparing the Use of termcap and terminfo

To see the practical difference between terminfo and termcap, try finding the **am** Boolean capability in both entries. The code name for the automatic right margin capability is the same in both terminfo and termcap, but it is much easier to find in the terminfo entry because the capabilities are grouped by type and listed in alphabetical order. The capabilities in the termcap entry are not divided into clear groups, and they are not all listed in alphabetical order.

The terminfo entry is longer because it defines many more capabilities of the Wyse 60 terminal than the termcap entry defines. Applications relying on terminfo can make more complete use of the terminal's capabilities, and users have more flexibility in adapting the terminal to their needs.

The most important point about the comparison of terminfo and termcap is that terminfo files are often more complete than termcap entries. If you are using a supported type of terminal and have a complete and accurate terminfo file, all SCO Professional functions should be available on your terminal. You do not have to modify your terminfo entry, so you do not have to learn the meaning of every code name and the limitations of your terminal's capabilities.

If you want to learn more about terminfo to take advantage of the expanded use of terminal capabilities that it offers, see **terminfo**(M) in your operating system's user's reference.

Terminal Capabilities Used by
SCO Professional

If you want to see which capabilities in your terminfo file are important for the use of SCO Professional, you can refer to Table 3.1. This table lists the terminfo capabilities required and suggested for optimum use of SCO Professional. Sample values are shown for an ANSI color terminal, which can be used for the system console.

Table 3.1 Capabilities Used By Professional

Required Capabilities		
Capability	**Terminfo**	**ANSI Terminal Entry**
Cursor Position	cup	cup=\E[%i%p1%d;%p2%dH
Clear Line to End	el	el=\E[K
End Standout Mode	rmso	rmso=\E[m
Begin Standout Mode	smso	smso=\E[7m
Number of Colors	colors	colors#8
Alternate Characters	acsc	acsc=K?lZm@jYnEwBvCt4qDx3
Turn on Blink	blink	blink=\E[5m
Turn on Bold	bold	bold=\E[1m
Clear Screen	clear	clear=\E[2J\E[H
Make Cursor Invisible	civis	not defined
Make Cursor Visible	cvvis	not defined
Delete Line	dl1	dl1=\E[M
Insert Character	ich1	ich1=\E[@
Insert Line	il1	il1=\E[L
Backspace	kbs	kbs=\b
Move Cursor Left	kcub1	kcub1=\E[D
Move Cursor Down	kcud1	kcud1=\E[B
Move Cursor Right	kcuf1	kcuf1=\E[C
Move Cursor Up	kcuu1	kcuu1=\E[A
Function Keys	kf0-kf9	kf0=\E[V, etc.
Home Cursor	khome	khome=\E[H
Next Page	knp	knp=\E[G
Previous Page	kpp	kpp=\E[I

(Continued on next page.)

Table 3.1 Capabilities Used By Professional *(Continued)*

Suggested Capabilities		
Capability	**Terminfo**	**ANSI Terminal Entry**
Original Color Pair	op	op=\E[37;40m
Turn off acsc	rmacs	rmacs=\E[10m
Turn Keypad Off	rmkx	not defined
End Underline	rmul	rmul=\E[m
Set Background Color	setb	setb=\E[4%b1%dm
Set Foreground Color	setf	setf=\E[3%p1%dm
Highlights Off	sgr0	sgr0=\E(\E[m
Turn on acsc	smacs	smacs=\E[12m
Turn Keypad On	smkx	not defined
Begin Underline	smul	smul=\E[4m

In the example terminfo entry for an ANSI color terminal, all of the required capabilities are defined. However, several suggested capabilities are not defined. In the case of an ANSI terminal, the undefined functions are adequately achieved by either SCO Professional or terminal-manipulating software such as **curses**(S).

If a few suggested capabilities are not defined in the terminfo entry for your terminal, there is a good possibility that SCO Professional can perform very well. Test the capabilities that are not defined for your terminal to see if your software can provide adequate performance. Your terminfo file may also have a number of capabilities defined beyond those listed. In some cases, different capabilities can produce the same effects as those listed.

If you notice inadequate performance and trace it to an undefined capability, you have three options: you can modify your supplementary terminal configuration files, as explained in "Adding Functions with the tconfig Utility" later in this chapter, you can edit the terminfo file to provide the desired capabilities, or you can devise a way to get the results you need without using the undefined capabilities.

If you choose to edit the terminfo file for your terminal, see **terminfo**(M) in your operating system's documentation or *Termcap and Terminfo* by John Strang, Tim O'Reilly, and Linda Mui (O'Reilly & Associates, Sebastopol, CA, 1988).

Keep in mind that editing the terminfo file is the most difficult of the options listed. If you can get the results you need by adding functionality with **tconfig** or by devising a workaround, avoid editing the terminfo file.

3

Configuring Colors for Professional

If you have suitable hardware and software for color displays, you can run SCO Professional in color.

- Default color settings make different screen objects, such as menus and windows, clearly distinguishable from each other.

- You can change these colors if they are not to your taste by using the Professional Manager's color configuration utility.

- You can change the default, system-wide color scheme by running the Professional Manager's color configuration utility as root and then copying the default color file, *.procolor*, from your home directory to */usr/lib/pro/procolor*.

- Individual users can specify their color preferences by running the color configuration utility themselves. Their preferences override, but do not change, the system defaults. Each user's personal color preferences are contained in the file *.procolor* in the user's home directory.

Color Configuration Background

Color configuration consists of selecting foreground and background color pairs for individual elements, or screen objects.

■ The foreground color is the color in which characters appear on the screen; for example, text in a list or on a menu.

■ The background color is the color of the blank portion of the object, such as a window background.

■ An object, or screen element, is an individual piece of SCO Professional that is color-configurable, such as a menu or a window.

Each object has a default color pair as well as a variety of available colors. The available objects and colors appear as you use the color configuration utility. You may need to run the utility several times, trying out different color pairs, before you obtain the color scheme you want.

Using the Color Configuration Utility

The following procedure applies to changing system-wide defaults as well as changing individual preferences. To change defaults, log on as root; to change individual preferences, log on as an individual user. To use the color configuration utility:

1. Type **pro** at your operating system prompt and press ⟨Return⟩. The Professional Manager Menu appears. Enter **cc** to select the Configuration Color command. The Applications list appears:

```
Choose an application (or Escape to exit)

            ────Application────
         * SCO Professional
         * SCO Professional Manager
```

3

2. Highlight either SCO Professional or the SCO Professional Manager and press ⟨Return⟩. The Objects list appears, with a note at the top of the screen stating which application you are modifying. There is also a note on the status line reminding you to choose an object:

```
Modifying SCO Professional

Choose an object (or Escape to return to applications)

            ┌──────Application──────┐
            │ SCO Professional      │
            │              ┌────────Objects────────┐
            │ * Column heading border           Red/Green
            │   Row heading border              Red/Green
            │   Status line (cell locator)      Red/Green
            │   Clock                           Red/Green
            │   External window indicator       Red/Green
            │   Negative values                 Red/Green
            │   Cell pointer                    Red/Green
            │   Overstrike Indicator (OVR)      Red/Green
            │   Circular references indicator (CIRC) Red/Green
            │   Learn mode indicator (LEARN)    Red/Green
            └── Recalculation indicator (CALC)  Red/Green
                End indicator (END)             Red/Green
                Scroll lock indicator (SCROLL)  Red/Green
```

3. Each object, or screen element, appears with the current color pair displayed. Choose an object to configure. You can do this by moving the highlight with the movement keys or the space bar, then pressing ⟨Return⟩ to select the object. You can also enter the first letter of the name of the object, or click on the object with the left mouse button if you have a mouse. The Colors list appears, with a message at the top of the screen stating the application and the object you are modifying. There is also a note on the status line reminding you that you have to choose a foreground color first.

3

```
Modifying SCO Professional - Column heading border

Choose a FOREground color (or Escape to return to objects)

     ┌────────Application────────┐
     │ SCO Professional          │
     │             ┌────────Objects──────────
     │   Column heading border        Red/Green
     │   Row heading border               ┌────────Colors────────
     │   Status line (cell locator)       │ * Black
     │   Clock                            │   Red
     │   External window indicator        │   Green
     │   Negative values                  │   Yellow
     │   Cell pointer                     │   Blue
     │   Overstrike Indicator (OVR)       │   Magenta
     │   Circular references indicator (CIRC│   Cyan
     │   Learn mode indicator (LEARN)     │   White
     │   Recalculation indicator (CALC)   │
     │   End indicator (END)              │
     │   Scroll lock indicator (SCROLL)   │
```

4. Choose a foreground color and press ⟨Return⟩. Note that the status line near the top of the screen now says Choose a BACKground color.

5. Choose a background color and press ⟨Return⟩. You return to the Objects list. The color pair you chose appears in the highlighted bar next to the object you configured. This color pair is what you will see when the element appears on the screen. Make sure the color pair can be distinguished from the colors of other screen elements that appear adjacent to it in SCO Professional.

6. Choose another object to configure and repeat the preceding steps, or press ⟨Esc⟩ to exit the color configuration utility. When you press ⟨Esc⟩, the Save menu appears.

7. Select **Yes** to exit and save your changes, **No** to remain inside the color utility, or **Abandon** to exit without saving changes.

8. If you select Abandon, a confirmation menu appears. Select **Yes** unless you want to return to the color configuration utility.

9. If you are altering the system default, you must now copy root's *.pro-color* file to */usr/lib/pro/procolor* after exiting the color configuration utility. The new *procolor* file creates a different color scheme for all users of SCO Professional on the system. It is best to test the color scheme locally and make a copy of */usr/lib/pro/procolor* before altering the system default colors.

Changes you have made to the Professional Manager color scheme take effect the next time you enter the Professional Manager. Changes you have made to the SCO Professional color scheme take place the next time you enter the spreadsheet program, even if you select it immediately from the Professional Manager's main menu. If the color scheme is not satisfactory, see the following section to restore the default color scheme.

Users can also turn off all colors and run SCO Professional in monochrome mode by invoking either Professional or Professional Manager with the **-M** option. For example, if you enter **pro -M** to start Professional Manager, it is displayed in monochrome mode.

Restoring the Default Colors

If a customized personal color scheme proves unsatisfactory, an individual user can restore the system's default colors by using the Restore option from within the color configuration utility. To do so:

1. Select Configuration Color from the Professional Manager menu. When you see the Applications list, press ⟨Esc⟩. The color configuration menu appears.

2. Select **Restore**. When you do so, the default color configuration file overwrites the user's local color configuration file.

3. Select **Yes** to confirm this restoration or **No** to cancel it.

3

Chapter 4

Setting Up Your Printers and Graphics Devices

4

Setting Up Your Printers and Graphics Devices

You can configure your system's printers for use with SCO Professional by running the **pconfig** utility. This utility specifies device drivers and capability files that control your printers' output. You can enhance the appearance of printed graphs by creating improved Pro-specific device drivers and capability files. The enhancements affect printing from within Professional and from the Professional Manager GraphPrint menu. This chapter explains how to use the **pconfig** utility, and how to add improved device drivers and capability files for your printers.

This chapter contains the following sections:

- "Describing pconfig" tells what the **pconfig** utility is and where it is located. It explains how you can use the **pconfig** utility to set up your printers for SCO Professional. It also tells how SCO Professional uses the printer definition files created by **pconfig.**

- "Describing Pro-specific Device Drivers" tells what these graphics drivers are and where to find them, as well as where you can look for a listing that compares the drivers. It describes the different categories of drivers listed and tells what their uses are.

- "Describing Character Graphics Capability Files" introduces the pcap files that SCO Professional uses to print graphs with character graphics. It tells where you can find the pcap files and lists the ones that SCO provides.

- "Before Using pconfig" explains the preparations you must make before configuring your printers.

- "Using pconfig" tells how to create printer definition files that help your system's printers produce the best possible hard copies of your worksheets and graphs.

- "Choosing Pro-specific Device Drivers" explains how to use the list of Pro-specific device drivers available for printers set up to print Professional output. It also tells how to add a new driver to the list.

- "Creating a New Character Graphics Capability File" describes how to create new pcap files to improve the appearance of printed graphs, especially graphs that consist of character graphics.

Describing pconfig

With the **pconfig** utility, you can create device definition files for a printer. Each definition file configures the printer so it can handle a specific type of data. Definition files can be used for other graphics devices, such as plotters, but for the purpose of this chapter, all such devices are referred to as printers.

The **pconfig** utility lets you define which Pro-specific drivers and capability files your printers use. Once you define a printing configuration with **pconfig**, it is available to all SCO Professional and Professional Manager users. An individual user may then specify the defined printing configuration as a personal default by using the menu command /Worksheet Global Default Printer Name-Select inside SCO Professional.

Each printer may have more than one definition file. Each definition file configures the printer to serve a particular purpose. As a result, one printer can do several different types of printing. For example, a single printer may have one definition as a text printer in normal mode, one definition as a text printer in sideways mode, and one definition as a graphics device. When the user selects a definition filename from the Print Printer Select menu before printing, SCO Professional calls on the appropriate definition file to print the data as needed. For more information on how to create these definition files, see the "Using pconfig" section later in this chapter.

The **pconfig** utility is located in the SCO Professional library directory */usr/lib/pro*. The device definition files you create with **pconfig** are in the directory */usr/lib/sco/printers*.

Describing Pro-specific Device Drivers

Pro-specific device drivers are the executable files that SCO Professional calls on to display or print output in special situations. These drivers serve mainly as filters, to interpret Professional graphs and spreadsheets for specific printers, plotters, or terminals.

Pro-specific drivers are not linked to the operating system kernel; these device drivers are only available to users when they are printing from SCO Professional or the Professional Manager.

Some Pro-specific device drivers allow you to use options on printers that improve graph appearance. They allow users to print bit-mapped graphs rather than character graphics, which are described in the next section. There are also drivers that show the text output of spreadsheets in landscape (sideways) mode on certain printers. To make these and other new drivers available to users, see "Choosing Pro-specific Device Drivers" later in this chapter.

The Pro-specific driver files are located in the directory *lusrlliblproldrivers*. A detailed list of the drivers that you can use with SCO Professional is located in the file *lusrlliblprolenglishluslldrivers*.

Describing Character Graphics Capability Files

Character graphics capability files help the user print clear and attractive hardcopy graphs from softcopy Professional graphs based on your spreadsheets. The graphics capability files, known as pcap files, provide adequate graph printing on many printers. The pcap files provided with SCO Professional are *default* and *laserjet*. If you have a printer that does not produce acceptable graphs using these pcap files, you can adapt the default *pcap* file. Use the method explained later in this chapter and in Chapter 5, "Creating Character Graphics" to create a new character graphics capability file that improves your printer's output.

Printer capability files are in the directory */usr/lib/pro/pcap*. Place any character graphics capability files you create in this directory also.

Before Using pconfig

Before you can use the printer configuration utility to configure your system's printers for printing with SCO Professional, you should understand UNIX system printer configuration. See the chapters on printers in your operating system's *System Administrator's Guide* for more information.

Use the following guidelines to make sure your system is ready to be configured for printing Professional files.

■ If possible, set up your system so printing is spooled. If your print requests go to a spooler program such as **lp**, they are kept in a queue until the printer is free to process them. The spooler prevents simultaneous print requests from jamming a printer or forcing users to wait.

■ Only use direct printing if there is no chance of two users sending print requests at the same time. For more information on different methods of printing, see your operating system's *System Administrator's Guide.*

■ Before using the **pconfig** utility to configure your system's printers for use with SCO Professional, test printing from the operating system prompt.

■ To test printing on a system with the *lp* spooler, print a text file with the **lp** command. For example, to print the message of the day, enter:

     lp /etc/motd

The message of the day will print out if the printing system is properly configured.

- To test direct printing, use the following command at your system prompt:

    cat /etc/motd >/dev/lp (or **tty***n* for serial printer)

    The message of the day will print out if the printing system is properly configured.

When you are sure printing works properly on the operating system level, you can configure printers for Professional.

Using pconfig

4

To run the **pconfig** utility, you must be logged in as *root*. Type **./pconfig** while in the directory */usr/lib/pro*. The utility presents you with the Main Configuration menu. From here, you can add, edit, or remove printer configuration files, or you can specify a default printer.

Creating and Editing Printer Definition Files

To create or edit a printer definition file, enter information in the **pconfig** form. Access this form in one of the following ways, depending on whether you are creating a completely new entry, creating an entry based on a copy of another one, or editing an existing entry:

- If you choose Add from the Main Configuration menu and then select New, the blank printer setup form appears. You can now create a new file by entering data as shown later in this chapter.

- If you choose Add from the Main Configuration menu and then choose Copy, you must select a file to copy for use as a template. Only select files that were created for Professional printing. See your administrative logs to determine which files these are. Move the cursor up and down with the cursor movement, ⟨Home⟩, or ⟨End⟩ keys, and press ⟨Return⟩ when your selection is highlighted. You can also type the first letter of the definition file you want to copy. The printer setup form appears, with information copied from the selected file. You can now enter a new name and edit the copied information as shown later in this chapter.

■ If you choose Edit from the Main Configuration menu, you must select the appropriate Professional printing file to edit, highlighting its name as described above and pressing ⟨Return⟩. The printer setup form appears, with the information of the selected file displayed.

Describing the Setup Form

The setup form is shown here:

```
                        Form Addition                              New

Enter name printer definition file


  Name:          [              ]
  Type:          [default        ]
  Description: [                                                        ]

  Destination: [Spooled]              Direct                Local
     Spooler: [           ] interface: [        ]  term: [           ]
     Options: [           ] device:    [        ]  tty:  [           ]
              [           ] baud:      [        ]
                           stty:       [                              ]

  Setup String: [                                                       ]
  Reset String: [                                                       ]

        [Text]                    Graphics              Disable
  Sideways:     [N]
  Driver:     [           ]    Driver:  [           ]
  Options:    [           ]    Options: [           ]
```

It is on this form that you enter or edit all of the necessary configuration data for your printer. Each choice on the form is described in detail on the following pages. To move around the screen, use the cursor movement, ⟨Home⟩, and ⟨End⟩ keys. To enter data in a field, simply type it, then press ⟨Return⟩ to move on to the next field. In some fields, data entry is mandatory before proceeding to the next field. To exit the setup form without accepting any changes or additions you have made while editing it, press ⟨Esc⟩.

The program starts in Insert mode. Any characters that you type move existing characters to the right of the newly entered information. To enter

Overstrike mode to overwrite existing data, press ⟨Ctrl⟩v. An indicator at the top of the screen now displays Ovr. Any data that you enter now overwrites existing data. Press ⟨Ctrl⟩v again to return to Insert mode.

The context indicator, located in the upper right-hand corner of the screen, indicates what **pconfig** is currently doing. This indicator displays various messages depending on the program's current status.

The fields of the printer setup form are in four sections. The top or primary section defines and describes the printer you are configuring. The next section defines the type of printer destination. The third section is for setup and reset strings. The fourth section deals with Pro-specific printer drivers.

4

Primary Setup Fields

Name: Enter a name of up to 15 characters. Any name can be used. This is the name of the definition file that is located in */usr/lib/sco/printers*. It is also the name displayed to users when they select /Print Printer Select while in SCO Professional. If you enter the name of an existing file, a pop-up window appears. Type **Y** to overwrite the existing file or **N** to enter a new name.

Type: Use this field to select a pcap file. Each pcap file defines a set of character graphics capabilities. The character graphics files supplied with SCO Professional are *default* and *laserjet*; you can also define your own, as described in Chapter 5, "Configuring Character Graphics". Press ⟨F3⟩ for a list of available capability files. Select one of the files by moving the highlight and pressing ⟨Return⟩. Select or enter **default** unless you are setting up a laserjet printer for printing character graphics. If choosing the default file does not result in adequate printing of character (non-bit-mapped) graphics, see the section "Creating a New Character Graphics Capability File" later in this chapter.

Description: Enter a short (up to 60 characters) description of the printer, one which is recognizable to the users of SCO Professional. This description appears when a user highlights a printer choice in the /Print Printer Select menu.

Destination: Your next choice is to send the output either to a spooler, to a direct device, or to a local device. If you choose Spooled, SCO Professional output is sent to the designated spooler. If you choose Direct, output is sent

directly to the designated device. Do not make this choice unless you are sure the printer cannot receive another user's print request at the same time as yours. Simultaneous requests to the same printer in the multiuser environment can result in data loss or printer malfunction. If you choose Local, output is sent to a printer connected directly to your terminal. The next three sections describe how to fill the fields for the three destination choices.

Spooled Setup Fields

Spooler: Enter the name of the appropriate spooler. The name is the same as the standard print command you give at the system prompt. For example, enter **lp** or **lpr**, depending on the print command you use. Refer to you operating system's *System Administrator's Guide* for information on setting up the **lp** and **lpr** spoolers.

Options: Enter any appropriate spooler options in the form *-option* just as you would if entering a print command from the system prompt. For example, the option **-d***printername* sends spooled output to a non-default printer. If you use a printer that has a landscape option in the interface script, and you want to configure a definition file for it, enter the option in this field. For example, if you have an HP Laserjet with the landscape option, enter **-ol** in the "Options" field.

Consult your operating system's *User's Reference* for more information on interface scripts, spooler names, and options.

Direct Setup Fields

Interface: Select Parallel from the pop-up window if the device is a parallel device or Serial if it is a serial device.

Device: Enter the full pathname of the port that the printer is connected to, in the form */dev/name*; for example, a serial port might be **/dev/tty1a.** A parallel port might have the pathname */dev/lp0*. For more information on these pathnames, see the printing chapter of your operating system's *Administrator's Guide.*

Baud: Enter the baud rate at which output is sent to the direct device. The default rate is 9600. For more information on baud rates, see the printing chapter of your operating system's *Administrator's Guide.*

stty: Enter any appropriate stty settings. For example, the setting **ixon ixoff** indicates the handshake mode of the printer. See **stty**(C) in your operating system's *User's Reference* for the available settings.

Consult your terminal and printer documentation for more information on baud rate and stty settings.

Local Setup Fields

Term: Enter the TERM environment variable of the local printer. If you are logged in to the terminal that is connected to the local printer, you can learn the TERM value by entering **env** at your system prompt.

tty: This is the port of the terminal that the printer is attached to. Enter **who** at the system prompt to see the terminal's tty setting. Use the full pathname of the tty in this field; for example, enter **/dev/tty1a** if your terminal is connected to the tty1a port.

4

If your terminal must be set in a special mode (such as transparent print) to send data to the printer instead of to the screen, enter the sequences to toggle this print mode for your terminal type in the Set-Up and Reset String fields, as described in the next section.

Setup and Reset Strings

If you want to include special font, point size, overstriking, or other initialization and de-initialization strings, enter this information in the "Setup String" and "Reset String" fields of the form. For information on these strings, see your printer's documentation. Also use these fields to enter the sequences that turn any local print mode on and off if you are doing local printing and your terminal requires the setting.

If you want to do landscape printing and do not have a printer that works with the spooler's landscape option as described in the "Spooled Setup Fields" section, you might be able to invoke landscape printing on your printer with a setup string. Consult your printer documentation to see if this option is offered.

Setup String: Enter a setup string in the form *\setup string*. For example, entering the setup string **\015** puts some printers into overstrike mode.

Reset String: Enter a reset string in the form \reset string. For example, entering the reset string \016 returns some printers from overstrike mode.

Non-printable characters must be represented as three-digit octal values preceded by a backslash. For example:

    ESC- [A

This should be represented as:

    \033[A

See Appendix D in the *SCO Professional User's Guide* for a listing of ASCII characters and their corresponding octal values.

Your next choice concerns Pro-specific device drivers. You can select a text driver or a graphics driver, or you can disable the configured driver. Select Text to configure a driver for printing worksheets, Graphics to configure a driver for printing either bit-mapped or character graphs, and Disable to make a defined driver temporarily unavailable to SCO Professional users. Use this Disable option if a printer you have defined is out of service for repair or maintenance.

Text Driver Setup Fields

Sideways: Press the space bar to toggle the sideways (landscape) printing indicator between Y (print text sideways) and N (do not print sideways). If you choose yes, you must enter a driver name. If your printer is spooled and has a sideways or landscape option such as -ol, or if you have specified sideways or landscape printing with setup and reset strings, do *not* try to define that option in this field. Configure it in the Spooler option field, as described in the "Spooled Setup Fields" section earlier in this chapter.

Driver: Enter the sideways driver name. For a list of available driver names, press ⟨F3⟩. The sideways drivers included with SCO Professional are *epsonfx* for the Epson FX printer and *hppaint* for the HP Paintjet printer. You cannot print graphs sideways using these drivers; they are only for text.

Options: Enter any available driver options in the form *-option*. Press ⟨F3⟩ for a list of available options.

Graphics Setup Fields

Driver: Enter the graphics driver name. For a list of available driver names, press ⟨F3⟩. Refer to Appendix B of this guide for descriptions of these drivers.

Options: Enter any desired graphics driver options in the form *-option*. For example, to switch to the alternate color palette on a device using the **hppaint** driver, enter the option **-c**. Press ⟨F3⟩ for a list of available options. These options are described in Appendix B.

Quitting Add or Edit

Once you have made all changes, press ⟨Ctrl⟩x to record the changes, or move to the bottom of the screen and press ⟨Return⟩. To exit from the printer setup form and delete all the changes or additions you have made by editing the data, press ⟨Esc⟩.

Removing Entries

To remove a text printer or graphics device from the list of devices available for use within SCO Professional, select **Remove** from the Main Configuration menu. Highlight the device you want to remove. Press ⟨Return⟩. Type **Y** to confirm or **N** to cancel the removal. You now return to the Main **pconfig** menu.

You cannot remove the printer selected as the system's default. To take the default printer out of service, you must first select another default printer by using the process described in the next section; then remove the previously designated default printer. You cannot remove the *lp* printer, though, even if it is not the default.

Choosing a Default Printer or Graphics Device

To choose a default printer or graphics device for your users' SCO Professional sessions, select Default from the Main Configuration menu. Next, select Text or Graphics. Text specifies the default for your /Print Printer sessions, while Graphics specifies the default for your /Graph Print or Professional Manager GraphPrint sessions. Highlight the printer or graphics device that you want to serve as your SCO Professional default device. Press ⟨Return⟩. The default device is highlighted at the top of your screen, and you are returned to the Main Configuration menu.

The default printer for SCO Professional can be assigned in several places. If the default printer is named in more than one location, SCO Professional looks for it in three places, in this order:

- *$HOME/.pro2cnf*

- *$HOME/.defprint*

- */usr/lib/sco/printers/.defprint*

If, in using the /Worksheet Global Default Printer Name-Select command, you have specified a personal default printer, SCO Professional looks for it in the *.pro2cnf* file in your home directory. If no default printer has been specified, SCO Professional searches the *.defprint* file in your home directory. If you have not created a *.defprint* file in your home directory, SCO Professional looks for the system default printer that is specified in the *.defprint* file in the directory */usr/lib/sco/printers*.

Quitting pconfig

When you finish configuring your printers and graphics devices, select Quit from the Main pconfig menu. Select Y to quit pconfig, N to remain in the program.

Choosing Pro-specific Device Drivers

SCO Professional supports a number of graphics drivers, which are listed along with their associated options in the file */usr/lib/pro/english/us/drivers*. The drivers themselves are in */usr/lib/pro/drivers*. These drivers are not kernel-linked operating system device drivers, but rather drivers created specifically for enhancing the printed appearance of Professional output. Compare the characteristics of the drivers by viewing the *drivers* file. Create a driver if you cannot find an existing one that meets your SCO Professional printing needs.

Comparing Existing Drivers

4

If you are trying to get improved graphic printing and are considering the addition of a new device driver file, first look at the *drivers* file to make sure an adequate driver does not already exist.

Here is a portion of that file:

```
G, hpaint, -1,   Produces 180 dpi output (default is 90dbi)
G, hpaint, -c,   Switch color palette
G, hpaint, -B,   Uses Block font
G, hpaint, -C,   Uses Courier font
G, hpaint, -n,   Don't fill bars with patterns
```

There are four fields of data for each driver. The first field indicates the category of graphics driver listed. A **G** indicates regular graphics, and **S** indicates sideways printing, although this applies only to text; graphs still print in profile mode with **S** drivers.

The second field indicates the name of the driver. These names are displayed in the pop-up menu for the "Driver" field in the Graphics section of the **pconfig** setup form. The *hpaint* driver in the sample above is a driver for an HP Paintjet printer.

The third field lists driver options. Each driver option must be on its own line. For example, the *hppaint* driver above has five associated driver options. Each option listed here becomes available to the user if you specify it in the Options field of the Graphics drivers section of the **pconfig** setup form.

The fourth field is a brief description of the driver option shown in the third field. Refer to Appendix B for more information on the options.

Each field is separated by a comma. In the case of an empty field, a comma is used as a separator.

Adding New or Copied Drivers

If you cannot find a driver and option in the *drivers* file to suit your printing needs, you can create a new driver. For more information and the location of examples, see the "Writing Additional Graphics Drivers" section in Appendix B. Once you have created a driver, use the following procedure to provide a new driver choice in the **pconfig** form.

First copy the new driver into the */usr/lib/pro/drivers* directory. Then edit the file */usr/lib/pro/english/us/drivers* to include a line containing the driver you are adding. Make sure you follow the format described in the previous section, adding a separate listing for each option of the driver.

SCO Professional outputs graphs in the form of CGMs (Computer Graphics Metafiles). Any driver that can interpret a CGM can be used to print Professional graphics, as long as it is compatible with SCO Professional and your printer.

Creating a New Character Graphics Capability File

SCO Professional uses the information in pcap files in conjunction with the **char** driver to print character graphics. If you have a printer that is capable of printing character graphics, but for which there is no pcap file, you can copy an existing pcap file and edit it to reflect the capability codes for your printer. Then use **pconfig** to make a printer definition file that makes use of the new *pcap* file.

For example, to make a custom print driver for a Diablo printer:

1. Copy the file */usr/lib/pro/pcap/default* to a file named */usr/lib/pro/pcap/diablo*.

2. Create and edit a "((GRAPHICS-diablo" section in the new file. See Chapter 5, "Configuring Character Graphics," for information on editing the file.

3. Use the **pconfig** utility to create a new entry specifying **diablo-graphics** as the printer name, **diablo** as the driver type, and **char** as the graphics driver.

Users see the new printer when they select /Print Printer Select when using SCO Professional. They can use this printer to print enhanced character graphics.

≡ Chapter 5

Configuring Character Graphics

5

Configuring Character Graphics

There are two methods of displaying or printing graphics such as the graphs used to represent data in SCO Professional worksheets. The graphics can be bitmapped or character based.

Bitmapped graphics are dependent upon device-specific drivers. If there is a driver for the display or printing device you are using, bitmapped graphics appear as clearly defined images. See Appendix B to determine whether there is a driver for your device.

Character based graphics use the "char" driver and device-specific pcap files. They provide an ASCII representation of your graphics images. All supported devices such such as printers, terminals, and consoles can use character based graphics.

SCO Professional supports a wide variety of character graphics capabilities, such as colors, symbols, and textures, depending on the capabilities of your terminals and printers. The output sequences used to display these graphics are located in terminal- and printer-specific graphics files, and they can be changed easily with most editors or with the **tconfig** utility described in Chapter 3, "Defining Terminal Capabilities." If you edit these files, you can enhance the appearance of SCO Professional graphs by changing their color, defining sequences that mimic graphics characters if you do not have a graphics terminal, and adding "textures" to your displays.

This chapter explains what graphics capability files are and how to create and edit them. It lists the entries and gives suggestions for improving graphs.

This chapter contains the following sections:

- ■ "Graphics Capability Files" tells what these files are and where they are located. It explains how to create new graphics files and how to edit the files. It gives a sample listing of a file for reference when creating or editing a new file.

- "Graphics Entry Format" tells what forms the entries appear in; samples are given for literal strings, nonprinting strings, and characters outside the displayable ASCII range.

- "Graphics Entry Definitions" lists descriptions of the different types of entries in graphics capability files.

- "Suggestions for Enhancing Character Graphics" explains how to make improvements in the appearance of graphs by using special texture characters, colors, and overstriking.

Graphics Capability Files

SCO Professional contains several default graphics files that you can copy and edit to reflect the capabilities of your system's terminals and printers. The file */usr/lib/sco/tcap/generic/graph.pro* is the default terminal graphics capability file; the default printer graphics capability file is */usr/lib/pro/pcap/default*. Each file contains ((GRAPHICS sections that are described in full later in this chapter.

Creating New Graphics Files

To create a terminal-specific graphics file for use by all users with that terminal type, use the operating system command **mkdir** to create a directory with the same name as your TERM type under the directory */usr/lib/sco/tcap*; then copy */usr/lib/sco/tcap/generic/graph.pro* into that directory. Edit the new *graph.pro* file as described in the following sections, or use the **tconfig** utility as described in Chapter 3, "Defining Terminal Capabilities."

You can also create terminal graphics files for individual users. Do this by creating the files and directories as already explained, and then placing them under *$HOME/.tcap* instead of under *$SCOLIB/tcap*.

To create a printer-specific graphics file for use by the whole system, copy */usr/lib/pro/pcap/default* to a file with the name of your printer type in the */usr/lib/pro/pcap* directory. Edit the file as described in the following sections.

Editing New Graphics Files

Each new file you create consists of a ((GRAPHICS section. Each ((GRAPHICS section contains three columns; the first column lists the number of the entry, the second column lists the current value for the entry, and the third column lists optional comments. For full definitions of the entries, see "Graphics Entry Definitions" later in this chapter.

Here is a portion of the ((GRAPHICS section for the ANSI terminal type. Refer to this example when reading this section and when viewing the tables found later in this chapter.

```
((GRAPHICS-ansi
g00          'ibmcons char'   Driver Invocation
g01          \E[12m           Graphics Begin
g02          \E[10m           Graphics End
g03          ' '              Graph Space
g04          '?'              Upper Right
g05          'Z'              Upper Left
g06          '@'              Lower Left
g07          'Y'              Lower Right
g08          'A'              Up Tick
g09          'B'              Down Tick
g10          'D'              Horizontal
g11          '3'              Vertical
g12          'C'              Right Tick
g13          '4'              Left Tick
.
.
g40          \E[10m           Graphics deinit
))
```

Each ((GRAPHICS section consists of a line defining the terminal or print-
er type, in this case ((GRAPHICS-ansi, followed by one or more lines of
entries. The section ends with two right parentheses,)), on a separate line at
the left edge of the screen.

The first step in editing your new file is to add the appropriate terminal or
printer name to the ((GRAPHICS section heading. Make sure that the name
you use matches that of the TERM environment variable that you use. The
next step in editing is to define each graphics entry, based on the format
and descriptions found in the following sections.

Graphics Entry Format

Each entry consists of output sequences that tell the terminal or printer how to draw line segments or change colors. Each graphics entry in the ANSI example consists of the entry number followed by the actual entry and an optional comment. For definitions of the entry numbers, see the "Graphics Entry Definitions" section later in this chapter.

Literal Strings in Graphics Entries

When literal strings are used in an entry, they are surrounded by single right quotation marks ('). A literal string is a series of characters you want to see displayed. For example, the entry for g14, graphics cross, could consist of the literal string +:

```
g14   '+'
```

To include single quotes in a literal string, precede them with a backslash (\\).

Nonprinting Strings in Graphics Entries

Nonprinting characters are those that are not displayed, such as escape and control characters, or those characters which, when the terminal is in graphics mode, display the desired graphics colors, textures, or line segments. Because most terminals use the escape character to begin sequences, \E is used as a shorthand. An example of a nonprinting character entry is:

```
g02 \E[12
```

5

Entering Characters Out of ASCII Range

The *graph.pro* file provides a syntax for entering characters falling below or above the displayable ASCII range, such as control characters (ASCII 1-31) and 8-bit characters (ASCII 128-255). To enter these characters, determine their octal value and precede that value with a backslash (\). For example, to enter the control character ⟨Ctrl⟩C, convert its ASCII value (3) to its octal value (003); then precede that value with a backslash (\003). You can learn the octal code for any ASCII character from the table in Appendix C of the *User's Guide*.

Before editing any of these entries, make sure that you have a manual that fully describes your terminal or printer and its graphics control sequences. Using the table at the end of this chapter and your hardware documentation as a guide, change the entries of your new file to correspond to the output sequences of your terminal or printer as listed in its manual. If the device cannot perform a capability listed in the ((GRAPHICS section, leave that entry blank.

Graphics Entry Definitions

The driver invocation entry specifies which driver sends graphics sequences to your terminal:

Driver Invocation		
Entry#	**Req?**	**Description**
g00	Y	Shell command line to invoke driver.

The graphics control sequence entries contain all line segments necessary to create bar graphs:

Graphics Control Sequences		
Entry#	**Req?**	**Description**
g01	Y	Starts graphics mode.
g02	Y	Ends graphics mode.
g03	Y	Code for a blank space when in graphics mode.
g04	Y	Graphics line segment for an upper right comer.
g05	Y	Upper left comer.
g06	Y	Lower left comer.
g07	Y	Lower right comer.
g08	Y	Horizontal line segment with an up tick.
g09	Y	Horizontal line segment with a down tick.
g10	Y	Horizontal line segment.
g11	Y	Vertical line segment.
g12	Y	Vertical line segment with a right tick.
g13	Y	Vertical line segment with a left tick.
g14	Y	Vertical line segment crossing a horizontal line.

5

The fill texture entries control the "texture," or "look," of the inside of a bar in a graph.

Fill Textures		
Entry#	**Req?**	**Description**
g15	Y	Texture 1. Fills bars in "A" range of a graph.
g16	N	Texture 2. Fills bars in "B" range of a graph.
g17	N	Texture 3. Fills bars in "C" range of a graph.
g18	N	Texture 4. Fills bars in "D" range of a graph.
g19	N	Texture 5. Fills bars in "E" range of a graph.
g20	N	Texture 6. Fills bars in "F" range of a graph.

The color controls initialize and de-initialize specific colors for various ranges of your graph:

Color Controls		
Entry#	**Req?**	**Description**
g21	N	Start color 1. Corresponds to "A" range of graph.
g22	N	Start color 2. Corresponds to "B" range of graph.
g23	N	Start color 3. Corresponds to "C" range of graph.
g24	N	Start color 4. Corresponds to "D" range of graph.
g25	N	Start color 5. Corresponds to "E" range of graph.
g26	N	Start color 6. Corresponds to "F" range of graph.
g27	N	End color 1.
g28	N	End color 2.
g29	N	End color 3.
g30	N	End color 4.
g31	N	End color 5.
g32	N	End color 6.

The symbol indicators allow you to set specific symbols for various data-points and legends on your graph:

Symbol Indicators		
Entry#	Req?	Description
g33	Y	Symbol 1. Used when graph "A" range symbol drawn.
g34	Y	Symbol 2. Used when graph "B" range symbol drawn.
g35	Y	Symbol 3. Used when graph "C" range symbol drawn.
g36	Y	Symbol 4. Used when graph "D" range symbol drawn.
g37	Y	Symbol 5. Used when graph "E" range symbol drawn.
g38	Y	Symbol 6. Used when graph "F" range symbol drawn.

The initialization and de-initialization entries place your terminal in graph-ics mode before displaying a graph, and they take you out of graphics mode after viewing your graph:

5

Initialization and De-initialization		
Entry#	Req?	Description
g39	N	Graphics initialization issued before output.
g40	N	Graphics de-initialization issued after output.

The printer specifications entries define the number of lines and columns your printer outputs. These appear only in printer sections; they are not necessary in tcap files:

Printer Specifications		
Entry#	Req?	Description
g41	N	Number of vertical lines of printer output.
g42	N	Number of horizontal columns of printer output.

Suggestions for Enhancing Character Graphics

To create hollow bars in bar graphs, use spaces for the texture descriptions (g15 - g20).

If your terminal supports foreground and background color, try setting combinations of both in the color-start sequences (g21 - g26). Setting the foreground and background colors to the same color yields solid bars without outlines.

If your printer has no graphics capabilities but allows overstriking, you can build graphics line segments with combinations of overstruck text characters. These are created by entries that consist of alternating literal characters and backspace characters. For instance, by combining a vertical bar (|) and a dash (-), you can create a suitable sequence for entry number g14 (graphics cross):

```
g14 '|' \010 '-'
```

On most printers, \010 is the octal code for backspace.

☰ Chapter 6

Troubleshooting Configuration Issues

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Troubleshooting Configuration Issues

SCO Professional operates in various environments and with different kinds of terminals, printers, and graphics devices. Sometimes, after you configure SCO Professional, you may encounter errors when attempting to run the program. Or, you may find situations where SCO Professional does not function as intended. Many of these problems are caused by incomplete or inappropriate software configuration, or hardware incompatibility.

This chapter covers some common configuration difficulties, including detailed descriptions and possible solutions. This information is presented in a question-and-answer format with an emphasis on procedure-based explanations. The proposed solution may include a reference to another chapter in this guide, where the issue is discussed in greater detail.

This chapter contains the following sections:

6

- ■ "Before Calling Support" explains effective troubleshooting and tells how to collect critical data about a problem before contacting SCO Support.

- ■ "Terminal Issues" provides solutions to various terminal difficulties, such as the standout (highlighting) or magic cookie (attribute byte) glitch, using an incompatible terminal, keystroke problems, and display problems.

- ■ "Printing Issues" explains how to make the best possible use of your printer in landscape (sideways) and other special modes, and provides solutions to printing difficulties such as lost stty settings and scrambled graphs.

Before Calling Support

If you encounter a problem that is not dealt with in this chapter, please refer to the question-and-answer section of the *SCO Professional Release Notes*, the appropriate chapter of this guide, or the *SCO Professional User's Guide*.

If you are unable to find a solution to your problem in the documentation, use the following checklist to pinpoint the problem before calling SCO support.

- Recreate and record the events that caused the problem, in chronological order. If possible, determine what you did before the problem occurred, especially if you changed the configuration of your hardware or software.

- If you need to send sample files to SCO support, determine and record the names of the files you were using at the time the problem occurred. If you were using a large spreadsheet file, determine, if possible, the specific range of cells affected by the problem. The less time support has to spend hunting for the cause of the problem, the sooner you will get a solution.

- Determine and record the version of SCO Professional that you are using, as well as the version of your operating system. You can read the version number from the copyright screen displayed at startup. To see the full version and release number of SCO Professional as it is recorded on your system, enter:

    grep rel= /etc/perms/pro

    To learn the full release number of the operating system, enter:

    grep rel= /etc/perms/rtsmd

    If **grep** cannot open *rtsmd,* enter:

    grep rel= /etc/perms/inst

    If you are using SCO Open Desktop (ODT), list the release number of the entire ODT bundle of software.

- Determine and record the make and model of your computer, and the make and model of your terminal. Determine the make and model of any other relevant hardware and software, such as your

SCO Professional Configuration Guide

printer, network cabling and adapters, network software, hard disk, multiport cards, and other software in use.

■ If you have printing problems while using SCO Professional, try printing a text file from the operating system prompt. If you are having trouble with local printing, try printing in Professional from the system console. Log in as *root* and attempt to print your Professional data. If your terminal is connected to a smart card, try connecting it to the COM port and printing; if this works, try turning off the smart card features that are affecting printing. Record the results of these tests.

When you call SCO support, keep the information you have collected and this guide with you. If possible, prepare your system so you can recreate the problem quickly while explaining it over the telephone.

Terminal Issues

This section covers several of the most common problems encountered when using SCO Professional on various terminals and offers possible solutions.

6

Eliminating the Standout Glitch

Q: Why do I get the following message when I try to run SCO Professional on certain terminals?

```
Pro will not run with terminfo descriptor
xmc (magic cookie glitch)
```

A: Some terminals require one or more character positions on the screen to indicate the start and end of highlighting or standout mode. The character positions are known as attribute bytes, or magic cookies. The number of character positions needed to start and end standout mode is specified by the numeric terminfo descriptor xmc#. Currently, SCO Professional does not support terminals that use attribute bytes. If the bytes were accepted, worksheet columns would not line up correctly on your screen.

Many terminals can emulate more than one terminal type. If you have a terminal with the standout or magic cookie glitch, check your terminal documentation to see if your terminal can emulate a supported terminal type that does not require an attribute byte. Change the TERM environment variable setting to this new terminal type. Use the **tset** command to actuate the new terminal settings. See Chapter 2, "Creating a Custom Environment," for more information.

The Wyse 30, 50, and 350 terminals generally use an attribute byte and, therefore, would not be supported. However, all three terminals have a "protected mode" that can be used instead. Install the terminfo files supplied with SCO Professional. They include the protected mode capabilities for the Wyse 30, 50 and 350 terminals instead of the xmc (magic cookie glitch) descriptor.

To ensure that your terminal is in protected mode, set the WPRT(write protect) INTENSITY operating parameter in setup mode to **normal** and the WPRT REVERSE parameter to **on.** Consult your terminal documentation for complete instructions on how to modify the operating parameters.

If there is no terminfo file without magic cookies for your terminal, and you have experience working with termcap or terminfo, you can edit your terminfo file as described in Chapter 3, "Defining Terminal Capabilities." Delete the **xmc#** capability, then define the **smso** and **rmso** l capab to turn a standout mode such as reverse video on and off. You might have to change the **sgr** capability if it sets this mode too. Compile the edited source file with the **tic** utility. Then make sure the "protected" setting in your terminal's internal configuration is set to reverse video. See your terminal's documentation for more information.

Terminal Initialization Fails

Q: Why do I receive the message `Terminal Initialization Failed` when I try to run SCO Professional?

A: SCO Professional is reading your TERM environment variable and searching for a corresponding terminfo file. When you are shown the error message above, it means that SCO Professional did not find a file corresponding to your TERM type.

Check that your TERM variable was set correctly, and determine which terminfo file SCO Professional is reading. Enter:

echo $TERM; echo $TERMINFO

The system returns your current terminal type and terminfo file. If the TERMINFO variable is undefined, the default location of the files is in use. This default is the directory */usr/lib/terminfo*. Look in the terminfo directory for a subdirectory named for the first letter of your terminal type, then look in that subdirectory for your terminal's terminfo file.

6

If no terminfo file exists for your terminal type, do one of the following procedures:

- Change your TERM variable to that of a terminal listed in your terminfo directory. This terminal should have the same capabilities as the one you are using. It may also be necessary to go into your terminal's setup mode to change the personality or emulation of your terminal to that of the new TERM type.

- Adapt an existing terminfo file, adding missing functions as needed with the **tconfig** utility.

- Create a terminfo file from a termcap entry, using the **captoinfo** utility.

- Create a terminfo file for your terminal type, if you are familiar with terminal capabilities and the syntax and format of terminfo entries.

For more information on terminfo files and how to create and use them, see Chapter 3 of this guide.

Function Key Mapping Incomplete

Q: Why do I receive the message Function Key Mapping Incomplete when I try to run SCO Professional?

A: SCO Professional did not have enough room to load the escape codes necessary to access all of your terminal's keys. This situation occurs when you invoke a string mapping utility such as **mapstr** with a file other than */usr/lib/keyboard/strings*. This invocation may have to do with other applications used on your system.

Edit the shell scripts */usr/bin/pro* and */usr/bin/procalc* to contain the command **mapstr** as the first line. This command sets the keyboard to the default escape codes by using */usr/lib/keyboard/strings*.

Backspace Fails in Edit Mode

Q: Why does the ⟨Bksp⟩ key not work while I am in EDIT mode in SCO Professional?

A: On some terminals, such as the Wyse 60, Televideo 912, and others, both the ⟨Left Arrow⟩ key and ⟨Bksp⟩ key send the same sequence, ⟨Ctrl⟩**h**, to SCO Professional. In SCO Professional, unlike some other applications, the ⟨Left Arrow⟩ and ⟨Bksp⟩ keys perform different functions. Therefore, SCO Professional requires two different sequences to perform these functions.

SCO Professional was preconfigured to handle this conflict. The sequence ⟨Ctrl⟩**b** is accepted as the backspace command in EDIT mode, because the default backspace sequence, ⟨Ctrl⟩**h**, is used by the ⟨Left Arrow⟩.

If you are having this problem with a Wyse 60 or Wyse 150 terminal and do not want to use ⟨Ctrl⟩**b** for backspace, change the TERM environment variable. Use the *wy60ak* and the *wy150ak* terminfo

files, which specify the 〈Left Arrow〉 key with a different sequence from the 〈Bksp〉 key. It is best to change the TERM variable at login rather than during an SCO Professional session. You should at least exit SCO Professional and use the **tset** command to actuate the new terminal settings, then source your login file.

If you use the Bourne shell (for example, if your prompt is a "$"), then enter:

. **$HOME/.profile**

If you use the C shell (for example, if your prompt is a "%"), enter **source .login** at the prompt. For more information on changing environment variables, see Chapter 2, "Creating a Custom Environment."

Arrow Keys Do Not Work

6

Q: Why do the arrow keys (or other defined keys) not work correctly in SCO Professional, but they do work in other applications?

A: Some applications use special utilities such as **mapstr** or special terminfo files to initialize your terminal for use within that particular application. These applications may not reset the capabilities to their previous state upon exiting. In this case, SCO Professional does not function correctly.

Edit the top of the shell scripts /usr/bin/pro and /usr/bin/procalc to reflect the terminfo files and other capabilities to be used by SCO Professional. For example, you might enter:

mapstr /usr/lib/keyboard/strings

For more information on the **mapstr** command, see "Function Key Mapping Incomplete" earlier in this section. If you have a TERMINFO variable setting other than the default, enter it in your startup shell script too. For more information on setting the correct TERMINFO environment variable, see Chapter 2, "Creating a Custom Environment," in this guide.

Graphics Displayed in Character Mode

Q: When I view a graph, why does SCO Professional display vertical lines as x's and horizontal lines as q's?

A: Some terminals, such as the vt100, need a graphics start and graphics end sequence to display graphs correctly. Without these sequences, specified as g01 (graphics start) and g02 (graphics end), these terminals print all graphics characters in character mode.

Determine the correct graphics start and end sequences by reading your terminal's documentation. Use the /Configuration Terminal Graphics menu option in the Professional Manager to modify these sequences. Specify the correct graphics start (g01) and graphics end (g02) entries. See the "Using tconfig to Add a Function Key" section of Chapter 3, "Defining Terminal Capabilities," for more information.

This adaptation works only if the terminfo file for your terminal type contains the necessary capability codes for starting and ending the use of an alternate character set (**smacs** and **rmacs**).

High Resolution Graphics Display

Q: What graphics display capabilities do I have if I am using a graphics card for my monochrome console?

A: SCO Professional supports a number of graphics adapters. The Professional graphs displayed on terminals controlled by all of these adapters are more clear and detailed than character graphics. However, graphics adapters that have high resolution capabilities, such as the EGA (Enhanced Graphics Adapter), VGA (Video Graphics Array), and higher resolution adapters are supported in CGA (Color/Graphics Adapter) mode only. Therefore, the graphs you view while using SCO Professional may appear to be less detailed than graphics created by other applications.

If you want to see Professional graphs in higher resolution modes, you can obtain an X terminal or console and run Professional in an **xterm** window. This not only improves the graphics display, but allows you to view a graph in one window while manipulating the pertinent spreadsheet in a second window. See "Viewing Your Graph" in Chapter 9, "Creating Graphs," of the *SCO Professional User's Guide.*

Turning Off Color or Shading

Q: How can I turn off the colors on my terminal while using SCO Professional?

A: If you are not satisfied with the appearance of SCO Professional in color, invoke the program with the -M or monochrome option. For example, to use Professional in monochrome mode on a color terminal, enter the following command:

procalc -M

The spreadsheet appears in monochrome mode.

6

If you are using a monochrome console with the TERM environment variable set to read a color terminfo file, you might notice numerous shading variations in your monochrome displays of spreadsheets and graphs. To eliminate this extra shading, invoke SCO Professional with the -M flag. Your spreadsheets and graphs appear in standard monochrome mode.

Turning Off the Clock Display for All Users

Q: How can I turn off the clock display for all users of SCO Professional?

A: SCO Professional provides a way for individual users to turn off the time and date display that appear at the bottom of the worksheet. To remove the display and make the bottom line available for worksheet data, you can select the /Worksheet Global Default Other Clock None command. You must update the defaults file, *.pro2cnf,* to keep this change in effect for future sessions of SCO Professional.

To turn off the clock display for all users, the system administrator must make a personal configuration file that turns the clock off and move it to the *$PROLIB* directory. Use the following procedure to complete this task.

1. Log in as a user who has no *.pro2cnf* file. This ensures that the *.pro2cnf* file you create reflects all the system defaults.

2. Start SCO Professional with the **procalc** command.

3. Select the /Worksheet Global Default Other Clock None command. The clock display disappears from the worksheet window.

4. Select the /Worksheet Global Default Update command. This creates a new *.pro2cnf* file in the user's home directory. The file has all of the system defaults and the clock display is turned off.

5. Quit Professional.

6. Switch to root or superuser and move the newly created *.pro2cnf* file to the *$PROLIB* directory.

This procedure turns off the clock display for all sessions of SCO Professional, unless a user has a personal *.pro2cnf* file that does not turn the clock display off. For more information on personal settings of the clock display, see "Configuring the Worksheet Clock" in Chapter 5, "Changing the Worksheet Format," of the *SCO Professional User's Guide*.

Printing Issues

This section covers several of the most common difficulties encountered when printing SCO Professional spreadsheets and graphs on various printers and offers possible solutions to the problems.

Landscape or Sideways Printing

Q: How do I set up my printer to print graphs and worksheets in landscape or sideways mode?

A: SCO Professional provides several ways to achieve landscape or sideways printing. Keep in mind that you cannot print bit-mapped graphs sideways with any of these methods.

■ If you are using spooled printing and have a printer that provides a landscape mode, enter the **-ol** flag in the "Options" field under the Spooled destination.

■ If you are not using spooled printing, see if your printer can be put into landscape mode with setup and reset strings. Enter the strings in the appropriate fields on the **pconfig** form.

■ If you have an Epsonfx, Hp Paintjet, or compatible printer, you can print text, such as worksheets, in landscape mode. Choose the Text driver category at the bottom of the **pconfig** form, and select Yes (Y) in the "Sideways" field. Then select the driver, **epsonfx** or **hppaint,** that is suitable for your printer. Keep in mind that you cannot print graphs with this driver.

For more information on these sideways printing methods, see Chapter 4, "Setting Up Your Printers and Graphics Devices."

Printing over a Network

Q: Why are my bit-mapped graphs scrambled when I try to print them on a laserjet printer over a network?

A: Some network software remove the eighth bit from 8-bit transmissions. Because bit-mapped graphics sent by SCO Professional require 8 bits, the graphics are corrupted when they arrive at the printer. This is a network issue rather than a problem with SCO Professional.

If you cannot prevent the network from removing the eighth bit, SCO Professional offers a way to print graphs with character graphics. Select the *char* driver in the "Graphics" driver field at the bottom of the **pconfig** form. If the appearance of the printed graphs is not satisfactory, you can change the "Type" field entry from **default** to **laserjet.**

For more information on this configuration, see Chapter 4, "Setting Up Your Printers and Graphics Devices."

Setup and Reset Strings

Q: How do I use setup and reset strings for printing with SCO Professional?

A: You can use character strings to set up your printer for special printing modes such as condensed print or boldface. First, learn the correct setup and reset strings from your printer documentation. Then, enter the strings in the correct form, depending on whether they are embedded in the worksheet, specified in a printer setup menu option, or specified in the **pconfig** form.

■ If you are embedding the setup and reset strings in your worksheet, enter the non-printing characters in ASCII decimal code. For example, if the literal string for starting boldface on your printer is `Esc(s3B'`, the ASCII decimal code version is `\027(s3B'`. Note that the ASCII decimal code value is preceded by a backslash and consists of three digits. For other ASCII decimal code values, see Appendix D in the *User's Guide.*

■ If you are specifying setup and reset strings in the /Print Printer Options Setup menu, the /Print File Options Setup menu, or the /Worksheet Global Default Printer Setup menu, enter non-printing characters in ASCII decimal code. The values are entered in the same way that they are when embedded in your worksheet.

■ If you are specifying setup and reset strings in the **pconfig** form, enter nonprinting characters in ASCII octal code, and

all other characters in literal form. For example, if the literal string for starting boldface on your printer is `'Esc(s3B',`, the values you enter in the **pconfig** "Setup String" field are **'\033(s3B'**. Note that only the octal code value is preceded by a backslash.

Printer setup and reset strings have the following order of precedence, with the highest priority setting listed first.

■ String specified in **pconfig** form

■ /Print File Options Setup

■ /Print Printer Options Setup

■ /Worksheet Global Default Print Setup (this setting is in effect unless a **pconfig** setting or one of the temporary settings overrides it)

■ Embedded string

This order of precedence explains why embedded strings are often overridden by setup and reset strings specified as defaults or specified in the **pconfig** form.

6

≣ Chapter 7

International Formats

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International Formats

SCO Professional provides three key-features that help you use the program in an international environment.

- It can be run with non-English strings files, causing menus, prompts, help, and error messages to appear in the desired language.

- It supports the international character sets that exist on your system.

- It contains many international date, time, and punctuation formats and allows you to specify any currency string that your keyboard supports.

When the above features are used in conjunction, SCO Professional can be adapted to work in many different locales, with different languages, currencies, and character formats. This chapter covers some of the most important configuration issues for international use of SCO Professional.

This chapter contains the following sections:

- "Choosing the Desired Language" explain how to change your configuration of SCO Professional for use in a language other than English. It describes the steps that you must take to set up your system so SCO Professional works in your language, and how the LANG environment variable can be used to specify a language.

- "Choosing an International Character Set" tells how international 8-bit character sets such as ISO 8859 are supported by SCO Professional, if your operating system contains such a character set. It also introduces the **mapchan** and **mapkey** utilities, which you can use to configure additional characters and keystrokes.

- "Setting Date, Time, Punctuation and Currency Formats" describes the international formats and how to set them for the whole system or for individual users.

Choosing the Desired Language

You can switch SCO Professional's entire user interface, including menus, error messages, and prompts, from English to a different language, such as French or German. One system can even contain multiple language sets that an individual user can choose.

To do this, you must purchase and install one or more supplementary language packages from SCO. The system-wide language of choice is governed by the file */etc/default/lang*. Individual users can specify their own language by changing their LANG environment variable. If the correct language file is not installed on your system, SCO Professional defaults to English.

General information on setting environment variables is found in Chapter 2, "Creating a Custom Environment," of this guide. The LANG environment variable is described in detail in your international operating system's documentation.

Choosing an International Character Set

SCO Professional supports international, 8-bit character sets. In addition, through the use of the **mapchan** and **mapkey** utilities of your operating system, it is possible to configure additional special keys.

The most common 8-bit character set, ISO 8859, contains all characters necessary for most European languages. Your operating system must contain this character set, or one that is comparable, to access these non-English characters successfully.

To access these characters, your terminals and other peripheral devices may need to be configured with **mapchan** and **mapkey**, as most terminals do not have specific keys for non-English letters, accents, currency signs, and so on. For information on these utilities and other international configuration issues, see your international operating system's documentation.

Setting Date, Time, Punctuation and Currency Formats

SCO Professional supports four international date formats, four international time formats, eight punctuation formats, and a currency string that is limited only by what your keyboard supports. Each of these formats is described in Chapter 5, "Changing the Worksheet Format," of the *SCO Professional User's Guide*.

Each format is stored in the *.pro2cnf* file. To change the system-wide global defaults of these formats, log on as *root* and follow the procedures described in Chapter 5 of the user's guide. Any changes you make become the system-wide default; individual users can then override these defaults for their own sessions by following the same procedures when they are logged on as themselves. These changes affect only the individual users' *.pro2cnf* files and have no effect on the system-wide defaults.

7

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SCO Professional System Files

SCO Professional is controlled by the configuration files, configuration utilities, Professional Manager files, spreadsheet files, translation utilities, help utilities, print files, driver files, and environment variables in this appendix. An * (asterisk) following a filename indicates that the file is executable.

Configuration Files

File	Description
$PROLIB/.archivedev	Specifies default archive device
$SCOLIB/printers/.defprint	Specifies default printers
$PROLIB/.dosdev	Specifies drive of the DOS device
/usr/lib/terminfo	Contains terminal configuration files

Configuration Utilities and Files

Utility or File	Description
$PROLIB/tconfig*	Configures terminals, keyboard commands
$PROLIB/pconfig*	Configures graphics and text printers
$PROLIB/color_config*	Configures color scheme
$PROLIB/procolor	color scheme file
$PROLIB/english/us/pstrs	pconfig strings file
$PROLIB/english/us/perrs	pconfig error messages file
$PROLIB/english/us/pform	pconfig form file
$PROLIB/english/us/phelp	pconfig help screens file
$PROLIB/english/us/pmenus	pconfig menu file
$PROLIB/english/us/tstrs	tconfig strings file
$PROLIB/english/us/colorstrings	color strings file

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Terminal Configuration Files

File	Description
$SCOLIB/tcap/2393/graph.pro	Graphics definition file for 2393 terminal
$SCOLIB/tcap/altos4/graph.pro	Graphics definition file for altos4 console
$SCOLIB/tcap/altos7/graph.pro	Graphics definition file for altos7 console
$SCOLIB/tcap/ansi/graph.pro	Graphics definition file for ansi console
$SCOLIB/tcap/ansic/graph.pro	Graphics definition file for ansi color console
$SCOLIB/tcap/cie414/graph.pro	Graphics definition file for cie414 terminal
$SCOLIB/tcap/cie414w/graph.pro	Graphics definition file for cie414w terminal
$SCOLIB/tcap/cie467w/graph.pro	Graphics definition file for cie467w terminal
$SCOLIB/tcap/dosansi/graph.pro	Graphics definition file for dosansi console
$SCOLIB/tcap/dt110/graph.pro	Graphics definition file for dt110 terminal
$SCOLIB/tcap/generic/cmds.pro	Default keyboard command mapping file
$SCOLIB/tcap/generic/fkeys.pro	Default function key mapping file
$SCOLIB/tcap/generic/graph.pro	Default graphics definition file
$SCOLIB/tcap/generic/macro.pro	Default macro key mapping file
$SCOLIB/tcap/hp700/graph.pro	Graphics definition file for hp700 terminal
$SCOLIB/tcap/hpansi/graph.pro	Graphics definition file for hpansi terminal
$SCOLIB/tcap/intelpc/graph.pro	Graphics definition file for intelpc terminal

(Continued on next page.)

Terminal Configuration Files (*Continued*)

File	Description
$SCOLIB/tcap/kt7ix/graph.pro	Graphics definition file for kt7ix terminal
$SCOLIB/tcap/opus3n1+/graph.pro	Graphics definition file for opus3n1+ terminal
$SCOLIB/tcap/pcaltos7/graph.pro	Graphics definition file for pcaltos7 terminal
$SCOLIB/tcap/vt220/graph.pro	Graphics definition file for vt220 terminal
$SCOLIB/tcap/vt320/graph.pro	Graphics definition file for vt320 terminal
$SCOLIB/tcap/vt420/graph.pro	Graphics definition file for vt420 terminal
$SCOLIB/tcap/wy50/graph.pro	Graphics definition file for wy50 terminal
$SCOLIB/tcap/wy50w/graph.pro	Graphics definition file for wy50w terminal
$SCOLIB/tcap/wy60/cmds.pro	Keyboard command mapping file for wy60 terminal
$SCOLIB/tcap/wy60/graph.pro	Graphics definition file for wy60 terminal
$SCOLIB/tcap/wy75/graph.pro	Graphics definition file for wy75 terminal
$SCOLIB/tcap/wy75w/graph.pro	Graphics definition file for wy75w terminal
$SCOLIB/tcap/wy75x/graph.pro	Graphics definition file for wy75x terminal
$SCOLIB/tcap/wy120/graph.pro	Graphics definition file for wy75x terminal

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(*Continued on next page.*)

Terminal Configuration Files (*Continued*)

File	Description
$SCOLIB/tcap/wy75x/graph.pro	Graphics definition file for wy120 terminal
$SCOLIB/tcap/wy120ak/graph.pro	Graphics definition file for wy120ak terminal
$SCOLIB/tcap/wy120w/graph.pro	Graphics definition file for wy120w terminal
$SCOLIB/tcap/wy150/graph.pro	Graphics definition file for wy150 terminal
$SCOLIB/tcap/wy150ak/graph.pro	Graphics definition file for wy150ak terminal
$SCOLIB/tcap/wy150w/graph.pro	Graphics definition file for wy150w terminal
$SCOLIB/tcap/wy350/graph.pro	Graphics definition file for wy350 terminal
$SCOLIB/tcap/wy350w/graph.pro	Graphics definition file for wy350w terminal
$SCOLIB/tcap/wy370/graph.pro	Graphics definition file for wy370 terminal
$SCOLIB/tcap/xterm/graph.pro	Graphics definition file for xterm terminal

The following files for controlling Professional Manager operation and Spreadsheet use are all located in the $PROLIB directory.

Professional Manager Files

File	Description
mgr*	Professional Manager executable
english/us/mgrhelp	Professional Manager help screens
english/us/mgrmenus	Professional Manager menu strings
english/us/mgrstrings	Professional Manager prompt and error messages
docpio*	Shell script for cpio device operations
dodos*	Shell script for executing XENIX DOS commands: **dosdir, doscp,** and so on.
dotar*	Shell script for **tar** archive operations
fformat*	Shell script for formatting floppies

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Spreadsheet Files

File	Description
.lock	A special file for implementing file locking
*calc**	Spreadsheet executable
ingres	Substitute shell script for sql commands
integra	Substitute shell script for sql commands
*no87**	Detects absence of a math coprocessor
oracle	Substitute shell script for sql commands
*promap**	Maps the <Alt> keys for macro execution
*proprint**	Shell script for printing from the spreadsheet
*setkeys**	Sets function key defaults on IBM systems
*sqlscript**	Shell script for using sql commands
english/us/errstrings	Error messages for the spreadsheet
english/us/prohelp	Help pages for the spreadsheet
english/us/promenus	Menu strings for the spreadsheet
english/us/prostrings	Prompt strings for the spreadsheet
english/us/tutorial/	Sample files used in tutorial

The following files for translating database files from other formats are located in the $PROLIB directory.

Translation Utilities

Utility	Description
english/us/transtrings	Error message strings for the translators
*trdb3towk1**	dBase III to wk1 translator
*trdbftowk1**	dBase II to wk1 translator
*trdiftowk1**	DIF to wk1 translator
*trslktowk1**	SYLK to wk1 translator
*trwk1todb3**	wk1 to dBase III translator
*trwk1todbf**	wk1 to dBase II translator
*trwk1todif**	wk1 to DIF translator
*trwk1toslk**	wk1 to SYLK translator
*trwk1towks**	wk1 to wks translator

The following files for controlling on-line help are located in the $PROLIB directory.

Help Utilities

File	Description
english/us/libstrs	Help strings file
help_menu	Menu file for the help utility, **xhelp**
*xhelp**	Help screen driver

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The following sample print definition files are included with SCO Professional. These files are located in */usr/lib/pro/printers*.

Print Definition Files

C-Itoh.3500	*DEClaser.ln03*	*HPpaintjet*	*epsonFX*
epsonFX.quad	*epsonFX.wide*	*hiplot.dmp29*	*hpcpro.cart*
hpcpro.plot	*hplaser*	*hplaser.land*	*hpterm.2393a*
ibmpro	*imagen*	*tandy.dmp430*	*tek4014*
ticolor	*xerox.4020*		

The following Pro-specific device drivers and font files are located in the $PROLIB directory. A list of the drivers and their options is in the *$PROLIB/english/us/drivers file*. For full descriptions of the drivers, see Appendix B.

Graphics Drivers

*drivers/char**	*drivers/decln103**	*drivers/epsonFX**
*drivers/hiplot**	*drivers/hpcpro**	*drivers/hplaser**
*drivers/hppaint**	*drivers/hpterm**	*drivers/ibmcons**
*drivers/ibmpro**	*drivers/imagen**	*drivers/postscript**
*drivers/protocgi**	*drivers/psinit*	*drivers/tek4014**
*drivers/ticolor**	*drivers/xerox4020**	*drivers/xgraph*

Graphics Fonts

drivers/fonts	*drivers/block.fnt*	*drivers/cour.fnt*
drivers/symbol.fnt		

The following files for creating new Pro-specific drivers are located in */usr/lib/pro/drivers/src*.

Driver Writer's Guide Directory

Drivers.Guide	*Makefile*	*hpcpro.c*
hpcpro.h	*metalib.a*	*metalib.h*

Environment Variables

Variable	Description
PROLIB	Location of Professional system files
SCOLIB	Location of SCO generic files
PROPATH	Search path to look for Professional configuration and string files
PRINTSCR	Device or file to which screen contents are sent
TMPDIR	Directory used by Professional to store temporary scratch files
BACKUPDIR	Directory used for backing up Professional output files

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SCO Professional Graphics Drivers

Devices:

> Standard terminals (through the /Graph View command)
> Standard line printers (through GraphPrint)

Driver Name:

> **char**

Driver Options:

> **-p**   Generates output for a generic device.
>
> **-p** *printer* Generates output for a specific printer, using
>   a customized description.

GraphPrint Notes:

> **Font:**
>
> > The character driver only supports font 1, which is the default
> > font on the terminal or printer. All other font numbers get
> > mapped to 1.
>
> **Colors:**
>
> > 1-6   Configurable. See below.
>
> **Fill Characters:**
>
> > 1-6   Configurable. See below.
>
> **Symbols:**
>
> > **1-6**

The character driver is used both for preview graphics from the spreadsheet
(with the /Graph View command) and for sending graphics output to print-
ers for which a specialized driver does not exist. See Chapter 5, "Configur-

ing Character Graphics," in the *SCO Professional Configuration Guide* for
details on customizing your character graphics display.

Devices:

Color Graphics Adapter (CGA)
Enhanced Graphics Adapter (EGA)
Professional Graphics Adapter (PGA)
on IBM 2.0 or SCO Release 2.2

Driver Name:

ibmcons

Driver Options:

-c	Uses installed CGA adapter.
-p	Uses installed PGA adapter.
-e	Uses installed EGA adapter.
-2	Draws graph in hi-resolution 640x200 black and white.
-4	Draws graph in low-resolution 320x200 four color.
-i	Draws graph in isotropic mode. (Pie charts are round.)
-l	Draws graph in landscape mode. (Pie charts are oval.)
-s	Leaves graph on screen after display.
-n	Does not fill in pie slices or bar graphs.

Syntax:

ibmcons [-cpe24ilsn] *[alternate executable] [alternate flags]*

Description:

If **ibmcons** attempts to open the requested adapter for graphics or if no
adapter is specified, then the current console device is used. If the
requested adapter is not a graphics device, the alternative executable with
associated flags is run. This allows the "ansi" entries in the *graph.pro* file
to have **ibmcons char** as the /Graph View command.

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If the command **ibmcons char** is run on a console without graphics capability, the command **char** is run in its stead, and the graph can be previewed in character-graphics mode.

If **ibmcons** is run as the /Graph View command, it ignores the **-i**, **-l**, **-2**, and **-4** options because these options are manipulated by SCO Professional.

Device:

Digital Equipment Corporation LN03 laser printer

Driver Name:

decln03

Driver Options:

-**f**   Prints graph full page.

-**n**   Does not fill bars with patterns.

GraphPrint Notes:

Fonts:

1   The **decln03** driver currently only supports fonts 1
              and 2. All other fonts are mapped to font 1. Font 1 is
              a simple bit-image font scaled up to generate large
              titles and subtitles.

2   Courier font

Colors:

1-6   Determines fill pattern

This driver, by default, prints a 4" by 4" image in the approximate center of
an 8½" by 11" sheet of paper. Use the -**f** option flag to print a full-sized
image.

By default, the **LN03** driver generates fairly small graphs due to a limita-
tion in the standard LN03 printer. When using the LN03 in its default
mode, you should keep labels to a minimum length to avoid overlap. If
your LN03 is capable of printing full-sized graphs, use the -**f** option to
force the **decln03** driver to create larger graphs.

This driver fills bars in bar charts with patterns unless the -**n** option is
specified during configuration. Using the -**n** option reduces the amount of
time required to generate and print graphs.

B

Devices:

> Epson FX80, FX100, and compatibles (for example, Smith Corona D300)

Driver Name:

> **epsonFX**

Driver Options:

-w	Generates wide graphs on 11" x 17" paper. 8½" x 11" is the default paper size.
-d	Generates double-density output.
-q	Generates quad-density output.
-n	Does not fill bars with patterns.

GraphPrint Notes:

> **Fonts:**
>
> | | |
> |---|---|
> | 1 | The **epsonFX** driver currently only supports fonts 1 and 2. All other fonts get mapped to font 1. Font 1 is a simple bit-image font scaled up to generate large titles and subtitles. |
> | 2 | Courier font. |
>
> **Colors:**
>
> | | |
> |---|---|
> | 1-6 | Determines fill pattern. |

This driver fills bars in bar charts with patterns unless the **-n** option is specified during configuration. Using the **-n** option reduces the amount of time required to generate and print graphs.

Device:

Hewlett-Packard ColorPro plotter and compatibles (for example, Graphtec MP2300 plotter in HPGL mode)

Driver Name:

hpcpro

GraphPrint Notes:

Font:

1   Standard font.

Colors:

1-8   Corresponds to the pen number on the plotter. Also determines fill pattern.

Device:

Hewlett-Packard LaserJet

Driver Name:

hplaser

Driver Options:

-d	Generates double-density output.
-q	Generates quad-density output.
-n	Does not fill bars with patterns.

GraphPrint Notes:

Fonts:

1   The **hplaser** driver currently supports only fonts 1 and 2. All other fonts get mapped to font 1. Font 1 is a simple bit-image font scaled up to generate large titles and subtitles.

2   Courier font.

Colors:

1-6   Determines fill pattern.

This driver fills bars in bar charts with patterns unless the **-n** option is specified during configuration. Using the **-n** option reduces the amount of time required to generate and print graphs.

Device:

Hewlett-Packard PaintJet Color Printer

Driver Name:

hppaint

Driver Options:

-   **-1**   Produces 180 dpi output instead of default 90 dpi.

-   **-n**   Does not fill bars with patterns.

-   **-c**   Switches to alternate color palette.

GraphPrint Notes:

Fonts:

1   The **hppaint** driver currently supports only fonts 1 and 2. All other fonts are mapped to font 1, which is the standard font.

2   Courier font.

Colors:

1	Magenta	5	Blue
2	Cyan	6	Red
3	Black	7	Yellow
4	Green		

Alternate Color Palette:

1	Black	5	Blue
2	Red	6	Magenta
3	Green	7	Cyan
4	Yellow		

B

This driver fills bars and pie sections with patterns unless the **-n** option is specified during configuration. Using the **-n** option reduces the amount of time required to generate and print graphs.

Device:

Hewlett-Packard 2393a terminal

Driver Name:

hpterm

GraphPrint Notes:

Font:

1   Standard font.

Colors:

1-8   Determines fill pattern.

Device:

Houston Instruments DMP-29 plotter

Driver Name:

hiplot

Driver Option:

-w   Generates wide graphs on 11" x 17" paper, instead of
            8½" x 11".

GraphPrint Notes:

Fonts:

1   Standard font.

2   Italic.

3   Bold Standard.

4   Bold Italic.

5   Double-Stroke Standard.

6   Double-Stroke Italic.

Colors:

1-8   Corresponds to the pen positions on the plotter. The pen
           location nearest the control panel corresponds to color 1.
           Also determines fill pattern.

B

Devices:

IBM Proprinter and compatibles
Epson MX80 and MX 100
Tandy DMP 430 in IBM mode (and C.Itoh 3500 model 20)

Driver Name:

ibmpro

Driver Options:

-d   Generates double-density output.

-q   Generates quad-density output.

-c   Driver supplies carriage-return newline at end of each line.

-n   Does not fill bars with patterns.

GraphPrint Notes:

    Fonts:

      1   The **ibmpro** driver currently supports only fonts 1 and 2. All other fonts are mapped to font 1. Font 1 is a simple bit-image font scaled up to generate large titles and subtitles.

      2   Courier font.

    Colors:

      1-6   Determines fill pattern.

This driver fills bars in bar charts with patterns unless the -n option is specified during configuration. Using the -n option reduces the amount of time required to generate and print graphs.

Device:

Imagen 8/300 Laser Printer

Driver Name:

imagen

GraphPrint Notes:

Fonts:

1   Times Roman.

2   Times Roman Bold.

Colors:

1-6   Determines fill pattern.

This driver fills all bars and pie slices with patterns.

_____

B

Devices:

Monitors and Xterminals supported by Open DeskTop Xsight server

Driver Name:

xgraph

Driver Options:

-f *fontname* Specifries the font used for graph titles and labels. This option only affects screen output, not printer output.

-p *n* Specifies color palette *n*, where *n* is a number from 1 to 6.

-s *n* Specifies a window of linear dimension *n*, where *n* is a pixel value from 128 to 1024.

Syntax:

xgraph [**-f** *fontname*] [**-p** *n*] [**-s** *n*]

Colors:

Default Color Palette

1	Green	4	Yellow
2	Red	5	Cyan
3	Blue	6	Magenta

Devices:

> Tektronix 4014 terminal and compatibles
> (for example, Digital Equipment Corporation VT240).

Driver Name:

> **tek4014**

Driver Options:

> **-i** Followed by the escape sequence (see below) needed to put the terminal into Tektronix graphics mode.
>
> **-d** Followed by the escape sequence needed to return the terminal to native-text from Tektronix graphics mode.

GraphPrint Notes:

> **Font:**
>
> > 1 Standard font.
>
> **Colors:**
> > 1-6 Determines fill pattern.

The escape sequences to turn on and off the Tektronix graphics mode must be entered as octal and literal codes enclosed in double quotes. Use octal codes for non-printing characters such as ⟨Esc⟩ and either octal codes or literal characters for the other characters. The escape sequences can be placed in the *graph.pro* file. This file is located by default in the *$SCOLIB/tcap/$TERM* directory, but users may have copies in a *$HOME/.tcap/$TERM* directory. For example, to enter the escape sequence for a DEC VT240 terminal, add the following three lines to *graph.pro* as they appear here:

```
#GRAPHICS-termtype
g00='tek4014  -i"\\033\\113\\077\063\\070\\150"  -d"\\033\\113\\077\063\\070\\154"'
))
```

where *termtype* is the terminal type stored in the TERM environment variable (for example, vt240 or vt100). Other than the non-printing ⟨Esc⟩ characters (\\033), you can use the literal characters instead of the octal codes if you prefer.

B

Device:

Texas Instruments 857 Color Printer

Driver Name:

ticolor

Driver Options:

-1	Produces 72 dpi output instead of default 60 dpi.
-2	Produces 120 dpi output.
-3	Produces 144 dpi output.
-n	Does not fill bars with patterns.

GraphPrint Notes:

Fonts:

1	The **ticolor** driver currently supports only fonts 1 and 2. All other fonts are mapped to font 1, which is the standard font.
2	Courier font.

Colors:

1	Magenta	5	Purple
2	Cyan	6	Orange
3	Black	7	Yellow
4	Green		

This driver fills bars in bar charts with patterns unless the **-n** option is specified during configuration. Using the **-n** option reduces the amount of time required to generate and print graphs.

Device:

Xerox 4020 Color Printer

Driver Name:

xerox4020

Driver Options:

-s   Generates standard single-pass output.

-d   Generates double-pass output.

-n   Does not fill bars with patterns.

GraphPrint Notes:

Fonts:

1   The **xerox4020** driver currently only supports fonts 1 and 2. All other fonts get mapped to font 1, which is the standard font.

2   Courier font.

Colors:

1	Black	5	Green
2	Magenta	6	Cyan
3	Red	7	Violet
4	Yellow		

This driver fills bars in bar charts with patterns unless the **-n** option is specified during configuration. Using the **-n** option reduces the amount of time required to generate and print graphs.

B

Writing Additional Graphics Drivers

It is possible to write new graphics drivers and incorporate them into SCO Professional. The XENIX or UNIX development system and knowledge of C programming are required. A sample driver and documentation are available in the installation directory */usr/lib/pro/drivers/src*.

≡ Index

K

Keystrokes, different from DOS 1-14

L

Landscape (sideways) printing, configuring for 4-3, 4-10, 6-11
Language, choosing 7-2
Library
    copying with the SCO Professional File-Manager 2-5
    creating custom libraries 2-4
Local Setup Fields, on pconfig setup form 4-9
Locale, choosing 7-2
Login shell. *See* Berkeley C-Shell (csh); Bourne shell (sh)

M

mapstr
    invoking to access arrow keys 6-7
    invoking to access function keys 6-6
Media-Archive command 1-8
Monetary format, international 7-3
Monochrome mode, switching from color to 3-24, 6-9

N

Name field, on pconfig setup form 4-7
Name lines, in terminfo files 3-11
Numeric capability codes 3-12

O

Object (screen element), and color 3-20
Octal values, using 4-10, 5-6, 6-12
Options, driver, in pconfig form 4-11
Options field, on pconfig setup form 4-8

P

pcap (printer capability) files
    creating 4-15
    described 4-3
    pconfig and 4-2
    Type field and 4-7
pconfig (printer configuration)
    accessing setup form 4-5
    choosing a system default printer 4-12
    defining a device for multiple modes 1-5
    defining drivers with 4-2
    described 1-5, 4-2, 4-6
    device definition files 1-5
    executing 4-4, 4-11
    exiting form 4-11
    location 1-5, 4-1, 4-2
    making form entries 4-7, 4-11
    modifying a printer definition file 4-5
    moving around on setup form 4-6
    quitting 4-12
    removing a printer definition file 4-11
    setting driver options 4-5, 4-7, 4-11
Permissions, file 1-11, 1-12
PRINT macro 2-7
Printer configuration. *See* pconfig.
Printer definition files
    pconfig and 4-2
    removing 4-11
Printer, testing 4-4
Printing, DOS and UNIX compared 1-6
Printing over a Network 6-11
PRINTSCR, variable setting printscreen file 2-7
Printscreen file, saving images to 2-7

U

≡SCO Professional®

USER'S
GUIDE

The Santa Cruz Operation, Inc.

Table of Contents

Preface

Welcome to SCO Professional, an integrated spreadsheet, graphics, and database program. SCO Professional primarily uses worksheets for a variety of applications, including bookkeeping, inventory control, accounting, financial and statistical analyses, and engineering applications.

Within SCO Professional worksheets, you can replace complex formulas with built-in formulas (called @ functions); replace a single key sequence with a stored sequence of keystrokes (called macros); move and copy parts of a worksheet to other areas or to another worksheet; change the appearance of data in the worksheet; protect data from accidental erasure or alteration; translate numerical data into graphs; print worksheets and graphs; and use the worksheet as a database.

SCO Professional is not just a worksheet, though. While the worksheet is the key element of the software, the Professional Manager organizes and controls the overall spreadsheet package. The Professional Manager provides access not only to the worksheet, but also to GraphPrint for printing graphs; File-Manager, for manipulating worksheet and graph files; and Configuration, for changing archive and graphics devices, and customizing key sequences.

The *SCO Professional User's Guide* was written for all users of the program. Anyone planning to work with SCO Professional should first become familiar with the information presented here. This guide provides all the basic information that you need to construct and use SCO Professional worksheets.

This guide assumes that SCO Professional is installed already. If not, refer to the *SCO Professional Installation Notes* for information on installing the program and the *SCO Professional Configuration Guide* for information on setting up printers and graphics devices.

Contents of This Guide

The chapters in this guide explain all SCO Professional commands and functions, as well as the concepts that you need to understand and use them effectively.

The following chapters and appendixes are included in this guide:

■ Chapter 1, "Getting Started," shows you how to enter and exit SCO Professional, describes the different parts of the worksheet, lists the key sequences for moving around the worksheet, and describes the editing keys and special function keys.

■ Chapter 2, "Worksheet Basics," introduces the concept of ranges and shows you how to create, save, and retrieve worksheet files.

■ Chapter 3, "Using Formulas and Functions," explains how to enter formulas into worksheet cells, distinguishes formulas from @ functions, and describes all the available @ functions.

■ Chapter 4, "Copying and Moving Worksheet Data," describes ranges more fully and shows you how to copy, move, and transpose a cell or a range of cells from one location in the worksheet to another.

■ Chapter 5, "Changing the Worksheet Format," describes the commands that allow you to change the appearance of cells and ranges as well as the entire worksheet.

■ Chapter 6, "Protecting Data," discusses the various commands for protecting worksheet data from accidental access, viewing, or alteration.

■ Chapter 7, "Using Multiple Worksheets," shows you how to use two different worksheets at the same time.

■ Chapter 8, "Using Macros," describes all the available macros and how to use them to customize your worksheet.

■ Chapter 9, "Creating Graphs," demonstrates the commands that let you transform worksheet data into bar graphs, stacked-bar graphs, pie charts, line graphs, and XY charts.

- Chapter 10, "Printing Worksheets," shows you how to print a worksheet or a portion of a worksheet, and how to use different print options to tailor the appearance of the printed report.

- Chapter 11, "Working with Databases," describes the commands for que ying and sorting data; you also learn to perform various statistical analyses.

- Chapter 12, "Exchanging Data between Applications," explains the procedures for importing ASCII files, exporting and importing files from other spreadsheet programs, and using the Clipboard to transfer files to and from different SCO applications.

- Chapter 13, "Using the Professional Manager," shows you how to organize files, print graphs, and configure key sequences within SCO Professional.

- Appendix A, "Information for Lotus® 1-2-3® Users," describes the ways in which SCO Professional differs from Lotus 1-2-3.

- Appendix B, "Command Line Flags," provides handy descriptions of different options that can be used when you execute SCO P ofessional.

- Appendix C, "Introducing ASCII," provides a list of the ASCII characters and their decimal codes.

- The glossary provides definitions of commonly used terms throughout the guide, and the index is included for quick reference of particular subjects.

Conventions Used in This Guide

The following conventions are used throughout this guide:

■ Several keys have special functions when used with SCO Professional, and they are illustrated in text as follows:

Key Conventions

Representation In Text	Keyboard Sequence
Abort	⟨Ctrl⟩\
Absolute	⟨F4⟩ or FunctionList 4
Backspace	⟨Ctrl⟩b or ⟨Ctrl⟩h
Break	⟨Ctrl⟩c
Calculate	⟨F9⟩ or FunctionList 9
Delete	⟨Del⟩
DeleteEOL	configurable
DeleteRow	⟨Ctrl⟩y
DeleteWord	⟨Ctrl⟩w
Down	⟨Ctrl⟩j or ⟨Down Arrow⟩
Edit	⟨F2⟩ or FunctionList 2
End	⟨Ctrl⟩e
Escape	⟨Esc⟩
Execute	⟨Ctrl⟩x
FunctionList	⟨Ctrl⟩f
Go	⟨Ctrl⟩g
GoTo	⟨F5⟩ or FunctionList 5
Graph	⟨F10⟩ or FunctionList 0
Help	⟨F1⟩ or FunctionList 1
Home	⟨Ctrl⟩t or ⟨Home⟩

Continued on next page.

Key Conventions (*Continued*)

Representation In Text	Keyboard Sequence
Insert	⟨Ctrl⟩v
Learn	⟨Ctrl⟩z
Left	⟨Ctrl⟩h or ⟨Left Arrow⟩
Menu	/
Name	⟨F3⟩ or FunctionList 3
OpenRow	⟨Ctrl⟩o
PageDown	⟨PgDn⟩ or ⟨Ctrl⟩d
PageLeft	⟨Ctrl⟩p or ⟨Shift⟩ ⟨Tab⟩
PageRight	⟨Ctrl⟩n, ⟨Ctrl⟩i, or ⟨Tab⟩
PageUp	⟨PgUp⟩ or ⟨Ctrl⟩u
PrintScreen	⟨PrtSc⟩ or ⟨Ctrl⟩]
Query	⟨F7⟩ or FunctionList 7
Refresh	⟨Ctrl⟩r
Return	⟨Return⟩ or ⟨Ctrl⟩m
Right	⟨Ctrl⟩l or ⟨Right Arrow⟩
ScrollLock	⟨Ctrl⟩w
Step	⟨Ctrl⟩x ⟨Ctrl⟩x or Execute Execute
Table	⟨F8⟩ or FunctionList 8
Up	⟨Ctrl⟩k or ⟨Up Arrow⟩
Window	⟨F6⟩ or FunctionList 6

■ **NOTE:** If your terminal has no arrow keys, ⟨Ctrl⟩h has the default specification for the left-arrow key.

■ References to commands within the text appear in regular type.

The /Worksheet Global Protect command...

When you are instructed to enter a command, the initial letters of the command appear in **boldface** type; when you are instructed to enter a word or phrase, that word or phrase appears in **boldface** type.

Select the **/W**orksheet **G**lobal **P**rotect command.
Enter the term **Budget** in cell A1.

■ Whenever new terms or ideas are introduced, they are shown in a smaller typesize with all uppercase letters. An example is NEW TERM. These terms are listed and defined in the glossary.

■ Examples that represent what you see on the screen are shown like this:

```
A1: [W18] 'Name:                                              READY

        A              B          C              D           E
1Name:          District:    Sales:      Commission:    Rate:
2Abrahms, Leon       J1     $1,299,667.00    $64,983.35    0.05
3Brown, Leslie       F2     $2,314,764.00   $115,738.20    0.06
4Hill, Catherine     A6     $2,778,432.00   $138,921.60    0.07
5Jamieson, Jack      D3     $1,332,887.00    $66,644.35    0.08
6Johnson, Andy       B2     $2,332,778.00   $116,638.90    0.09
7Roberts, Ted        L1     $1,112,343.00    $55,617.15
8Smith, Samantha     G7     $2,884,928.00   $144,246.40
9Stevens, Julie      H4     $2,473,343.00   $123,667.15
10
11COMMISSION RATE:  +E2
12TOTAL:                    $16,529,142.00   $826,457.10
13
14
15
16
17
18
19
14-Feb-91 08:00 AM
```

■ In some examples, we indicate the position of your cursor or highlight with reverse video (white letters on a black background). In the following example, the cursor rests on the word *Center*:

```
Left   Right   Center
```

Other SCO Professional Guides

There are five other guides included in the set of SCO Professional documentation. Each guide has a different purpose and addresses a different audience:

■ The *SCO Professional Tutorial* contains basic information for beginners. New spreadsheet users can read the tutorial as a general introduction to SCO Professional.

■ The *SCO Professional Quick Access Guide* contains brief descriptions of most SCO Professional commands and how to use them. It also lists all available keystrokes, macro commands, and built-in functions in an easily accessible format. This guide can benefit all users of the program, experienced or not.

■ The *SCO Professional Configuration Guide* explains how to set up printers and graphics devices and how to configure terminals and command sequences. This guide is intended for system administrators.

■ The *SCO Professional Installation Notes* describe the procedure for installing SCO Professional on your system. These notes are written specifically for system administrators.

■ The *SCO Professional Release Notes* describe new features, special requirements, and limitations of the current version of the SCO Professional program. These notes are written specifically for system administrators.

≡ Chapter 1

Getting Started

≡ 1

Getting Started

The SPREADSHEET is central to the functioning of SCO Professional. With this spreadsheet, you can track important aspects of your business. This chapter introduces you to the spreadsheet and discusses how to enter and exit SCO Professional; how to recognize and use the various modes of SCO Professional; how to use commands with SCO Professional's Menu system; how to enter data; and how to move around the worksheet.

Contents of This Chapter

This chapter is organized into the following sections:

- "Entering SCO Professional" describes the different ways to start SCO Professional including from the command line and from SCO Open Desktop®. There is also an introduction to the worksheet screen's layout.

- "Using Different Modes" shows you many of the modes in which SCO Professional resides at different times. These modes affect how and when you can issue commands and enter data, and also control the effects of certain keystrokes or commands.

- "Using Menus" explains the menu system of commands in SCO Professional and the various ways to move around from menu to menu and select commands from those menus.

- "Entering Data" defines the different types of data (such as labels, values, and formulas) that you can enter into your worksheet, and it also describes how this data entry is accomplished.

- "Using the Keyboard" introduces you to the many ways in which your keyboard is used, such as moving around the worksheet, entering and exiting menus, and controlling special functions.

- "How Modes Affect Keyboard Commands" lists the different keystrokes used in each mode of operation in SCO Professional.

- "Special Keys" describes the default function keys and tells what effect each key has in SCO Professional.

- "Using a Mouse" tells how to use a mouse with SCO Professional. It describes mouse commands for selecting and manipulating worksheet data, calling up menus, choosing menu options, and moving around the worksheet.

- "Exiting SCO Professional" tells how to end your SCO Professional session.

Entering SCO Professional

There are two primary ways to start SCO Professional from the UNIX or XENIX command line. Typing **pro** from your operating-system command line puts you into the SCO Professional Manager menu, where you can choose "SCO Professional" to enter the worksheet area. Typing **procalc** from your operating-system command line bypasses the Professional Manager and places you directly into the worksheet area. Each of these commands can be followed by one or more flags, which are described in detail in Appendix B, "Command Line Flags."

To enter SCO Professional, type **pro** at the operating-system command line.

The SCO Professional Main Manager menu appears on your screen:

```
                                                                      MENU
SCO Professional File-Manager GraphPrint Translate Configuration Quit Enter
SCO Professional — SCO Spreadsheet/Graphics/Database program


████████████████████████████████████████████████████████████████████████




                           Tue  24-May-91
                           1:43:09 PM







        Use the arrow keys to highlight a command choice and press <RETURN>
     Press <ESC> to cancel a choice; Press Function Key 1 or <CTL>f1 for help
```
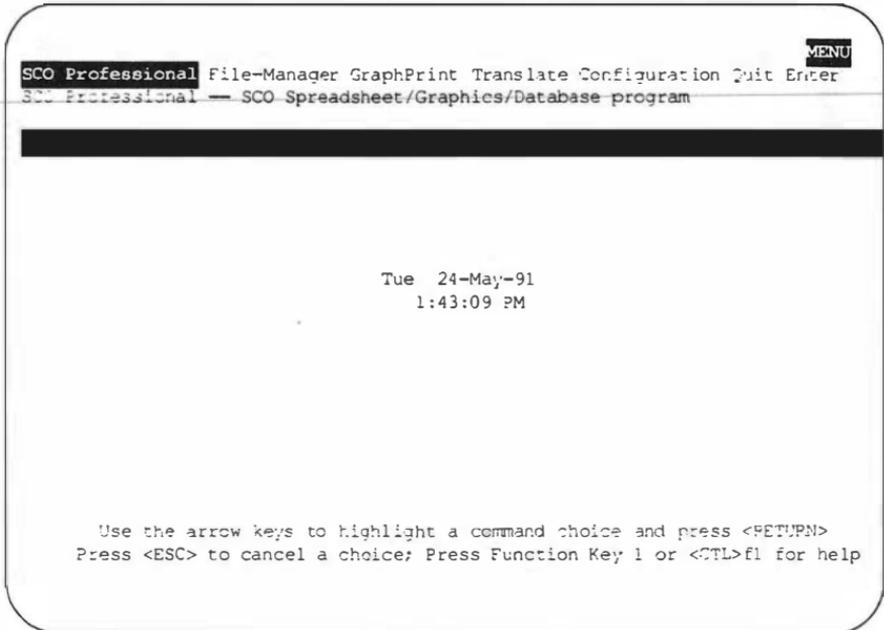
From this menu, you can enter SCO Professional. You can also move files, print graphs, import files from other spreadsheet programs, and configure your system. A complete description of these other commands and how to use them is found in Chapter 13, "Using the Professional Manager." SCO Professional is highlighted. To enter the worksheet area, press ⟨Return⟩.

SCO Professional displays the following screen:

```
A1:                                                                    READY

        A         B         C         D         E         F         G         H
    1
    2
    3
    4
    5
    6
    7
    8
    9
   10
   11
   12
   13
   14
   15
   16
   17
   18
   19  14-Feb-91  08:00 AM
```
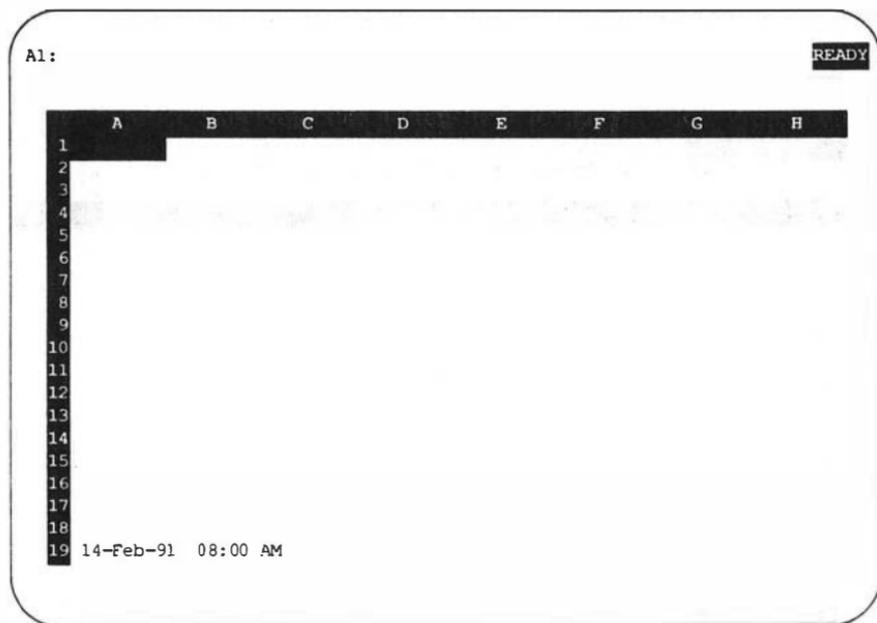
You can access this basic worksheet screen directly from the operating-system command line. To do this, type **procalc** from the command line.

You use this worksheet to enter all of your data and labels. SCO Professional has a maximum possible size of 1024 COLUMNS and 8192 ROWS -- a total size of over 8 million cells. Therefore, only a small portion of the entire worksheet area is visible at any given time.

The CELL is the basic unit of the worksheet in which you store information. It represents the intersection of a row and a column. A CELL ADDRESS is simply the location of a particular cell in the worksheet, identified by a column letter and a row number, for instance, A1.

Using Icons in Open Desktop
to Enter SCO Professional

If you are using SCO Open Desktop, you can enter SCO Professional through the Pro, Procalc, and worksheet file ICONS. The Pro and Procalc icons appear automatically on the desktop after installation of SCO Professional. If these icons are not visible on the desktop, see your system administrator. The worksheet icon appears when you create a worksheet file with SCO Professional.
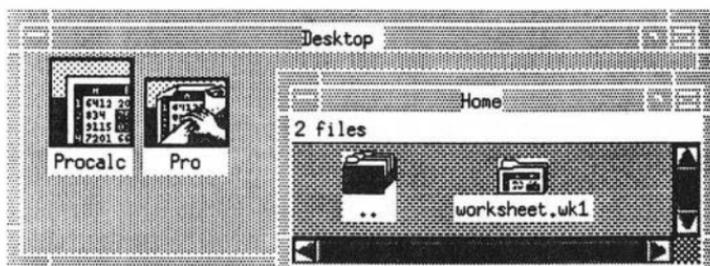
To enter SCO Professional directly, double-click on the Procalc icon. The worksheet screen appears in an Open Desktop window running the **scoterm** terminal emulator. The A1 cell is highlighted, ready for data entry. For more information on **scoterm**, see the SCO Open Desktop online help.

To enter the Professional Manager program, double-click on the Pro icon. The Professional Manager menu appears in a scoterm window. If you want to enter the Professional spreadsheet, choose SCO **Professional** from the menu.

To enter SCO Professional and display the data of a specific worksheet file, double-click on the icon of that worksheet file (see the **worksheet.wk1** icon in the illustration), or drag the icon of the file to the Procalc icon and drop it. The worksheet screen appears, with the data of the file displayed.

Using SCO Professional on a Color Terminal

If you are using a color terminal that is configured for SCO Professional use, the worksheet screen appears in full color. You must have a terminal that supports the color scheme used by SCO Professional, then the colors must be specified as explained in Chapter 3 of the *SCO Professional Configuration Guide*.

If you have a color terminal that is configured for SCO Professional, but you would rather use the program in monochrome mode, start SCO Professional by entering the command **procalc -M** at the system prompt (in this case, you cannot use the icons if you are running Open Desktop). The worksheet appears in two tones, as it does on terminals that do not support color.

Using Different Modes

SCO Professional indicates different MODES to inform you of possible actions at different times. The more frequently used modes are: READY, LABEL, VALUE, POINT, EDIT, MENU, ERROR, WAIT, and FIND. Each mode governs the actions you may take and the effects of certain commands or keystrokes while in that mode. A small box in the upper right corner of the screen, called the MODE INDICATOR, shows which mode is in operation.

The program starts in READY mode. From READY mode, you can issue a command, enter data, or move to any part of the worksheet. When you issue commands, the mode indicator replaces the word READY with the word MENU. While in MENU mode, you cannot move about your worksheet (except to do such special tasks as specifying ranges in response to prompts).

When you type either text or numbers, SCO Professional places you in the LABEL or VALUE mode, depending on the type of entry. You must complete the entry or press ⟨Escape⟩ to return to the READY mode before you can move around the worksheet. See the sections "Different Types of Worksheet Data" and "Entering Data" later in this chapter for more information.

If you are entering a formula in the VALUE mode and you point at a cell to include in a formula, SCO Professional immediately changes to the POINT mode:

```
 C16: [W12]                                                        POINT
 @SUM(C9.
                A           B     C          D          E
      1                                  XYZ Corporation
      2
      3         Revenues-Production Cost & Operation Cost by Product
      4             Year-to-Date For Months Ended December 31, 1991
      5                  .
      6
      7   REVENUES               |       ADD      WRITE       DRAW
      8                          |
      9     Distributors         |     50,432     6,865     35,920
     10     Dealers              |     22,641     4,512     32,741
     11     Telemarketing        |     19,760    92,736     53,876
     12     Mail Order           |    129,443    65,003    102,906
     13     Strategics           |     19,995    15,387     59,876
     14     Retail               |    199,874    87,965    399,865
     15                          |
     16       TOTAL REVENUES     |    442,145   273,068    685,184
     17 =======================  |  ============================
     18  OPERATION COST          |
     19                          | ─────────────────────────  14-Feb-91
  08:00 AM
```

Once you have pointed to and set a cell reference in a formula, SCO Professional returns to the VALUE mode.

The EDIT mode provides you with sophisticated editing procedures for making changes in cell entries. You can enter EDIT mode in one of two ways. First, you can enter the EDIT mode whenever you are in the READY, LABEL, or VALUE mode by using the ⟨Edit⟩ key as described later in this chapter. In addition, the system automatically places you in the EDIT mode whenever you are prompted for data input during a command, or whenever you have made an error in data input that is discovered by SCO Professional.

When you use the EDIT mode, the current value or label is displayed on the edit line as well as on the status line. A cursor appears at the end of the entry. You can move this cursor to any character of the entry and change that part without affecting the rest of the entry. Press ⟨Return⟩ to enter the newly edited version.

MENU appears in the mode indicator when you are selecting one of the menu commands. Until you are finished with a command sequence, or until you use either the ⟨Escape⟩ or the ⟨Break⟩ key, you are limited to making the choices offered by the menus. You cannot move around the worksheet or edit entries in the midst of a command sequence.

When a minor error is made, such as trying to move off the worksheet with the arrow keys, SCO Professional merely beeps at you. For a mistake that is not so obvious, the mode indicator changes to ERROR. A prompt may be displayed on the screen to explain the type of mistake you have made. Once you have corrected your mistake, the prompt disappears and the mode indicator returns to READY.

The WAIT mode is used when SCO Professional is processing a command. During this mode, commands cannot be invoked nor data entered.

The FIND mode is used during a data-query operation, while SCO Professional is searching for the records that meet the specified criteria. The arrow keys move the cursor from record to record, and the ⟨Edit⟩ key allows you to enter the Edit mode and change entries. See Chapter 11, "Working with Databases," for more information on data queries.

Using Menus

Most SCO Professional commands are accessed through MENUS. The choices listed on a menu are called COMMANDS. SCO Professional's commands are structured in layers, with additional menus stemming from one Main menu. From these menus stem other menus, and so on.

You can select a command in a menu either by typing the first letter of the command, by using the arrow keys to move the highlight to the command, or, if your terminal is equipped with a mouse, by selecting the command with the mouse (use of the mouse is discussed later in this chapter).

To enter the menu structure from READY mode, press the ⟨Menu⟩ key. SCO Professional's Main menu appears at the top of the screen:

```
A1:                                                                    MENU
Worksheet Range Copy Move File Print Graph Data System Learn Transfer Quit
Global, Insert, Delete, Column-Width, Erase, Titles, Window, Status, Page
       A        B        C        D        E        F        G        H
 1
 2
 3
 4
 5
 6
 7
 8
 9
10
11
12
13
14
15
16
17
18
19  14-Feb-91   08:00 AM
```
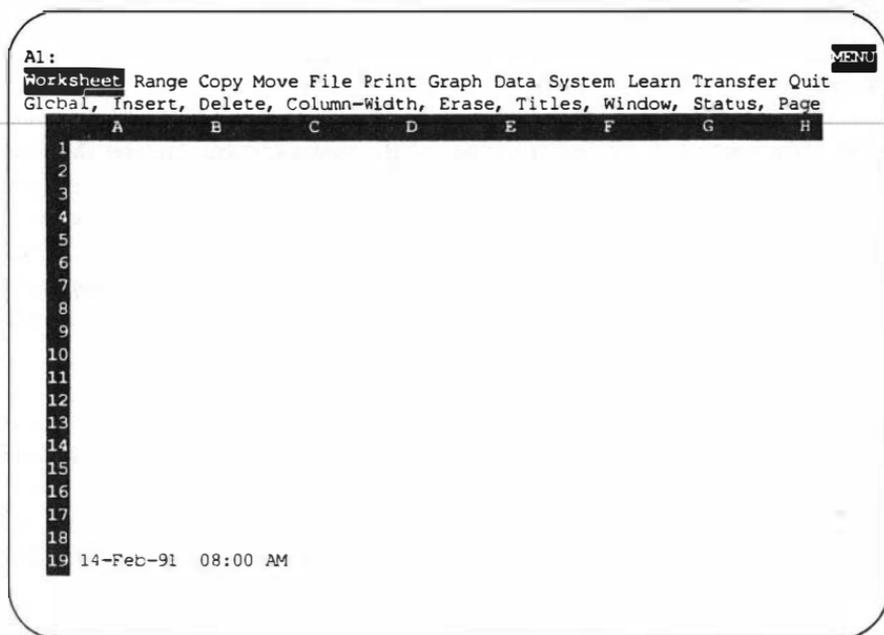
The mode indicator displays MENU. This indicator stays constant until you execute a command or quit the menu system. While in a menu, you may choose commands but you may not move around the worksheet or enter data. If you are already in the MENU mode and press the ⟨Menu⟩ key, your terminal sounds a beep.

Once in the Main menu, choose an item by typing its first letter. For instance, say you choose /File Save from the Main menu. This moves you from the Main menu to the File menu, and then selects the Save command. If you are already in the File menu, you do not move through that menu again to get to the command. Typing Save (if you are in the File menu) is sufficient.

The layering of menus is most obvious when you use cursor movement keys to choose items. Only one menu is displayed at a time on the Menu line. When you highlight a command from the menu, an explanation of its purpose or a new menu appears just below the current menu. Choosing a command brings up additional explanations or menus until you finish the series.

The Main menu has 12 choices. Four of the menu choices are the /Move, /Copy, /System, and /Quit commands. These important commands are used like other menu commands. Unlike the other menu commands, however, they have no submenus. The other eight items each have submenus with commands that govern a certain aspect of the SCO Professional program. They are /Worksheet, /Range, /File, /Data, /Graph, /Print, /Learn, and /Transfer.

SCO Professional usually returns to the READY mode after the command or command series has been executed. You can then enter another command or start entering data in your worksheet. However, there are times when SCO Professional anticipates that you may be issuing several commands in succession. In that event, select Quit if you want to return to the READY mode.

Selecting Commands by Using the
Arrow Keys

By using the ⟨Left⟩, ⟨Right⟩, ⟨Home⟩, ⟨End⟩ keys, you can move back and forth along the row, highlighting each item in turn. If you press ⟨Return⟩ while any command is highlighted, that command is executed, including those leading to "lower" menus if applicable. If you do not want to make any of the selections, press ⟨Escape⟩ until you return to the READY mode, or press the ⟨Break⟩ key.

Selecting Commands by Typing Command Letters

The other way to select a command is by typing the first letter of the command of your choice. If you are in READY mode, begin the command sequence with a slash, /. This tells SCO Professional that the letters that you are about to type are a menu command, not a label.

SCO Professional recognizes a command by its first letter and moves on to the next step of the command. For example, if you want to retrieve a worksheet you worked on previously, type /FR. The slash puts you in the Main menu, F chooses the File submenu, and R chooses the Retrieve command. Notice that there is no need to press ⟨Return⟩ to enter your menu command choices unless it is required as part of the command-prompt sequence.

If you make a mistake while typing command letters, you can use ⟨Escape⟩ to back up one step at a time in your command sequence. For instance, if you type /File Save, but you really want /File Retrieve instead, you can press ⟨Escape⟩ once. This takes you back to the /File menu. From this point, all you need to do is type Retrieve. On the other hand, if you want to escape from the entire sequence, press the ⟨Break⟩ key to return to the READY mode.

Using On-Line Help

On-line help is available at any time. To get help, press the ⟨Help⟩ key. SCO Professional automatically displays a help topic based on your current status within the program. For more detailed help, and to access the Help menu, press the ⟨Help⟩ key again.

Here is the main Help menu:

```
F1 again for more HELP          Back Next Index Related Search Help Quit Next
page please
```

The help text can be a few sentences or several screens full of information, depending on the complexity of the command or menu. Generally, the help text explains why you would need to use the command and summarizes the steps involved with using it. Help text can also describe features that are typically used with the current command.

At the end of each topic, the help screen shows a list of related topics for additional information. At the same time, the menu command shifts to Quit, so that you can return to the application from which you started by pressing ⟨Return⟩.

Here are descriptions of the choices available on the Help menu:

Help Menu Commands

Command	Action
Continue	Scrolls down if the help text is longer than one screen
Back	Returns to a previous help topic
Next	Moves to the next topic in the help stack
Index	Displays a general index of help topics
Related	Displays topics that are related to the current topic
Search	Goes directly to a specific topic without having to sort through the levels of help screens
Help	Displays additional information on the help facility
Quit	Returns to the menu where you first accessed help

Using Shell Escapes

A shell escape allows you to perform one operating system command (such as viewing another file) without ending your SCO Professional session. You can use the shell escape by pressing the ! key while any SCO Professional menu is displayed. In the example below, the command about to be executed will view the text file *new*:

```
A1:                                                          EDIT
!cat new
Enter shell command
          A          B       C         D        E        F        G        H
      1
      2
      3
      4
      5
      6
      7
      8
```

Once you enter your shell command and press ⟨Return⟩, your screen is cleared and the output of your command is displayed. Once the command is executed, you are asked to press any key to continue. After you do this, the screen is redrawn exactly as it was before you left to do your shell escape, and you are returned to the same menu you escaped from.

T e shell escape feature can be disabled by executing SCO Professional using the command line flag procalc -s. If this -s flag is used, then typing ! while a menu is displayed results in a beep, as it does when any other invalid character is entered. Other flags are discussed in Appendix B, "Command Line Flags."

In addition to using the ! character to perform one shell escape, you can use the /System command to exit to the operating system and perform multiple commands.

To exit to the operating system:

■ Select /System. The operating system prompt is displayed.

To return to SCO Professional from the operating system:

■ Enter **exit** at the operating system prompt. You return to the SCO Professional worksheet screen.

Different Types of Worksheet Data

SCO Professional differentiates between two types of data: VALUES and LABELS. In addition, SCO Professional recognizes FORMULAS as a complicated form of values. These distinctions are important when it comes to entering data, formatting your worksheet, creating formulas, and performing calculations. For example, it is important for SCO Professional to recognize that an entry such as *2-91* may represent the formula 2 minus 91, or it may represent a label for February of 1991. The first character of an entry lets SCO Professional know the type of entry it is.

Values are used in calculations throughout most worksheets. Values are typed as numbers and entered by pressing ⟨Return⟩.

Labels are usually text. They can act as column or row headings, or provide descriptive information about the worksheet. When you start typing text, as opposed to numbers or operational signs, SCO Professional goes into the LABEL mode.

One difference between values and labels occurs when the entry is too large to fit in the cell. If a value is too large, asterisks are displayed throughout the cell. A label, on the other hand, spills over into the cell to the right if it does not fit, provided that the cell to the right is empty. This feature allows you to add sentences or even paragraphs of explanatory text to your worksheet:

```
A3: Revenues-Production Cost & Operation Cost by Product          READY

  1              ·                      XYZ Corporation
  2
  3       Revenues-Production Cost & Operation Cost by Product
  4            Year-to-Date For Months Ended December 31, 1991
  5
  6
  7  REVENUES                    |     ADD     WRITE     DRAW
  8  ----------------------------|--------------------------------
  9     Distributors             |   50,432    6,865    35,920
 10     Dealers                  |   22,641    4,512    32,741
 11     Telemarketing            |   19,760   92,736    53,876
 12     Mail Order               |  129,443   65,003   102,906
 13     Strategics               |   19,995   15,987    59,876
 14     Retail                   |  199,874   87,365   399,865
 15                              |
 16       TOTAL REVENUES         |  442,145  273,068   685,184
 17 ===========================  |================================
 18  OPERATION COST              |
 19 ----------------------------|------------------------------- 14-Feb-91
08:00 AM
```

Four special characters, called LABEL PREFIXES, let you know that the characters to follow compose a label and indicate where in the cell that label is positioned. The four prefixes and their effects are as follows:

Label Prefixes

Character	Alignment
Single-quote (')	Left alignment
Double-quote (")	Right alignment
Caret (^)	Centering
Backslash (\)	Repeats the keystroke series across the cell

For instance, in an entry such as *3rd Quarter*, SCO Professional might assume from the first character that it is a value. However, using the character ' as a prefix leaves no doubt that you intend it to be a label and that it should be aligned to the left edge of its cell. Label-prefixes are discussed further in Chapter 5, "Changing the Worksheet Format."

Formulas are basically complicated values. A narrower definition of a formula is that it is a calculation that results in a value. The resulting value, and not the formula that calculated it, is displayed in the worksheet. Formulas are discussed fully in Chapter 3, "Using Formulas and Functions."

Entering Data

You can type an entry (value or label) or issue a command whenever you are in READY mode. If you type an entry, you must enter (or "set") it in the cell by pressing ⟨Return⟩ or by using one of the cursor movement keys. Once you have set an entry, SCO Professional returns you to the READY mode.

While you are typing the entry, it appears on the edit line so you can see what you typed. A cursor indicates the position your next character will occupy. You can edit entries in either of two ways: by pressing the ⟨Edit⟩ key to enter EDIT mode, or by retyping the new entry followed by either a ⟨Return⟩ or a cursor movement key. The entry in the current cell appears on the status line as well as in the cell.

SCO Professional may also present you with a default entry that appears automatically on the screen in response to a prompt. Default entries are based on the premise that it is easier to revise an existing entry than to type a new one. You can accept this entry by pressing ⟨Return⟩; revise this entry by entering EDIT mode; or delete this entry and enter one of your choice by pressing ⟨Escape⟩, then entering your data and pressing ⟨Return⟩.

The arrow keys and other cursor movement keys can also be used to set entries in the LABEL and VALUE modes. After setting an entry, a movement key changes your position on the worksheet according to its function. For example, if you use the ⟨Right⟩ key to set an entry, the cell indicator moves one cell to the right. The movement keys are not used to set data from the EDIT mode, as the EDIT mode has its own uses for the movement keys.

Using the Keyboard

You may be using a personal computer with a CONSOLE, which serves as an interactive interface for a single user, or you may be one of several users connected to a single computer by a TERMINAL. The console and the terminal each have a screen and a keyboard, but the console can have special capabilities not available on a terminal.

SCO Professional has many special functions that use the extra keys that may be on your keyboard.

If your terminal has not been configured, then refer to Chapter 13, "Using the Professional Manager." In addition, refer there to configure special keys such as the ⟨PrintScreen⟩ key. This special key allows you to send a copy of what is on the screen, minus any highlighting, to a pre-defined file or printer.

The following table lists all the key sequences used for moving around a worksheet and for special functions. See the section "Conventions Used in This Guide" in the "Preface" of this guide for a table of the keyboard sequences associated with these functions. For more information on the movement keys, refer to the *SCO Professional Tutorial*. Information on how the functions of the keys change in other modes appears later in this chapter.

Keyboard Functions

Key	Action
Abort	Unconditional termination of SCO Professional
Break	Returns to READY mode
Down	Moves cell pointer one cell down
End *arrow*	Moves cell pointer to end of block in direction of arrow key*
End Home	Moves cell pointer to bottom right of worksheet
Escape	Escapes current entry or submenu
Execute *letter*	Executes macro named *letter*
Home	Moves cell pointer to top left of worksheet
Left	Moves cell pointer one cell left
PageDown	Moves cell pointer one page down
PageLeft	Moves cell pointer one page left
PageRight	Moves cell pointer one page right
PageUp	Moves cell pointer one page up
Refresh	Redraws (refreshes) screen
Right	Moves cell pointer one cell right
ScrollLock	Toggles Scroll Lock (window scroll)
Step	Toggles Single-Step mode for macros
Up	Moves cell pointer one cell up
!	Shell escape from menus

*End of block moves the cell pointer to the end of a current block of data. If you are in an empty area, it moves to the first cell of the new block.

How Modes Affect Keyboard Commands

As stated earlier, different keystrokes behave differently depending upon which mode SCO Professional is in.

READY Mode

When you are in the READY mode, use the cursor control keys to move around the worksheet. For more information on the cursor control keys, see the *SCO Professional Quick Access Guide* or Chapter 1 of the *SCO Professional Tutorial*, "Getting to Know SCO Professional."

LABEL, VALUE, and POINT Modes

In the LABEL and VALUE modes, use the ⟨Escape⟩ key to move backward one step at a time toward the READY mode. Use the ⟨Break⟩ key to return immediately to the READY mode.

Using ⟨Escape⟩ from the VALUE or LABEL modes cancels your entry and returns you to READY mode.

Pressing the ⟨Backspace⟩ key moves the cursor backward one space and erases one character.

In POINT mode, press ⟨Escape⟩ twice or ⟨Break⟩ once to return to READY mode.

Not only do you revert to the previous mode each time you press ⟨Escape⟩, but any cell you have just pointed to has its address removed from the formula you are entering. The ⟨Backspace⟩ key deletes the cell reference you just made and replaces it with the cell address of the formula cell. This can result in a circular reference (a formula using a reference that depends on the formula itself).

EDIT Mode

In EDIT mode, the following keys have the specified functions:

EDIT Mode Functions

Key	Action
Backspace	Erases character preceding cursor
Break	Returns to READY mode
Calculate	Changes formula to its result
Delete	Erases character under cursor
Delete EOL	Deletes to end of line
Delete Word	Deletes a word
Edit	Returns to previous mode
End	Moves cursor to last character of entry
Escape	Cancels editing of entry
Home	Moves cursor to first character of entry
Insert	Toggles between overstrike and insert modes
Left	Moves cursor 1 character left
PageLeft	Moves cursor 5 characters left
PageRight	Moves cursor 5 characters right
Right	Moves cursor 1 character right

In addition to using the Delete, Backspace, and movement functions as shown earlier in this chapter, you may also insert characters while you are in the EDIT mode. By default, SCO Professional does not replace existing characters with those that are typed. Instead, SCO Professional inserts the new characters at the spot indicated by the position of the cursor and shifts the remaining characters to the right. You can replace existing characters by pressing the ⟨Insert⟩ key. The ⟨Insert⟩ key toggles between overstrike and insert modes. To return to insert mode, press ⟨Insert⟩.

Use the movement keys in the EDIT mode to move to a certain area in the label or value that needs to be corrected. Correct the mistakes by inserting characters and using ⟨Backspace⟩ and ⟨Delete⟩.

END Mode

In END mode, the following keys have the specified functions:

END Mode Functions

Key	Action
Down	Moves cell pointer down to the end of the current block
End	Returns SCO Professional to the previous mode (turns END mode off)
Go Down	Moves cell pointer to bottom of current column
Go Left	Moves cell pointer to beginning of current row
Go Right	Moves cell pointer to end of current row
Go Up	Moves cell pointer to top of current column
Home	Moves cell pointer to the bottom right of worksheet
Left	Moves cell pointer left to the end of the current block
Right	Moves cell pointer right to the end of the current block
Up	Moves cell pointer up to the end of the current block

Special Keys

SCO Professional has 10 special functions related to various aspects of the program. These special functions are discussed further in the sections that pertain to them. The following is an overview of these special functions.

The functions default to the 10 function keys. If your keyboard has no function keys, see "Conventions Used in This Guide" in the "Preface" of this guide for the default keyboard sequences. These special functions are configurable to any desired key or key sequence. See Chapter 13, "Using the Professional Manager," for information on how to configure these special keys.

Special Functions

Key Name	Action
Help	Offers condensed explanations of available commands along with directions on their execution. Press 〈Escape〉 to return to the worksheet.
Edit	〈Edit〉 key Allows you to edit the value or label entry of the cell in which the cell pointer currently resides. Press 〈Return〉 or a cursor control key to set the label or value. SCO Professional returns you to the READY mode. If you are in the EDIT mode when you use this function, SCO Professional returns you to the previous mode.
Name	Displays a list of your worksheet's currently named ranges. This function works when you are prompted for a range while in POINT mode. You can clear the list by choosing a name. (Point to one of its names and select it by typing 〈Return〉, or press 〈Escape〉.)
Absolute	Causes the cell or range that you are referencing in a formula to be a relative, absolute, or mixed reference. (See Chapter 3, "Using Formulas and Functions," for a discussion of the three types of references.) Before using 〈Absolute〉, point to the cell whose address you wish to use in the formula; for instance, A1. Press 〈Absolute〉 to make the cell reference absolute (A1). If you continue to use 〈Absolute〉, the address cycles through the possibilities from completely absolute to mixed ($A1 and A$1) to completely relative (A1). When the desired address type has been obtained, return to the formula by typing the next operator or pressing 〈Return〉.
GoTo	Moves you to any cell address you specify. It can also be used to reach cells normally inaccessible in a Titles area (created by the /Worksheet Titles command).

(Continued on next page.)

Special Functions (*Continued*)

Key Name	Action
Window	Use this function after you have created two different windows with the /Worksheet Window command. By using this function, you can move from one window to another. For information on how to view multiple worksheets, see Chapter 7, "Using Multiple Worksheets." For information on windows in general, see Chapter 5, "Changing the Worksheet Format."
Query	Use this function after you use the /Data Query command to find certain records. You may wish to repeat the command, particularly if you have made changes to the data. The ⟨Query⟩ key reapplies the command using the most recently specified Input and Cr terion ranges. The query function also executes any existing SQL calls in the worksheet. See Chapter 11, "Working with Databases," and Chapter 12, "Exchanging Data between Applications," for more information on this function.
Table	Allows you to recalculate a table after you have invoked the /Data Table command. This function recalculates the most recently used Data Table. The ⟨Table⟩ key also uses the most recent input cell(s) in its calculation. If you have just erased all the specifications by using /Data Table Reset, this function is disabled until you specify another range and input cell(s).
Calculate	Forces a recalculation of the entire sheet. It may be used at any time. However, it is most often used in either of two situations. The first is when you have selected manual recalculation. When you enter data after having chosen manual recalculation, the program does not recalculate the sheet automatically. Instead, you must manually force recalculation when you have finished

(Continued on next page.)

Special Functions (*Continued*)

Key Name	Action

Calculate
(*continued*)

entering your data. The CALC message indicates that pressing the ⟨Calc⟩ key would update the worksheet. See Chapter 3, "Using Formulas and Functions," for more information about setting calculation formats.

You can also use the ⟨Calculate⟩ key to find the result of a formula — as a sort of built-in calculator. Whenever you are in the VALUE or EDIT mode and are working on a formula, you can press the ⟨Calculate⟩ key to make the program calculate the result of the formula on the edit line. This permanently changes the formula into the resulting value. If you wish to continue to use the formula as is, you should first enter it into a cell, and enter EDIT mode, which produces a duplicate of the entered formula. Then press ⟨Calculate⟩, and the resulting value appears on the edit line. Do not enter this value. Instead, press ⟨Escape⟩. The evaluation of the formula is erased, and the previously entered version remains. See the discussion of the /Range Value command in Chapter 4, "Copying and Moving Worksheet Data," for information on how to apply this concept to an entire range.

Graph

This function is identical to the /Graph View command. Used in the READY mode, it allows you to see the most recently defined graph. This function is particularly helpful when you are working on a graph and want to see how all the changes made in a worksheet affect your graph. As with the /Graph View command, once you have finished viewing the graph, you can return to your worksheet by pressing ⟨Escape⟩. For more information on graphs, refer to Chapter 9, "Creating Graphs."

1

Using a Mouse

If your computer or terminal is equipped with a MOUSE, you can use it with SCO Professional instead of your terminal's cursor movement keys, ⟨Escape⟩ key, ⟨Return⟩ key, and other keys. The mouse significantly reduces the need for entering keystroke commands.

Specifically, you can use the mouse to:

- scroll the worksheet horizontally or vertically,

- leave the worksheet for the Main menu,

- make selections from a menu,

- escape from a menu or from a menu selection,

- select items in point-and-pick lists,

- move to and select a cell, and

- select a range of cells.

What the Mouse Buttons Do

On a standard three-button mouse, SCO Professional uses the left mouse button to select worksheet cells, the Main menu, commands in menus, and listed items. Just move the mouse cursor to the thing that you want to select and press or "click" the left-hand button.

The center button acts like the ⟨Return⟩ key. Many operations in SCO Professional require you to select a cell or cells and then press ⟨Return⟩. The center button makes it unnecessary to move your hand from the mouse to the ⟨Return⟩ key.

The mouse's right button acts like the ⟨Escape⟩ key. Use it when you want to escape from a menu to the worksheet, or escape from any procedure.

If you have a two-button mouse, the left button selects and the right button acts like the ⟨Escape⟩ key. Use your keyboard ⟨Return⟩ key for the functions performed by the three-button mouse's center button.
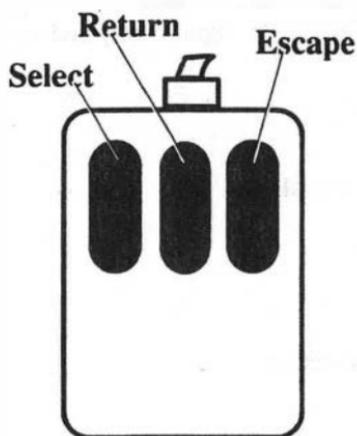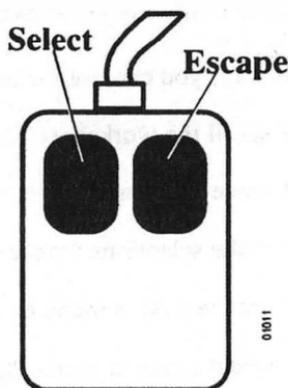
Three-button mouse   Two-button mouse

Scrolling through the Worksheet

The worksheet's borders, which display the worksheet's row numbers and column letters, interact with your mouse like scroll bars. Use them to move other parts of the worksheet onto the screen.

You can scroll horizontally either a column at a time or a "page" (eight columns) at a time. Similarly, you can scroll vertically one row at a time or one page (20 rows) at a time. The page size may vary, depending on your terminal and the layout of your worksheet.

Scrolling Horizontally

To move your view of the worksheet one column to the right, place the mouse cursor anywhere in the right half of the column border, except at the right end. Then press the left mouse button. In response, the cell pointer moves one column to the right. For example, in the following illustration the mouse cursor between F and G is in a position that is correct for moving the cell pointer from cell A1 to B1. If the cell pointer is in the far right column, the next column in the worksheet scrolls onto the screen.

1

To move the cell pointer one column to the left, place the mouse cursor in the left half of the column border before clicking the button.
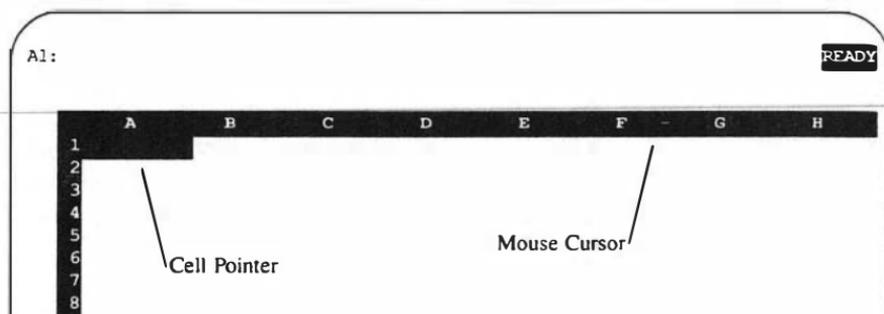
To scroll the worksheet one page to the right or left, move the mouse cursor to the far right or left end of the border and press the left mouse button. If you are scrolling to the right, position the mouse to the right of the last column letter if possible. For example, the mouse cursor in the following illustration is to the right of the "H" character. If you press the left mouse button when the mouse cursor is in this position, the cell pointer moves a page (eight columns) to the right. If scrolling to the left, position the mouse to the left of the first column letter.
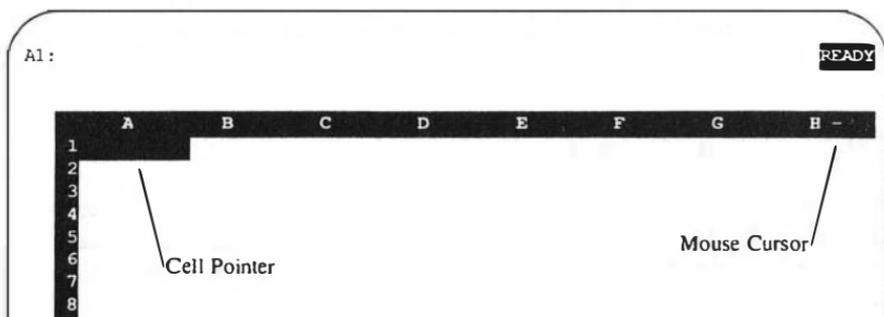
If you are using SCO Professional in a **scoterm** window, the mouse cursor appears as an arrow ($\rightarrow$) when it is in the correct position to move the cell pointer one column at a time. If the mouse cursor is at the end of the column border, where you can move the cell pointer a page at a time, the

shape of the cursor changes to an arrow and a vertical line (→). When the mouse cursor is in the middle of the column border, where it does not move the cell pointer, it changes to an X.

Scrolling Vertically

To move down through the worksheet one row at a time, first place the mouse cursor anywhere in the bottom half of the row border except by the last two rows. Then press the left mouse button. In response, the cell pointer moves down one row. If the pointer is already in the bottom row, the next row scrolls onto the screen.

To scroll up one row, just put the mouse cursor in the top half of the row border when you press the mouse button.

To scroll the worksheet one page up or down, put the cursor at the very top or bottom of the border and press the mouse button. To scroll up a page, put the cursor in the border by the first or second row. To scroll down a page, put the cursor by the last or next-to-last row.

If you are using SCO Professional in a **scoterm** window, similar changes in the appearance of the mouse cursor occur for vertical scrolling as those described for horizontal scrolling. The shape of the mouse cursor changes to an arrow if the cell pointer can move up or down a row. It becomes an arrow and line when the cell pointer can move up or down a page, and it is an X when clicking the left mouse button does not move the cell pointer at all.

Using Menus with a Mouse

To reach the Main menu, move the mouse cursor to the status area at the top of the screen and press the left mouse button. The Main menu appears. To escape from the menu back to the worksheet, press the right mouse button, which acts like the ⟨Escape⟩ key. The menu disappears.

To select an option from a menu, move the mouse cursor to the option you want and press the left mouse button. Notice that as you move the mouse cursor from one option to another, each one becomes highlighted, and the description line changes to tell you about the highlighted option.

1

Selecting Items in Point and Pick Lists

Some menu commands and form fields in SCO Professional present you with point-and-pick lists. The mouse provides a simple way for you to use these lists.

To select an item in a point-and-pick list, move the mouse up or down to move the highlight to the item you want, then click either the left or center mouse button to select the item. The point-and-pick list closes and your choice takes effect.

Selecting a Cell

To select a cell, move the mouse cursor to the cell you want and then press the left mouse button. The cell pointer (the highlighted area on the worksheet) now moves to that cell. You can use this technique to select any cell that is currently displayed on the screen. To move to a different part of the worksheet, however, you must use the commands described in the preceding sections on scrolling.

If there are two windows on the screen, you can move from cell to cell in either window, but if you want to select a cell in a different window, you must first press ⟨F6⟩. The mouse cursor appears in the new window, and you can move it and select cells with the mouse.

Marking a Range of Cells

Many operations in SCO Professional prompt you to mark the range of cells that you want the operation to affect. This section shows how to mark the boundaries of a range with your mouse.

A RANGE is a rectangular portion of the worksheet made up of one or more worksheet cells. You specify a range by selecting the cell at the upper left corner of the range and the cell at the lower right corner.

When your work with SCO Professional requires that you specify a range, you can follow this procedure.

1. SCO Professional prompts you to enter the first cell of the range. Move the mouse cursor to the cell at the top left corner of the group of cells you want to mark. Then click the left mouse button. The program responds by highlighting the cell.

2. SCO Professional then prompts you to enter the last cell of the range. Move the mouse cursor to the lower right corner of the group of cells and click the left mouse button again. The entire range becomes highlighted. If the lower right corner of the range you want to specify is off the screen, use the scrolling techniques described earlier in "Scrolling through the Worksheet" to move there.

   You can change a selected range by moving the cursor and clicking the left mouse button again. You can also move to a cell that is above or to the left of the first cell you selected.

3. When the range you want to select is highlighted, click the center mouse button, which acts like the ⟨Return⟩ key. SCO Professional now performs the operation you requested on the range of cells you selected.

   To de-select a range, so you can select just part of it or a different range, press the right mouse button, which acts like the ⟨Escape⟩ key.

For in-depth information on ranges, see "Using Ranges" in Chapter 2, "Worksheet Basics."

Exiting SCO Professional

There are several ways to leave SCO Professional, depending on how you entered the application and whether or not you want to save your worksheet when leaving.

To exit SCO Professional while in READY mode:

1. Select /Quit. SCO Professional displays three commands: Save, Yes, and No.

   ■ Select Save to save the current worksheet. If the worksheet has been saved before, SCO Professional displays three commands: Cancel, Replace, and Backup.

      Select Cancel to cancel the Quit command. To replace the old version of the worksheet with the new version, select Replace. Select Backup to save the new version of the worksheet and create a backup copy of the old version. This backup copy is stored in the directory specified by the BACKUPDIR environment variable, which is described in detail in Chapter 1 of the *SCO Professional Configuration Guide*.

   ■ Select Yes to exit SCO Professional without saving your changes to the current worksheet.

   ■ Select /Quit No to cancel the Quit command and remain in SCO Professional.

2. After you select either /Quit Save or /Quit Yes, SCO Professional displays the Main Manager menu. To return to the operating system, select Quit. SCO Professional displays two commands: No and Yes.

   ■ Select Yes to return to the operating system.

   ■ Select No to return to the Main Manager menu.

3. Choose Yes. You return to the operating system.

To exit from any level of SCO Professional, press the ⟨Abort⟩ key.

For example. from the File menu, pressing ⟨Abort⟩ once returns you to the Main Manager menu. Press ⟨Abort⟩ a second time to return to the operating system.

You cannot save by quitting with this command sequence, and SCO Professional does not prompt you to save your file.

■ **NOTE:** If you entered SCO Professional by typing **procalc** and you do not want to save your worksheet, the same three choices apply. However, both choices bypass the Main Manager menu by leading directly from the worksheet to the operating system.

Chapter 2

Worksheet Basics

2

Worksheet Basics

The previous chapter introduced you to the worksheet and showed you how to do basic data entry. In this chapter, you learn how and when to specify a RANGE of data; how to create, save, and retrieve various worksheet files; and how to set up printer and directory defaults for your system.

Contents of This Chapter

This chapter is organized into the following sections:

- "Using Ranges" introduces you to data ranges and shows you how to specify and use them.

- "Using SCO Professional Files" defines the File menu and the three types of files used by SCO Professional; it also tells how to create, name, save, retrieve, and list these files.

- "Setting Worksheet Defaults" explains how to set up defaults that affect the format of your printed worksheet.

- "Worksheet Status" describes how to display certain global settings of your worksheet.

Using Ranges

A RANGE, a rectangular group of one or more worksheet cells, has many uses in SCO Professional. Ranges may be copied or moved from one area to another, formatted for text or graph printing, or saved to a file. The upcoming chapters describe the commands used to complete these actions; this chapter introduces you to ranges and how to specify them at the appropriate time.

Multi-celled ranges are delimited by two cells, the ANCHOR cell and the FREE cell. The anchor cell is the first cell of the range, and its location remains fixed unless changed by using the anchor-cell rotation shown later in this chapter. The free cell, located diagonally from the anchor cell, is moved to expand or shrink the dimensions of the range. When ranges consist of only one cell, the anchor and free cells are the same. Range dimensions are always rectangular, and can describe single cells, rows, columns, or any other type of rectangular area.

Each range can consist of a size of anywhere from one cell to the entire worksheet. However, if you want to convert your worksheet to a format that can be used by another spreadsheet program, you need to be conscious of that spreadsheet's size limitations. To be sure that you do not create a range that is too large for another format, you may want to invoke SCO Professional with the -w option. This option, described in Appendix B, "Command Line Flags," of this guide, sets the worksheet width to any desired multiple of 128 columns up to a total size of 1024 columns.

When to Specify a Range

Many of SCO Professional's commands require that one or more ranges be specified. SCO Professional prompts you when a range is required as part of a command. Ranges can also be specified when entering or editing worksheet formulas.

With some commands, SCO Professional remembers ranges from the first time you defined them and displays them if you use the command again. To accept the default value displayed, press ⟨Return⟩. To change a displayed range, press ⟨Escape⟩ and then specify a range of your choice by following the procedure outlined in the following section.

How to Specify a Range

You can specify ranges in several ways: by using your arrow and other movement keys, by typing the cell coordinates of the range's anchor and free cells, or by entering the name of a previously defined range. If a named range does not exist for the range you want to specify, you may want to use the /Range Name command shown later in this chapter to define one. After you name a range, you can easily use it later by entering the name, as opposed to cell coordinates, when prompted.

To use your arrow and other movement keys to specify a range:

1.   Move the cursor to the anchor cell.

2.   Press the period (.) key to set the anchor cell. SCO Professional displays the anchor cell coordinates in the edit line, followed by two periods and the current cell address of the free cell.

3.   Move the cursor to the desired free cell. SCO Professional highlights the range as you move the free cell, and the edit line changes to reflect the current free cell location.

4.   If you want to change the anchor cell when specifying a range, press the period key while in POINT mode. Every time you type a period, the anchor cell moves to the next corner of your range in a clockwise fashion. The free cell remains diagonally located from the new anchor cell. This rotation allows you to pull your range in any direction.

5.   Once you have specified the correct anchor and free cells, press ⟨Return⟩. SCO Professional displays your range next to the range prompt.

You can also specify ranges by typing the cell addresses. Type the cell address of the anchor cell, a period, and the cell address of the free cell. Press ⟨Return⟩ to enter the range address.

If you previously used the /Range Name command to name the range you want to specify, enter the range name when prompted for a range address.

Using Named Ranges

SCO Professional allows you to give a name to each worksheet range that you specify. This is particularly useful if you want to refer to a particular range or ranges frequently. It also provides a means of documenting your worksheet. For example, the formula @SUM(SUBTOTALS) is much more informative than the formula @SUM(B2..H2). Named ranges are easy to refer to and specify, and are saved along with your worksheet when you use the /File Save command described later in this chapter.

Four commands relate specifically to range names: /Range Name Create, /Range Name Delete, /Range Name Reset, and /Range Name Table. In addition, /Range Name Labels is a special command you can use to name a series of single-celled ranges.

Creating Named Ranges

The /Range Name Create command assigns a name to a certain range. Once a range is named, you can revise its boundaries at any time by changing the position of its anchor and free cells.

You can enter range names of upper- or lowercase letters. SCO Professional stores and displays all letters in uppercase. Range names can be up to 15 characters long. To avoid confusion with labels, values, and formulas, we suggest that you do not use space characters or the @, +, -, *, /, and ^ characters. For the same reason, we advise that you not use range names that look like cell addresses.

To name a range:

1.   Select /Range Name Create. SCO Professional prompts you for a range name.

2.   Type a name of your choice and press ⟨Return⟩.

2

3.   Specify the range using one of the methods (arrow keys or typing) described earlier in this chapter.

You can also use /Range Name Create to view a previously named range:

1.   Select /Range Name Create.

2.   Select a range to display by highlighting its name with the arrow keys or by typing the name; then press ⟨Return⟩.

      or:

      Press the ⟨Name⟩ key for a full-screen listing of range names and coordinates.

3.   To return to READY mode without displaying any range, press ⟨Break⟩.

To redefine a range after you have named it with /Range Name Create:

1.   Select /Range Name Create.

2.   Select a range to redefine by highlighting its name with the arrow keys or by typing the name; then press ⟨Return⟩.

3.   Redefine the range by using the arrow keys or by typing the range coordinates; press ⟨Return⟩when

SCO Professional updates all formulas that referred to the old range coordinates to reflect the changes made.

You can move to a named range by using the ⟨GoTo⟩ and ⟨Name⟩ keys:

1. Press the ⟨GoTo⟩key, ⟨Name⟩key. SCO Professional displays a list of named ranges beneath the Edit line.

2. Select a range to move to by highlighting its name with the arrow keys or by typing the name; then press ⟨Return⟩. You are moved to the top left-hand corner of the specified range.

For more information on the ⟨GoTo⟩ and ⟨Name⟩ keys, see Chapter 1, "Getting Started," in this guide.

Deleting a Named Range

Use the /Range Name Delete command to delete range names that are no longer needed. When deleted, the name ceases to appear on the range name display, and cannot be used to refer to a range in the future. However, the cell contents of the range are unaffected.

To remove a range name:

1. Select /Range Name Delete.

2. Indicate the name that you want deleted, either by typing it or by highlighting it from the list that is automatically displayed. Press ⟨Return⟩to

Formulas with cell references that previously referred to the range by name now refer to the range by using relative cell addresses.

Deleting All Named Ranges

Use the /Range Name Reset command to delete all range names from your worksheet:

1. Choose /Range Name Reset. SCO Professional deletes all range names from the range name list.

All formulas that previously referenced cells by range name now use cell addresses. Only after you create new range names can Range Name commands be executed.

Labelling Named Ranges

Use the /Range Name Labels command to name several single-celled ranges with the contents of adjacent cells.You can name any range with the /Range Name Create command; however, when several cells in a row contain data, and each has an identifying label located directly above, below, to the left or to the right of it, using the /Range Name Labels command to name all the ranges at once is easier. The name of each range derives from the adjacent label. When you are using /Range Name Labels, the labels must be all to the left, all to the right, all below, or all above the value cells. In the example below, single-celled ranges from B9 to B14 are named with labels from A9 to A14:

```
A14: [W30] '  Retail                                              POINT
Enter label range: A9..A14
```

```
1
2                                        XYZ Corporation
3           Revenues-Production Cost & Operation Cost by Product
4               Year-to-Date For Months Ended December 31, 1991
5
6
7  REVENUES                      ADD      WRITE      DRAW      CALC
8
9   Distributors              50,432     6,865    35,920    43,876
10  Dealers                   22,641     4,512    32,741     3,246
11  Telemarketing             19,760    92,736    53,876    47,247
12  Mail Order               129,443    65,003   102,906    38,390
13  Strategics                19,995    15,987    59,876       875
14  Retail                   199,874    87,965   399,865    63,404
15
16     TOTAL REVENUES        442,145   273,068   685,184   197,038
17  ================================================================
18  OPERATION COST
19
14-Feb-91   08:00 AM
```

To label multiple ranges with adjacent labels:

1. Select /Range Name Labels.

2. Specify whether you want to use these labels as names for the value cells to the right or left, above, or below the label cells (**Right**, **Left**, **Up**, or **Down**).

3. Specify the range of labels that you want to use. Remember, as with all range names, SCO Professional can only use the first 15 characters of the label in the range name.

Once you have named a series of value cells using the /Range Name Labels command, you can then use any of the individual range names to refer to the corresponding cell, just like any other range name.

Creating a Table of Named Ranges

You can list all of your defined range names on the worksheet by using the /Range Name Table command. This command places the name and location of each range that you have defined in a table whose worksheet coordinates you specify.

To create a table of named ranges:

1. Select /Range Name Table.

2. Be sure that the area you selected does not contain any data; the table overwrites any previously existing information. When you are certain that you will not overwrite any necessary data, press ⟨Return⟩.

3. Your table now appears:

```
P9: 'ADD                                                          READY

        K        L        M      N    O      P           Q
6
7  Training Service   TOTAL    |
8
9   25,507   13,250    229,614  |          ADD        C9..C14
10  34,710   27,710    208,753  |          CALC       F9..F14
11       0        0    278,815  |          DRAW       E9..E14
12 209,965   73,580    912,184  |          WRITE      D9..D14
13   1,249        0    107,432  |          TOTAL      A16..E16
14 232,511    7,925  1,373,137  |
15
16 503,942  122,465  3,109,935  |
17
18
19
20 306,564  108,851    630,518  |
21       0        0     53,250  |
22
23 306,564  108,951    683,768  |
24                              | 14-Feb-91  08:00 AM
```

Erasing the Contents of a Range

Use the /Range Erase command to erase the contents of a selected range. The /Range Erase command does not require confirmation before erasing. Therefore, use it with care.

To erase the contents of a range:

1. Select **/R**ange **E**rase.

2. Specify the range that you want to erase by entering its name or typing the cell coordinates; then press bY "Return".

Formatting Ranges

You can set a variety of date, time, punctuation, numeric, and currency settings for a particular range by using various /Range Format commands. For a complete description of these commands, see Chapter 5, "Changing the Worksheet Format."

Using SCO Professional Files

When you finish your SCO Professional session, you need the ability to save your work. SCO Professional File commands allow you not only to save your worksheet, but also to retrieve or combine entire worksheets or portions of them.

SCO Professional supports several types of FILE formats to store worksheet information. Each worksheet file stores a different worksheet, while graph and print files store graphs and print copies, respectively.

SCO Professional uses directories to hold your files. Your current directory is the one to which your files are saved, unless an alternate directory is specified either during the saving procedure or by means of the /Worksheet Global Default Directory or /File Directory commands discussed later in this chapter.

Types of Files

As explained above, SCO Professional uses three different types of files to store data. Each one contains a different type of information, and each is manipulated differently:

■ Worksheet files store raw worksheet data. You can manipulate them by using the various File commands.

■ Graph files store the graphs that you create. You make these files from within the Graph menu, and print them from either the Graph menu or the Professional Manager's GraphPrint utility. File commands do not affect graph files.

■ Print files reflect the contents of worksheet files and contain only the resultant information, not the worksheet structure. You can both create and print these files from within the Print menu. They consist of standard ASCII text and can be viewed and modified with standard operating system utilities and editors. Print files also serve as the bridge between importing and exporting standard files from other programs. File commands do not affect print files.

2

All three types of files can be moved, renamed, deleted, or copied by using the Professional Manager's File-Manager utility, as described in Chapter 13, "Using the Professional Manager," of this guide.

SCO Professional distinguishes the three types of files by their FILENAME extensions. A filename extension consists of a period (.) followed by three letters. The filename extensions are *.wks* for worksheet (Lotus 1-2-3's worksheet format), *.gph* for graph, and *.prn* for print. No space characters are allowed between the filename and its extension, and filename extensions must be lowercase for SCO Professional to recognize them.

SCO Professional adds the filename extension automatically. For example, SCO Professional stores a graph file named *accts91* as *accts91.gph*. Inside SCO Professional, you may specify filenames without the extensions. However, when using the Professional Manager, you must specify complete filenames, including the appropriate extensions.

Naming Your Files

You must store each file under its own unique filename. Then, when you want to retrieve a file, the computer can locate the correct one from among all of the available files. No two files in the same directory can have the same name. If you use the same name twice, SCO Professional replaces the contents of the first file with the contents of the second. Before overwriting an existing file, SCO Professional asks you to confirm your request.

Worksheet filenames can be up to 10 characters long. SCO Professional then adds the correct file extension automatically. A punctuation mark, such as a comma or a period, counts as one character. Letters and numbers

are all valid in filenames; you can also use periods and dashes. However, a filename cannot contain blank spaces or any of the following characters: asterisk (*), question mark (?), angle brackets ( ), square brackets ([ ]), curly braces ({ }), parentheses (( )), ampersand (&), pipe (|) , exclamation point (!), tilde (˜), caret (^), double quote ("), left quote ('), or right quote (').

We recommend using filenames that indicate the contents of the files. For example, title a budget worksheet *budget91* or a sales file *feb-sales.*

The computer differentiates between upper- and lowercase letters. For example, if you name a file *Feb-Sales* and try to retrieve it by typing either *feb-sales* or *FEB-SALES*, the computer cannot find your file. To retrieve a file by typing its name, the name typed must match the filename exactly.

If you plan to transport SCO Professional files to a computer running DOS, limit your filenames to eight characters, with no distinction between upper- and lowercase. If you want to import files from a computer using DOS, use the -l flag when invoking SCO Professional to convert all file and macro names to lowercase. For more information on this command line flag, see Appendix B, "Command Line Flags," of this guide. For more information on transferring and converting files between XENIX or UNIX systems and DOS, refer to Chapter 13, "Using the Professional Manager," of this guide.

Saving Your Files

Use the /File Save command to save a worksheet to a file. This command is particularly important because it is your only protection against complete, irretrievable loss of your worksheet once it leaves the computer's main memory. In cases of power outages or incorrect commands, your computer may lose its main memory and erase your worksheet. To avoid this problem, save your worksheet frequently, as often as every 15 minutes. After you save your file, you may continue to update or add information.

To save a file:

1. Select /File Save.

2. Type the filename to which you wish to save or choose an existing filename from the list appearing below the edit line. For a full-screen list of filenames, press the ⟨Name⟩key. If you want to save to a directory other than the current one, type the entire path of the file's new location.

   The list of available filenames appears automatically if this is the first time the /File Save command is used since you started your SCO Professional work session. If you used the /File Save command previously, the same filename that you saved last appears at the prompt. The entire filename list appears if you press ⟨Escape⟩.

3. If you type or highlight an existing filename, SCO Professional asks you whether to replace the old file or not. SCO Professional gives you three options:

   ■ If you choose Replace, the older version on the disk is overwritten by the current worksheet.

   ■ If you choose Cancel, the older version remains saved but the current one is not. You return to the File menu. If you still want to save the newer version, you must use a different filename.

   ■ If you choose Backup, the stored version is saved in a backup directory and the newer, on-screen version is saved in your current working directory. The location of this backup directory is defined by the BACKUPDIR environment variable. (See the *SCO Professional Configuration Guide* for information on defining variables.) If you did not define a BACKUPDIR variable, SCO Professional creates a directory called *probackup* in your current directory.

   If there is not enough space left in your directory to store the worksheet, SCO Professional prints an error message. Consult your system administrator for assistance.

Protecting Worksheets with Passwords

During /File Save, you may want to restrict future access to your worksheets by creating a secret password. Information on this password restriction is found in Chapter 6 of this guide, "Protecting Data."

Saving Portions of a Worksheet

In some cases, you may want to save only a particular range of a worksheet. The /File Xtract command allows you to save ranges that you specify to a file that you name. By using /File Xtract, you can also save the currently displayed formula values (rather than the formulas themselves) from a range into another worksheet file. You can also use /File Xtract with /File Combine to save part of one worksheet to another worksheet.

To save a range from the current worksheet to another worksheet file:

1. Select the Xtract option from the /File menu.

2. Select Formula (to retain formulas) or Value (to save the currently displayed values of the formulas only) from the Xtract menu.

3. Follow the /File Save procedure for specifying a file to save to; if you choose an existing file, Replace or Backup the existing file to continue the /File Xtract process.

4. SCO Professional prompts you for the range to extract. Specify it by entering the range coordinates, pointing, or typing a range name, and pressing (Return).

5. SCO Professional creates a new worksheet file with the name you specified containing the extracted range. SCO Professional saves all settings associated with the extracted range to the new worksheet.

To retrieve the information from the two files, use the /File Combine command. See Chapter 7, "Using Multiple Worksheets," for a discussion of these commands.

Listing Your Files

Use the /File List command to display a list of filenames of a particular type in the directory that you are currently using. Once you have finished viewing the list of filenames, ⟨Break⟩ returns you to READY mode and your previous worksheet location.

2

To display a list of filenames:

1. Select /File List.

2. Specify the type of file that you want to look up by choosing the correct file type: Worksheet, Print, Graph, or Other. The Other option displays all files in the current directory.

3. If SCO Professional finds files of the type you specified, it lists them. If it does not find files of the type you requested, SCO Professional sends you an error message. If this happens, press ⟨Return⟩ or ⟨Escape⟩ to go back to your worksheet.

Changing Your Current Directory

Use the /File Directory command to change your current directory. The current directory is set initially by the /Worksheet Global Default Directory command, and it is usually the directory you are in when you start SCO Professional.

To change the current directory:

1. Select /File Directory.

2. The current directory setting is displayed. If you wish to retain it, press ⟨Return⟩. To change the current directory, type the new directory name.

3. You can edit the existing pathname, rather than typing the complete pathname beginning with /. To do this, enter the EDIT mode by typing the ⟨Edit⟩ key.

SCO Professional now defaults to the specified directory any time a file operation is performed.

We recommend using /File Directory if you need to work on several files that exist in another directory. However, if you want to change the directory to retrieve just one file, use /File Retrieve (without changing the directory) and specify the entire path of the file you want to retrieve.

Retrieving Your Files

Use the /File Retrieve command to move a worksheet file into SCO Professional from its storage location on the disk. SCO Professional searches for the file only in the current directory (specified by the /Worksheet Global Default Directory command or the /File Directory command), or in an alternate directory explicitly specified by using a pathname.

■ **IMPORTANT:** Do not use /File Retrieve before saving a worksheet that you are currently working on. SCO Professional automatically clears from memory whatever file is currently displayed before it retrieves a specified file for you.

To retrieve a file:

1. Select /File Retrieve.

2. Indicate which file you want to retrieve by typing its name or by using arrow keys to choose it from the files listed below the Edit line. You can also select a directory name to list files in a directory, or backspace to list files in a higher-level directory. For a full-screen listing of filenames, press the ⟨Name⟩key. Press ⟨Return⟩ to enter the filename.

SCO Professional now displays your worksheet. The name of the worksheet that you retrieve appears in the message area to the right of the date and time.

Deleting Your Files

Use the /File Erase command to delete unwanted or outdated files from the disk. Take care when exercising this command because, once a file is erased, you cannot retrieve it.

To erase a file:

1. Select /File Erase.

2. Choose the type of file that you want to erase: Worksheet, Graph, Print, or Other.

3. Indicate the file to be deleted by typing its name or by highlighting it from the list displayed. Press bY "Return" .

4. SCO Professional asks you to confirm the deletion or cancel the command. If you choose Yes, SCO Professional erases the file that you specified. If you choose No, you return to your previous position and SCO Professional cancels the command.

To use the /File Erase command for deleting more than one file at a time, use one of two wildcard characters: the question mark (?) and the asterisk (*). Use these characters along with filename characters to produce a type of filename pattern that erases all files matching its specifications.

Use the question mark to list files matching the filename pattern plus any single character in the question mark's position. For example, if you type **rcvbl?** as the filename when you issue the /File Erase command, SCO Professional lists files such as *rcvbl1* and *rcvbl2*. You can then select and delete the appropriate file. SCO Professional does not list the file *rcvbl12*, as the question mark allows only one character in its place.

Use the asterisk to list files matching the filename pattern plus any string of characters in the asterisk's position. You can then select and delete the appropriate file. If you type **acct*** as a filename when you execute /File Erase, files with names such as *accts*, *acctg*, or *acctgl* are listed. You can then select and delete the appropriate file. SCO Professional does not list the file *actsltr*, because its characters do not conform with those specified before the asterisk.

Editing Pathways and Ranges

Often, when you manipulate files or directories, you must enter the complete pathname for a particular file or directory. Rather than typing the entire name from the first slash (/), enter the EDIT mode by pressing the 〈Edit〉 key, and edit your pathname. When you finish, press 〈Return〉. Similarly, you can use the EDIT mode to enter or edit a range name.

Should you make a mistake, an error message appears. If you press 〈Escape〉 when SCO Professional displays this message, you return to EDIT mode so that you can correct your mistake. If you would rather return to READY mode to begin a new command sequence, press 〈Return〉 at this time.

File Locking

On any system with more than one user, two people may try to use the same worksheet file at the same time. SCO Professional was designed with a safety feature called FILE LOCKING that does not allow two or more people to modify the same file at the same time.

File locking occurs any time you begin to work on a given file. The name of the file that you are locking appears at the bottom of your screen, to the right of the date and time. After SCO Professional locks the file, other users can still read or obtain a printed copy of it. If you try to retrieve a file that is currently being used by another user, SCO Professional responds with the message:

```
File currently locked. Read only. Save to a
different name.
```

You can then retrieve the file, but you cannot save it to the same filename. If you try to save the file, SCO Professional responds with the message:

```
File currently locked.  Save to different name.
```

Remember that the file remains locked only as long as another user is actually using it. We recommend trying to retrieve it again later rather than creating another copy by saving it to a different name.

Setting Worksheet Defaults

The /Worksheet Global Default commands control a group of settings that SCO Professional uses automatically every time you enter the program. The commands specify which directory to use for saving and retrieving files, which printer to use as the default, and the format of the printed page (for example, the margins and line spacing). These commands remain the same until you change them.

Selecting the /Worksheet Global Default Status command displays your current directory and all current printer settings (Auto-Linefeed, Margins, Page-Length, Setup, Wait, and Name). From this list, you can decide what, if anything, you want to change. Press any key when done.

To alter and save a new directory or new global default printer configurations, use the following procedure:

1. Select /Worksheet Global Default. SCO Professional displays the menu of commands that determine the directory and printing values.

2. Make your changes as needed with the Directory, Help, and Printer commands as described in the upcoming sections. To return to the Default menu, select Quit from each of these menus when done.

3. When you are through making changes, select /Worksheet Global Default Update to save them. If you skip this step, your new settings are not saved for future SCO Professional sessions. You can check to make sure these settings were saved correctly by selecting Status again and inspecting your default settings. Press any key when done to return to the /Worksheet Global Default menu.

These new default settings remain from session to session until you change them again by using the process just described. In addition, temporary changes to print commands may be made from the Print menu (discussed in Chapter 10, "Printing Worksheets"), and the current directory can be changed with the /File Directory command as previously shown. These temporary changes apply only to the specific worksheet you are working on, and do not affect SCO Professional's global default values.

Choosing a Directory

Your current directory is the one to which SCO Professional saves your files and that contains those files you can retrieve.

To choose a default directory:

1. Select /Worksheet Global Default Directory.

2. Select or enter the directory name you want to serve as the system default. Press ⟨Return⟩ when done.

If you want to save or retrieve files in another directory at a later time, use this command again. You can also change the current setting with the /File Directory command, or, in many cases, you can specify another directory by typing the directory name and the filename (for example, **accounting/acct**). However, each time you restart SCO Professional, the current directory is that specified by the /Worksheet Global Default Directory command.

Setting Help Status

The /Worksheet Global Default Other Help commands, Instant and Removable, affect the speed at which Help is executed.

If you select **Instant**, the Help program is loaded into memory each time you invoke SCO Professional. Because this program uses more memory and can increase the number of running processes, we have chosen Removable to be the default value.

If you select **Removable**, the Help program is not loaded into memory until you press the ⟨Help⟩ key. Therefore, the first time you press the ⟨Help⟩ key it takes slightly longer to display the Help text than it does when you have set Instant Help. After the first time you use Help, SCO Professional processes all subsequent Help requests as quickly as if you used Instant.

Choosing Printer Information

Your printer is controlled by several default settings. To change these defaults, select /Worksheet Global Default Printer. We discuss each printer control command in the paragraphs below. The default configuration values are as follows:

2

Control Command	Value
Auto-Linefeed:	No
Left margin:	4
Right margin:	76
Top margin:	2
Bottom margin:	2
Page length:	66
Wait (pause at end of page):	No
Set-up string:	None

Auto-Linefeed and Wait are set up for your printer during installation. You do not need to modify these settings for normal use. Refer to Chapter 10, "Printing Worksheets," and Chapter 13, "Using the Professional Manager," for more information.

Margins in SCO Professional

SCO Professional allows you to alter your margins to control the aesthetics of your printed reports. The default settings assume an 8-1/2" x 11" sheet of paper using a 10-pitch typeface (10 characters per inch). The default margins are a top margin of 2 lines and a bottom margin of 2 lines, giving you 62 lines of text. The left margin is 4 spaces and the right margin is 76 spaces, giving you 72 characters per printed line.

You can, however, change the default printer configurations based on the width of either your paper or your font. Wide paper can accommodate more characters per printed line, and compressed fonts can print more characters per line, so adjust margins accordingly. SCO Professional allows you to do this by changing any of the default settings.

Changing the Left and Right Margins

The Left and Right Margin commands set those margins of your printed page. Both the left and right margins are expressed as the distance (in characters) from the left side of the page.

To view or change the default left and right margins:

1. Choose /Worksheet Global Default Printer Left or Right.

2. Retain the default value by pressing ⟨Return⟩; or choose a new value between 0 and 240 character spaces by entering the new value and pressing ⟨Return⟩.

Changing the Top and Bottom Margins

The Top and Bottom Margin commands set those margins for the printed page. These margins are expressed as the number of lines from the top and bottom of the page, respectively.

To view or change the current top and bottom margin values:

1. Select /Worksheet Global Default Printer Top or Bottom.

2. Retain the default value by pressing ⟨Return⟩; or enter a new number of lines between 0 and 10; and press ⟨Return⟩ to change the margin.

Changing the Page Length

The Page-Length command sets the length of the printed page. The standard 11" page length is 66 lines.

To view or change the default page length:

1. Choose /Worksheet Global Default Printer Page-Length.

2. Retain the original page length by pressing ⟨Return⟩. To change the page length, enter a number of lines between 20 and 100, and press ⟨Return⟩.

Defining Special Features

The Setup command allows you to configure a string of printer control codes to control special features of your printer, such as an alternate font. For a discussion of setup strings, see the "Print Options" section of Chapter 10, "Printing Worksheets."

To define a setup string:

1. Select /Worksheet Global Default Printer Setup.

2. Enter a setup string and press ⟨Return⟩, or press ⟨Return⟩ without entering a string if you decide not to include one.

Selecting the Printer Type

Use the Name-Select command to choose the printer to which SCO Profes-
sional sends print jobs. To define printers for use within SCO Professional,
refer to the *SCO Professional Configuration Guide*. To use the Name-Select
command, select **/Worksheet Global Default Printer Name-Select**. SCO
Professional displays the following screen:

```
A1:                                                          PRINT
Enter printer name:

HP2563          HP2563B 350 lpm line printer

HP2563        HP2563B       HP2564        HP2564B       alps
alps-land     default       deskjet       direct        epson
epson.side    hplaser       hplaser.side  imagen        laser
14-Feb-91   08:00 AM
```
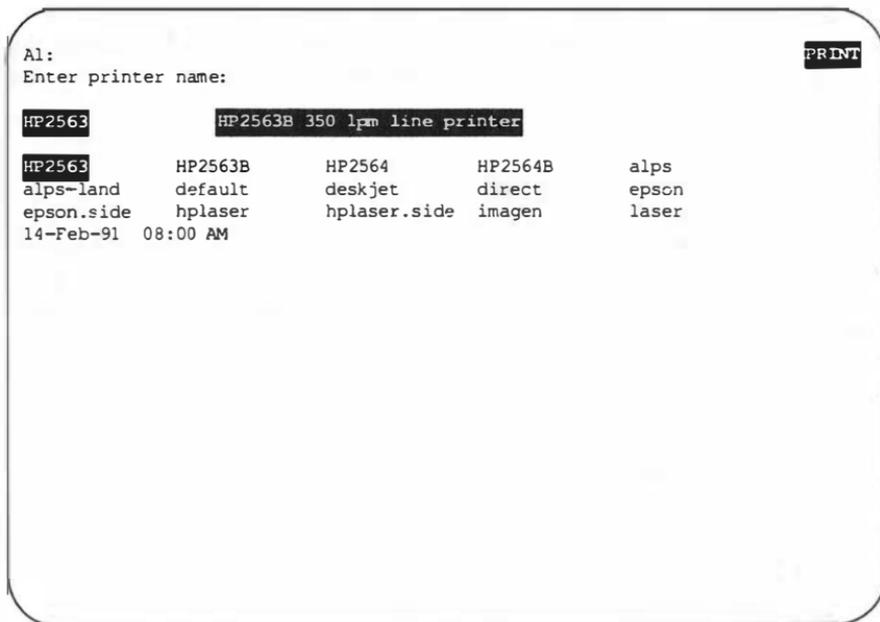
You can now move the cursor to the desired printer name and press
⟨Return⟩.

Worksheet Status

The /Worksheet Status command gives you information about the global settings for your current worksheet. This command displays current recalculation, global format, global label-prefix, global column-width, and global protection settings.

Select /Worksheet Status. The following screen appears:

```
A1:                                                      Status

Memory Used (bytes):        0

Math Co-processor:          (None)

Recalculation:
  Method................. Automatic
  Order.................. Natural
  Iterations............. 1

Circular Reference:         (None)

Cell Display:
  Format................. (G)
  Label-Prefix...........  '
  Column-Width........... 9
  Zero Suppression....... Off

Global Protection:          Off


Press any key to continue:
```

The "Memory Used" line indicates the memory used in bytes by your current worksheet.

The "Math Co-processor" line indicates whether or not your system has a math co-processor, a special chip that speeds calculations.

SCO Professional displays the current method of recalculation. To order your worksheet calculations, see Chapter 3, "Using Formulas and Functions," in this guide.

If you encounter any problems with circular referencing in formulas, SCO Professional displays the affected cells here. To avoid circular references, see Chapter 3, "Using Formulas and Functions," in this guide.

SCO Professional displays the current global cell formats, such as centering, column-width, and non-printing zeroes. See Chapter 5, "Changing the Worksheet Format," for information on global cell formatting.

Global Protection indicates whether or not your worksheet is protected against further data or label entry. See Chapter 6, "Protecting Data," for more information on turning protection on and off.

Press any key when done, and you return to READY mode.

≡ Chapter 3

Using Formulas and Functions

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Using Formulas and Functions

Functions and formulas are fundamental to SCO Professional's operation as a spreadsheet. With formulas, you can manipulate data, establish relationships between cells, and perform mathematical operations. Using arithmetical operators (+, -, *, /, ^) or relational operators (<, >, =, <=, >=, <>), you can enter into a cell a simple arithmetic formula like 2+2, or a more complex formula like (6*(3*7)^3)/6*3.

In addition to logical or arithmetical operators, you can use "at" (@) functions in formulas. Some functions process numbers; others process strings. Ready-made or preprogrammed formulas, @ functions allow you to replace lengthy formulas with the @ symbol, the function name, and one or more arguments. If you want to estimate payments on a loan, for instance, you could type in the following lengthy formula:

*principal**(*interest*/(**1**-(**1**+*interest*)**raised to the** - *term* **power**))

Using this formula, you would replace the words in italics (which are the arguments) with values or cell addresses. To simplify the process, again replacing the arguments with values or cell addresses, you could use the following formula:

@PMT(*principal, interest, term*)

As you become more comfortable with formulas, you can find ways of using them in combination with a variety of SCO Professional commands. The /Copy command, for instance, extends the power of a single formula by allowing you to copy it many times over. In addition, the /Worksheet Global Protection, the /Range Protect, and the /Range Unprotect commands allow you to protect your formulas from accidental change.

This chapter shows you how to construct formulas for SCO Professional worksheets and describes all the available operators and @ functions.

Contents of This Chapter

This chapter is divided into the following sections:

■ "Building Formulas" tells you what a formula is and how to distinguish between formulas that use operators and formulas that use @ functions; it also describes the methods of entering formulas and shows you how to construct and edit them.

■ "Using @ Functions in Formulas" explains how @ functions are used in formulas and lists the available SCO Professional functions in each of the seven categories. This section also describes how to enter formulas that use @ functions.

■ The remaining sections of the chapter describe all the @ functions available with SCO Professional, divided into the following categories: date and time, financial, logical, mathematical, special, statistical, and string.

Building Formulas

A FORMULA is an entry that tells SCO Professional how to manipulate numbers or strings. Worksheets are often constructed using both values and formulas. You can construct formula cells that depend on the contents of other cells to obtain results. The cells that are referred to by the formula are called REFERENCE CELLS. The cells containing the formulas that use the reference cells are called FORMULA CELLS.

This section describes what a formula is, how it is entered in your worksheet, how it is calculated, and how you can move or copy it to other parts of your worksheet.

A formula can be built using both operators and @ functions, each of which can contain arguments:

■ A formula using arithmetical operators (+ - * / ^) calculates a value based on other values or cell references. For example, if you type **+B3*(12/6)** in cell B4 and cell B3 contains the value 500, then the formula returns the result 1000.

■ A formula using the ampersand operator (&) concatenates the string values on either side of the &. For example, if you type **+B3&B4** in cell B5, where cell B3 contains the value ABC and cell B4 contains the value DEF, then cell B5 returns the result ABCDEF. If you use this operator with numerical values, however, the result is an ERR value.

■ A formula using relational operators (<, >, =, <=, >=, <>) or compound statements (#NOT#, #AND#, #OR#) determines whether a condition is true (1) or false (0). For example, if you type **+B3>200** in cell B4 and cell B3 contains the value 500, then the formula returns the result 1 (for true).

3

■ A formula using an @ function calculates based on a predefined formula, which is built into the spreadsheet. For example, if you type **@sum(B1..B3)** in cell B4 and cells B1 through B3 contain the values 200, 300, and 500, respectively, then the formula returns the result 1000, the sum of the arguments.

The logical and arithmetic operators are described in the section "Determining the Order of Operator Precedence" later in this chapter. The specific @ functions are described in the section "Using @ Functions in Formulas" later in this chapter. The remainder of this section discusses the procedures for entering formulas into your worksheet.

Entering Formulas

Formulas may consist of values, operators, and @ functions. Depending on the type of calculation, when you refer to a value you can type in the numbers for it, use a cell address to indicate that the cell's contents be used as a value, or specify a range by name or by cell addresses. An operator is a character that defines what is performed on the value(s).

There are three basic ways to enter a formula: (1) you can type in all the operators and characters, including those from referenced cells; (2) you can type in cell references along with operators; and (3) you can type in only operators and point to cells.

The first, and simplest, way to set up a formula is to type the actual characters that symbolize the values and operation(s).

To type out the entire formula:

1. Type a formula prefix. A formula prefix can be any one of the following characters: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., +, -, (, @, #, or $. The <, >, and = characters are operators.

2. Type the characters of the first value, the symbol of the operator, the characters of the next value, and so on in a string until you reach the end of the formula.

   Like values, formulas appear on the edit line as you type them. The ⟨Return⟩ key (or any of the methods used for setting values described in Chapter 1, "Getting Started") signals that you are finished typing the formula, and that it is to be entered into its cell. By typing the ⟨Edit⟩ key, you can enter EDIT mode, from which you can edit formulas using standard editing functions.

3. Press ⟨Return⟩ to enter it. Do not use the equal sign (=) to end the formula.

Instead of typing in values that exist in other cells, you can refer to those cells as you set up formulas. With this second method of entering a formula, reference cells tell SCO Professional to get the value(s) of the cell(s) specified.

To type an individual cell reference: simply enter the row and column of that cell (B5, for instance).

To type a range of reference cells: enter the row and column of both the beginning and the ending cell of the range, with at least one period in between (B5..E12, for instance).

When you include cell references in a formula, SCO Professional uses the values stored at the referenced cell to calculate the formula. When the contents of the referenced cells change, the program automatically updates the formula's results upon recalculation.

The third method of entering a formula is to point to the reference cells instead of typing them.

To point to reference cells:

1. Type a formula prefix (usually +).

2. Use the arrow keys to move to the reference cell. As soon as you start pointing to a reference cell, SCO Professional places you in the POINT mode.

3. If the cell reference is at the end of the formula, press ⟨Return⟩ to set the reference and enter the formula at the same time.

   If another operator follows your reference in the formula, you can set the reference by typing the next operator. Type the operator (notice that the cell indicator returns to the formula cell) and so on to the end of the formula.

4. Press ⟨Return⟩ to enter the formula.

For more information on typing ranges, see the section "Using Ranges" in Chapter 2. For more information on EDIT mode, see the section "How Modes Affect Keyboard Commands" in Chapter 1.

Addressing Cells

As you build formulas, it is important to remember that in SCO Professional, there are three different ways of addressing cells: RELATIVE, ABSOLUTE, and MIXED. The way that you address the reference cells in formulas can affect the results of the formulas when you use the /Copy or /Range Transpose commands to copy those formulas throughout the worksheet.

■ When you use cell references to build formulas, you are not referring to the contents of specific cells; you are referring to the relationship between cells. The default in SCO Professional is a relative reference, which uses the distance between the referenced cell and the formula cell to establish the relationship. This distance is measured as the number of cells between them.

■ You may need to construct a formula that refers to the contents of a cell at a specific address, no matter where the formula itself is located. Cell references can be made absolute by placing a dollar symbol ($) in front of the column or row designation or both.

■ A formula can also be written so that either the column or row is absolute while the corresponding row or column of the cell address is relative. A mixed-cell reference can be created by putting the absolute symbol ($) before the part of the cell address, either the column letter or the row number, you want kept absolute. The remaining part of the cell address is left relative. Mixed cell references are often used with formulas that are copied along rows or columns.

By using the ⟨Absolute⟩ key when you are in the POINT mode, you can run a cell or range reference through a cycle (absolute, row absolute, column absolute, relative). To do so, point to the cell reference, and then press the ⟨Absolute⟩ key. Each time you use the ⟨Absolute⟩ key, your reference moves one step further in the cycle.

If you want to change the addressing in cell B5, for example, press the ⟨Absolute⟩ key four times for the following results:

Absolute entered	Result
once	B5
twice	B$5
three times	$B5
four times	B5

If you have a formula in cell D2 that references cell C2, as in the following example, SCO Professional looks for the current value of the cell column to the left of the formula cell (D2). If you copy the formula in cell D2 to range D3..D9, it references cells C3..C9. A relative reference picks up a pattern, not a particular cell.

```
D2: (,0) [W14] +C2*$B$11                                          READY

          A              B              C              D          E
   1 Name:          District:        Sales:       Commission:
   2 Abrahms, Leon      J1        1,000,000         50,000
   3 Brown, Leslie      F2        2,314,765        115,738
   4 Hill, Catherine    A6        2,314,764        115,738
   5 Jamieson, Jack     D3        2,778,435        138,922
   6 Johnson, Andy      B2        1,332,887         66,644
   7 Roberts, Ted       L1        2,332,778        116,639
   8 Smith, Samantha    G7        2,884,928        144,246
   9 Stevens, Julie     H4        2,473,345        123,667
  10
  11 COMMISSION RATE:      0.05
  12 TOTAL:                        $17,431,902      $871,595
 14-Feb-91   08:00 AM
```

If you were to scan down column D after having copied the formula in cell D2 to D3..D9, you would see the following formulas:

Cell	Formula
D3	+C3*B11
D4	+C4*B11
D5	+C5*B11
D6	+C6*B11
D7	+C7*B11
D8	+C8*B11
D9	+C9*B11

When you copy the formula from cell D2 to range D3..D9, and you want it to reference cell B11, then place a dollar symbol in front of the *B* as well as the *11* (B11). Now, when you copy this formula, it always refers to the contents of cell B11.

Named ranges are made absolute by placing a $ before the name. This makes all cells in the named range absolute.

Suppose that you want to have mixed cell addressing. In the following example, the formula in cell C4 considers column A to be absolute, while the row (4) is relative; likewise, row 2 is absolute, while the column (C) is not. Now, when this cell is copied to range C4..G9, the formula calculates the appropriate interest rate (row 2) attached to the appropriate principal (column A):

```
C4: (G) [W12] +$A4+($A4*C$2)                                    READY


1                                    Interest Rates:
2Principal:|    9.50%     10.00%     10.50%     11.00%     11.50%
3────────────|─────────────────────────────────────────────────
4  $150,000 |    164250     165000     165750     166500     167250
5  $160,000 |    175200     176000     176800     177600     178400
6  $170,000 |    186150     187000     187850     188700     189550
7  $180,000 |    197100     198000     198900     199800     200700
8  $190,000 |    208050     209000     209950     210900     211850
9  $200,000 |    219000     220000     221000     222000     223000
14-Feb-91   08:00 AM
```

Determining the Order
of Operator Precedence

The order in which formulas are calculated often has a bearing on the result of the calculation. SCO Professional uses three factors to govern precedence in calculation:

■ Precedence of individual operators: There are 17 different operators and seven "levels of precedence." A LEVEL OF PRECEDENCE is the priority one operator has over others. The following table lists (in order) the operator symbols and their operations.

Levels of Precedence

Operator	Function	Priority
^	Exponentiation	1
+	Make Positive	2
-	Make Negative	2
*	Multiplication	3
/	Division	3
+	Addition	4
-	Subtraction	4
=	Equals	5
<>	Not Equal	5
>	Greater Than	5
>=	Greater Than or Equal To	5
<	Less Than	5
<=	Less Than or Equal To	5
#NOT#	Logical Not	6
#AND#	Logical And	7
#OR#	Logical Or	7
&	String Concatenation	7

■ Use of parentheses to indicate groups: When you use parentheses to indicate groups in a formula, the sections inside the parentheses are evaluated independently of the rest of the formula and calculated first. The results of the section are then integrated back into the formula and used to calculate it as a whole. We might write a formula like this: 6-(8+2). In this case, SCO Professional calculates the part of the formula enclosed by parentheses (8+2=10) first; the result is then integrated back into the formula (6-10=-4).

■ Order of entry: If the individual operators have equal precedence, and you have not used parentheses, the formula is calculated from left to right. For example, if you have a formula like 6-8+2, SCO Professional calculates 6-8=-2 first, and then -2+2=0.

Whenever possible, SCO Professional does operations in the order of the operator's precedence. For instance, an addition operation (which has a precedence of 4) is done after a multiplication operation (which has a precedence of 3) even if the addition operation is entered first in the formula. For example, in the formula 7+4*10, the result is 47 because SCO Professional calculates 4*10=40 first, and then calculates 7+40=47.

Where subgroups are set off by parentheses, those subgroups are calculated first, and then integrated into the rest of the formula. Using the previous example, 7+4*10, we could enclose part of the formula in parentheses to change the order of precedence. If the formula looks like this, (7+4)*10, the result is 110 because SCO Professional calculates 7+4=11 first, and then calculates 11*10=110.

Using Logical Operators

In addition to the relational operators that have precedence level 5 (=, < >, >, >=, <, <=), there are three logical operators that have precedence level 6 (Logical Not) and 7 (Logical And, Logical Or). Each of these operators returns either 0 or 1.

- ■ #NOT# returns 1 if the operand to which it is applied evaluates to zero (false) and 0 otherwise. For example, *#NOT#(+B3>200)* returns 1 if the value in cell B3 is less than or equal to 200.

- ■ #AND# returns 1 if both operands evaluate to one (true) and 0 otherwise. For example, *+B3>200#AND#+B3<500* returns 1 if the value in cell B3 is between 200 and 500, and 0 if it is not.

- ■ #OR# returns 1 if either operand evaluates to one (true) and 0 otherwise. For example, *+B3>200#OR#+B4>200* returns 1 if the value in either cell B3 or cell B4 is greater than 200.

The logical operators =, < >, >, >=, <, and <= can also be used with strings to do lexigraphic comparisons using collating sequences; for example, "abc" < "bcd" < "bcdef". Logical operators are frequently used with the @IF function and to find information in databases. For example, a formula using a logical expression can be used as a criterion in a /Data Query command. The construction of formula criteria is described in Chapter 11, "Working with Databases."

Using Worksheet Commands
to Control Calculation Sequencing

Global Recalculation commands control how the worksheet is calculated. The default is in natural order. This means that any time a value, formula, or reference cell is entered or modified, the entire worksheet is recalculated. In addition, the order in which the formulas are recalculated is determined by the natural order of the arguments of the formulas.

The /Worksheet Global Recalculation commands allow you to turn the automatic calculation feature of your worksheet on and off. They also allow you to choose the type and number of calculations you want done on the worksheet.

When you select the /Worksheet Global Recalculation command, you are offered a menu of commands governing the type and order of calculation (Automatic, Manual, Columnwise, Rowwise, and Natural); one command allows you to choose the number of times you want recalculation to occur (Iteration).

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```
A1:                                                RECALCULATION
Natural Columnwise Rowwise Automatic Manual Iteration
Recalculates columnwise, in natural order
```

- Automatic is the default setting. Every time you add or change an entry in your worksheet, SCO Professional automatically recalculates all the values in your worksheet for you. Automatic recalculation can be time-consuming, particularly when your worksheet is fairly large. You may want to switch to Manual recalculation to save time between changes.

- Manual is the setting that lets you decide when to calculate the worksheet. Pressing the ⟨Calc⟩ special key recalculates the worksheet. If a change is made to the worksheet that causes a recalculation to update it, the message CALC appears.

Select the /Worksheet Global Recalculation Manual command. Now the worksheet is recalculated only when you want it to be. To switch back to Automatic recalculation, select the /Worksheet Global Recalculation Automatic command.

■ Natural recalculation is the default setting for order of calculation. This causes calculation to occur in the order of columns (from left to right). Every time SCO Professional comes across a FORWARD REFERENCE (a formula that refers to another cell whose contents have not been calculated yet), it calculates the contents of the cell further ahead before it jumps back and continues calculating in the order of columns.

Select the /Worksheet Global Recalculation Natural command whenever you choose another type of recalculation, and then decide to return to natural calculation.

■ Columnwise order recalculates the worksheet in the same order as Natural does—column by column from left to right. When you use columnwise calculation, however, forward references do not have their contents calculated before the formula cells are calculated. This may result in cell values differing from those obtained with natural recalculation.

Select the /Worksheet Global Recalculation Columnwise command to specify recalculation by column.

■ Rowwise order recalculates the worksheet row by row. One reason you may decide to use rowwise instead of columnwise is to avoid some simple forward reference problems.

Select the /Worksheet Global Recalculation Rowwise command to change the calculation order to rowwise.

■ Iteration is the command that controls the number of times recalculation occurs. Some complex formulas, requiring circular or forward references, achieve accurate results only after being recalculated several times.

Select the /Worksheet Global Recalculation Iteration command. Then choose the number of times you wish calculation to occur by typing the number (between 1 and 50) and pressing (Return). At the next calculation, the worksheet is recalculated the number of times you specify.

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Understanding Unexpected Results

Depending on the method of calculation you choose, it is possible to create a worksheet that yields unexpected results. This can be done in many ways. Two of the most common are described below:

■ FORWARD REFERENCES occur, in rowwise and columnwise mode only, when a formula refers to other cells calculated later in the sequence.

■ CIRCULAR REFERENCES occur when two formulas refer to each other for values.

If you should find yourself recalculating a worksheet with a circular reference, the CIRC message appears in the lower section of the screen.

It is also a good idea to check the order of precedence in calculations if you are obtaining unexpected results. The order of precedence makes a difference in the way individual formulas are calculated. This, in turn, can affect many formula cells in the worksheet.

Discussed thoroughly in texts devoted to spreadsheets, these problems, as well as others, may arise when creating worksheets. For further information, refer to texts that discuss design, construction, and use of spreadsheets, along with many other hints for successful worksheet creation.

Calculating an Individual Formula

To find a formula's result without calculating an entire worksheet, use the ⟨Calculate⟩ key while you are in the VALUE or EDIT mode. When you use the Calculate function, your formula is calculated; the result, instead of the formula, is then displayed on the edit line.

Using @ Functions in Formulas

A variety of complex calculations can be performed with @ functions. Formula cells can contain one @ function or a combination of @ functions, providing additional flexibility for your worksheets.

Some @ functions, such as @NPV (Net Present Value), replace what would otherwise be a very complex formula, while others, such as @SUM, serve as a substitute for a commonly used formula. Also, @ functions include logical operations that result in numerical values representing "True" or "False."

When you use @ functions, a few general rules apply:

- Do not insert space characters anywhere in an @ function.

- Enter the function name in either uppercase or lowercase letters; they are not case sensitive. Example:

  @true or @TRUE

- Surround the argument(s) in parentheses. Example:

  @DAY(31314)

- Separate each argument (if the function contains more than one argument) with an argument separator (in English, a comma). Example:

  @TIME(8,22,36)

- Surround another @ function used as an argument in parentheses. Example:

  @HOUR(@TIME(8,22,36))

■ Enclose string values that are used as arguments in double quotation marks (" "). Example:

@TRIM("The Santa Cruz Operation")

A special set of @ functions are reserved for use with databases. These @ functions begin with the letter D after the @ symbol.

For more information on formulas, see the section "Building Formulas" earlier in this chapter. For information on database @ functions, see the section "Generating Statistics with Database @ Functions" in Chapter 11.

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Entering @ Functions

Because @ functions are part of formulas, the methods for entering formulas apply here. The cell references, for example, can be typed in or pointed to.

To enter @ functions:

1.   Begin with the @ symbol, which signals a function.

2.   Follow the @ symbol by a function name (such as SUM or AVG), which lets SCO Professional know what type of function to expect.

3.   Although there are a few special cases, most @ functions are concluded with one or more arguments, which are enclosed in parentheses.

The @ function arguments can consist of either formulas, other functions, numeric values, range values, single cell addresses, or string values. The @ functions that do not require an argument are described as such.

When ranges are used, they can be referred to by name or by cell addresses. Depending on the nature of the operation, some @ functions only accept numbers; they do not accept range names or cell references.

If you enter a cell that contains an incorrectly spelled @ function, SCO Professional beeps and goes into EDIT mode with the cursor placed on the cell containing the mistake.

The @ functions can be used by themselves or as part of a larger formula.

Description	Value entered
@ function used alone	**@sum(A12..A15)**
@ function used in a formula	**3+@sum(A12..A15)**

Extremely complex formulas can be constructed with @ functions. Should you ever write a formula too long to be entered into one cell, you can break down the formula into two or more parts, enter them into different cells, and use those cell references to form a simple formula.

Here is an example of this technique, using simple formulas:

Location	Value entered
Cell A1	**+A7+@COUNT(A8..A19)**
Cell A2	**+2+3-1+@COUNT(B8..B19)**
Cell A3	**+A1+A2**

For more information on entering formulas, see the section "Entering Formulas" earlier in this chapter. For more information on typing ranges, see the section "Using Ranges" in Chapter 2.

Types of @ Functions

The @ functions are grouped into eight different categories: database, date, financial, logical, mathematical, special, statistical, and string. The following lists show all of the @ functions available, grouped by type and alphabetically arranged within each list:

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Database @ Functions

Function	Description
@DAVG	Average
@DCOUNT	Count
@DMAX	Maximum
@DMIN	Minimum
@DSTD	Standard deviation
@DSUM	Sum
@DVAR	Variance

For a complete description of these seven database @ functions, please turn to the section "Using Database @ Functions to Generate Statistics" in Chapter 11, "Working with Databases," in this guide.

Date and Time @ Functions

Function	Description
@DATE	Serial date number of specified day [1-73050]
@DATEVALUE	Serial date number of specified string
@DAY	Day of month [1-31], given a serial date
@HOUR	Hour of specified time [0-23]
@MINUTE	Minute of specified time [0-59]
@MONTH	Month of specified date [1-12]
@NOW	Serial number of current date and time
@SECOND	Second of specified time [0-59]
@TIME	Serial number of specified time [0-.999988425925926]
@TIMEVALUE	Serial number of specified time string
@YEAR	Year of specified day [0-199]

Financial @ Functions

Function	Description
@CTERM	Compound term
@DDB	Double-declining balance depreciation
@FV	Future value
@IRR	Internal rate of return
@NPV	Net present value
@PMT	(Mortgage) payment
@PV	Present value
@RATE	(Periodic interest) rate
@SLN	Straight-line depreciation
@SYD	Sum-of-the-year's-digits depreciation
@TERM	Term (number of payments)

Logical @ Functions

Function	Description
@FALSE	False (0)
@IF	x if *cond* (condition) is non-zero, y if zero
@ISERR	True if x=ERR
@ISNA	True if x=NA
@ISNUMBER	True if x = number
@ISSTRING	True if x = string
@TRUE	True (1)

Mathematical @ Functions

Function	Description
@ABS	Absolute value of x
@ACOS	Arc cosine of x
@ASIN	Arc sine of x
@ATAN	Arc tangent of x (2 quadrant)
@ATAN2	Arc tangent of y/x (4 quadrant)
@COS	Cosine of x
@EXP	Natural exponential expression of x (e^x)
@INT	Integer part of x
@LN	Natural log of x (base e)
@LOG	Log of x (base 10)
@MOD	x modulo y (remainder of x/y)
@PI	π (3.1415926536)
@RAND	Random number between 0 and 1
@ROUND	Round x to y decimal places
@SIN	Sine of x
@SQRT	Square root of x
@TAN	Tangent of x

Special @ Functions

Function	Description
@@	Indirect cell reference
@CELL	Attributes of cell in the range
@CELLPOINTER	Attributes of current cell
@CHOOSE	Selects value from list of values
@COLS	Returns number of columns within a range
@ERR	Returns the value ERR (error)
@HLOOKUP	Table lookup using row index (x)
@INDEX	Table lookup using range, column and row index
@NA	Returns the value NA (not available)
@ROWS	Returns number of rows within a range
@VLOOKUP	Table lookup using column index (x)

Statistical @ Functions

Function	Description
@AVG	Average of argument values
@COUNT	Number of argument values
@MAX	Maximum of argument values
@MIN	Minimum of argument values
@STD	Standard deviation of argument values
@SUM	Sum of argument values
@VAR	Variance of argument values

String @ Functions

Function	Description
@CHAR	Character for ASCII code x
@CODE	ASCII code for character x
@EXACT	True if *string1* and *string2* are identical
@FIND	Search string and return location of substring
@LEFT	Return n characters from left side of *string*
@LENGTH	Return number of characters in *string*
@LOWER	Convert characters in *string* to lowercase
@MID	Return n characters from *start number* of *string*
@N	Return numeric value of top-left comer of range
@PROPER	Convert first characters of words in *string* to uppercase and all other characters to lowercase
@REPEAT	Repeat *string* n times
@REPLACE	Replace *original string* with *new string*
@RIGHT	Return n characters from right side of *string*
@S	Return string value of top-left comer of range
@STRING	Convert number x to string with n decimal places
@TRIM	Delete blank characters in *string*
@UPPER	Convert characters in *string* to uppercase
@VALUE	Convert *string* to numeric value

3

The remainder of this chapter discusses the @ functions in the order of type for further discussion. Database functions are excluded from further discussion here because they are discussed in Chapter 11, "Working with Databases." However, all other @ functions are described here. For in-depth information on these functions, we suggest you turn to one of the widely available reference books on Lotus 1-2-3.

Date and Time Functions

SCO Professional provides a sophisticated method for using date and time arithmetic in calculations. You may need to determine elapsed time, for instance, or the number of hours or days in a particular period of time.

Some of these functions use serial numbers to represent dates and times, some generate serial numbers. Used as a means of identification, a SERIAL NUMBER indicates placement in a series.

- With Date functions, SCO Professional converts calendar dates (from January 1, 1900, to December 31, 2099) into numbers, starting at 1 and increasing by one for every day since. Every date has a specific number that can be attached to it. This takes into consideration the lengths of the months including February and leap years. For example, January 1, 1900, is 1; January 1, 2000, is 36526; and December 31, 2099 (the final date in the 200-year calendar) is 73050.

- With Time functions, SCO Professional uses decimals from 0 to .999999 to represent a 24-hour day. Each second has a fractional serial number attached to it. For example, midnight is 0.000; noon is .5; and 11:59:59 P.M. is .999999.

Performing Date and Time Arithmetic

To perform date or time arithmetic, you need functions to generate the serial numbers that are associated with specific dates. And, for ease in reading, you need formatting commands to interpret these numbers into calendar dates. For instance, use the /Range Format Date Time (1, 2, 3, or 4) command to format time; use /Range Format Date to format dates.

An example of date arithmetic is to create a column of months in the year for expenses, such as that created in the tutorial. Instead of painstakingly entering labels for all of the months, we could use date arithmetic to increment the last date by 30 days, continuing through the sequence of months from January through December.

1. Use the @DATE function in cell A5 to find the serial number for a day in January of 1991, say January 6. Enter **@DATE(91,1,6)**.

2. Go to cell A6 and enter the formula **+A5+30**. This adds 30 days to the previous serial number. (Thirty days is considered a banker's month.)

3. Use the /Copy command to copy the contents of cell A6 to range A7 to A16. This serves to add 30 days to the date of the previous cell.

3

4. Format the cells from A4 through A16 with the /Range Format Date-Month-Year 3 command.

Now you have an easily generated succession of the months in a clearly readable format.

```
A6: (D3) [W9] +A5+30                                              READY

1                       Total Annual Rental Income
2
3              Apartments    Houses      Condos     Commercial
4
5 Jan-91       $3,219.00   $11,887.00  $21,088.00  $63,226.00
6 Feb-91       $4,457.00   $14,344.00  $19,734.00  $62,795.00
7 Mar-91       $8,712.00   $16,783.00  $21,343.00  $57,052.00
8 Apr-91       $6,295.00   $10,909.00  $22,556.00  $63,886.00
9 May-91       $5,589.00   $12,564.00  $23,801.00  $52,637.00
10 Jun-91      $4,628.00   $13,807.00  $18,421.00  $50,440.00
11 Jul-91      $4,454.00   $17,005.00  $20,105.00  $58,226.00
12 Aug-91      $7,843.00   $18,816.00  $23,665.00  $51,903.00
13 Sep-91      $6,975.00   $12,443.00  $28,997.00  $59,032.00
14 Oct-91      $3,477.00    $9,849.00  $25,643.00  $60,055.00
15 Nov-91      $7,322.00   $15,672.00  $24,468.00  $49,876.00
16 Dec-91      $8,556.00   $10,551.00  $27,132.00  $55,821.00
17
18 TOTALS:    $71,527.00 $164,630.00 $276,953.00 $684,949.00
19
14-Feb-91   08:00 AM
```

The remainder of this section presents the date and time functions in alphabetical order. The first two functions listed below allow you to change today's date or another specified date into its serial date so it can be used in calculations. A Date Format command can be used to display the calculation's result in calendar format.

@DATE (year, month, day)

The @DATE function computes the serial number of a date. The year used must be between 1900 and 2099. Years are numbered from 0-199, and start at 1900. When you use a date as an argument, enter it in this format: Year,Month,Day.

You might want to change the calendar date September 24, 1991, into its serial number representation:

Formula entered	Result
@DATE(91,9,24)	33505

If you enter the date numbers in the wrong order, SCO Professional still tries to evaluate it.

SCO Professional displays ERR in the cell if the argument is out of range. For example, the dates (91,14,12) and (91,2,30) are impossible because a year cannot have 14 months, nor are there 30 days in February.

@DATEVALUE (date string)

The @DATEVALUE function returns the serial date number of the specified string, provided that the date string is in one of the date formats specified by the /Range Format Date command. Instead of the three numeric values for the year, month, and day (as used in @DATE), @DATEVALUE uses a string as its argument.

You might want to change the calendar date May 5, 1991, into its serial number representation:

Formula entered	Result
@DATEVALUE("5-May-91")	33363

@DAY (date number)

3

The @DAY function finds the day of a month given the serial date. This function uses the date number that is computed by the functions @DATE, @DATEVALUE, @TODAY, or @NOW. The date number must be from 1 to 73050, for the dates 1/1/1900 to 12/31/2099.

You might want to know the day of the serial date 33505, which is from the date September 24, 1991. The examples below show you several ways to do this:

Formula entered	Result
@DAY(33505)	24
@DAY(@DATE(91,9,24))	24
@DAY(@DATEVALUE("24-Sep-91"))	24

@HOUR (time number)

The @HOUR function extracts the hour value from the specified time number, returning a value between 0 (midnight) and 23 (11 P.M.). The time number can be generated by @TIME, @TIMEVALUE, or @NOW.

You may want to calculate the hour from the time 8:22:36 A.M., as in the first example; or you may wish to calculate the hour of the current time, as in the second example:

Formula entered	Result
@HOUR(@TIME(8,22,36))	8
@HOUR(@NOW)	8 (if the current time is 8:22:36 A.M.)
@HOUR(.5)	12

@MINUTE (time number)

The @MINUTE function extracts the minute value from the specified time number, returning a value between 0 and 59. This time number can be generated by @TIME, @TIMEVALUE, or @NOW.

You may want to calculate the minute from the time 8:22:36 A.M., as in the first example; or you may wish to calculate the minute of the current time, as in the second example:

Formula entered	Result
@MINUTE(@TIME(8,22,36))	22
@MINUTE(@NOW)	22 (if the current time is 8:22:36 A.M.)

@MONTH (date number)

The @MONTH function finds the month number from a given serial date. This function uses the date number that is computed by the functions @DATE, @DATEVALUE, @TODAY, or @NOW. The date number must be from 1 to 12, for the twelve months of the year.

You might want to know the month of the serial date 33505, which is from the date September 24, 1991. The examples below show you several ways to do this:

Formula entered	Result
@MONTH(33505)	9
@MONTH(@DATE(91,9,24))	9
@MONTH(@DATEVALUE("24-Sep-91"))	9

@NOW

The @NOW function returns the serial number for either the current date or time. This value is updated every time the worksheet is stored or recalculated.

If the current time and date is 9:45 A.M. on June 29, 1991, then:

Formula entered	Result
@NOW	33787.395
@NOW	06/29/91 (when the cell is formatted as /RFD4)
@NOW	09:45:00 AM (when the cell is formatted as /RFD1)

@SECOND (time number)

The @SECOND function extracts the second value from the specified time number, returning a value between 0 and 59. This time number can be generated by @TIME, @TIMEVALUE, or @NOW.

You may want to calculate the second from the time 8:22:36 A.M., as in the first example; or you may wish to calculate the second of the current time, as in the second example:

Formula entered	Result
@SECOND(@TIME(8,22,36))	36
@SECOND(@NOW)	36 (if the current time is 8:22:36 AM)

@TIME (hour, minute, second)

The @TIME function returns the serial number of the specified hour, minute, and second. The hours can be any value from 0 to 23; the minutes must be from 0 to 59; and the seconds must be from 0 to 59. The function returns decimal values, from 0 (for midnight) to .999988425925926 (for one second before minute).

You might want to change the time 8:22:36 A.M. into its serial number representation:

Formula entered	Result
@TIME(8,22,36)	.348611
@TIME(8,22,36)	8:22:36 AM (if the cell is formatted as /RFDT1)

@TIMEVALUE (time string)

The @TIMEVALUE function returns the serial number of the specified string, provided that the time string is in one of the date formats specified by the /Range Format Date command.

You might want to change the time string *8:22:36 A.M.* into its serial number representation:

Formula entered	Result
@TIMEVALUE("8:22 AM")	.349027
@TIMEVALUE("16:18")	04:18 PM (if the cell is formatted as /RFDT2)

@TODAY

The @TODAY function changes today's date (on your computer clock) to its serial date (up to December 31, 2099).

If your computer clock thinks it is September 24, 1991, then:

Formula entered	Result
@TODAY	33505
@TODAY	09/24/91 (if the cell is formatted as /RFD4)

3

@YEAR (date number)

The @YEAR function finds the year number from a given serial date. This function uses the date number that is computed by the functions @DATE, @DATEVALUE, @TODAY, or @NOW. The date number must be from 1 to 199, for the years 1900 to 2099, respectively.

You might want to determine the year of the serial date 33505, which is from the date September 24, 1991. The examples below show you several ways to do this:

Formula entered	Result
@YEAR(33505)	91
@YEAR(@DATE(91,9,24))	91
@YEAR(@DATEVALUE("24-Sep-91"))	91

Financial Functions

Financial functions are useful for investment calculations, particularly those concerning the time value of money. You may want to find the present or future value of an annuity, for example, or estimate the depreciation value of an asset at any given period of time.

Here are two things to note about using financial functions:

■ When you enter functions that require a term and a rate as arguments, make sure to use the same unit of time for both arguments. If a term is expressed in months, then use a monthly interest rate as well (instead of an annual interest rate).

■ When you use percentages (as interest rates, for example), you can enter them either as decimals (.20) or with the percent symbol (20%), in which case SCO Professional converts them into decimals.

The remainder of this section describes, in alphabetical order, the financial functions available with SCO Professional.

@CTERM (interest, future value, present value)

The Compound Term (@CTERM) function returns the number of time periods it takes to reach a future value by compounding the interest of the present value.

The function uses the following formula, where *@LN* is the natural logarithm to calculate a time period:

$$\text{CTERM} = \frac{\text{@LN(future value / present value)}}{\text{@LN(1 + interest)}}$$

Say you have invested $15,000 in an asset that has an annual interest rate of 12% with monthly payments. You want to know how long it takes for your asset to be worth $50,000. The screen looks like this:

```
B6: (F4) [W14] @CTERM(B2,B3,B1)                                    READY

1Current investment:              $15,000.00
2Interest rate:                        12.00%
3Expected future value:           $50,000.00
4
5Time required to triple investment:  120.9983 months
6                                      10.6237 years
7
```

The formula looks like this:

Formula entered	Result
@CTERM(.12,50000,15000)	10.6237

@DDB (cost, salvage, life, period)

The Double-Declining Balance function (@DDB) computes the depreciation of an asset for a period of time. This method accelerates the rate of depreciation so that you can determine the appropriate depreciation expense to write off in each period of an asset's life. Depreciation stops when the cost reaches salvage value.

This function uses the following formula to calculate depreciation where *book value* is the cost you paid for the asset minus the salvage (which is the total depreciation of the asset).

$$DDB = \frac{\text{book value for the period} * 2}{\text{life}}$$

Say you have an asset worth $10,000. You know that its salvage value after five years is $2000, but you want to know its value for each year up to five years. The screen look like this:

```
C2:  (C2)  [W14] @DDB($F$2,$F$3,$F$4,A2)                                    READY

        A         B            C       D        E              F
1  Period:      Value:        DDB:
2       1    $6,000.00    $4,000.00          Cost of asset: $10,000.00
3       2    $3,600.00    $2,400.00          Salvage value:  $2,000.00
4       3    $2,160.00    $1,440.00          Life of asset:          5
5       4    $2,000.00      $160.00
6
```

The formulas look like this:

Formula entered	Result
@DDB(10000,2000,5,1)	4000
@DDB(10000,2000,5,2)	2400
@DDB(10000,2000,5,3)	1440
@DDB(10000,2000,5,4)	160

@FV (payment, interest, term)

The Future Value (@FV) function finds the future value of an investment that has equal payments and a given interest rate. For this, you need to specify a monthly payment value, an interest rate (per period), and a number of payment periods.

The function uses the following formula, where n is the number of periods, to calculate future value:

$$FV = payment * \frac{(1 + interest)^n - 1}{interest}$$

Suppose you want to calculate the total if you make payments of $1200 a month for twelve months at a steady interest rate of 6%. The screen looks like this:

```
B4: (C2) [W14] @FV(B1,B2,B3)                                    READY

  1 Monthly payments:              $1,200.00
  2 Interest rate:                        6%
  3 Number of payment periods:            12
  4 Future value:                 $20,243.93
```

The formula looks like this:

Formula entered	Result
@FV(1200,.06,12)	20243.92

@IRR (guess, range)

The Internal Rate of Return (@IRR) function calculates the internal rate of return on a cash investment or profit that has positive or negative cash flows at regular intervals. This function requires the user to guess at the right internal rate to trigger the subsequent calculation.

All cash flows must be included in the range specified in the range argument. Payments are entered as negative numbers, and receipts are entered as positive numbers. The initial investment should be the first cash flow in the range and must be entered as a negative number. Any zero cash flow should be entered as zero.

This function uses an iterative scheme to find the correct answer. If it cannot find a rate within .0000001 after 20 iterations, the result is displayed as ERR. At times, depending on what best possible guess you first make, the result of the function may vary when you use the same series of cash flows. Usually, if a guess is between 0.0 and 1.0, it yields an accurate result.

The function uses the following formula, where n is the time period, to calculate the internal rate of return:

$$IRR = \sum \frac{payment_n}{(1 + interest)^n}$$

Let's say you invested \$2500 that will receive four payments through the years. You guess a 12% interest rate, and you want to calculate the rate of return from the following series of payments (shown in row 3). The screen looks like this:

```
B5: (P2) [W12] @IRR(B4,B3..F3)                                    READY

1                Original
2                Investment:
3Payments:       ($2,500.00)  $1,250.00 $1,000.00  $500.00  $250.00
4Estimated IRR:       12.00%
5Actual IRR:          10.22%
6
```

The formula looks like this:

Formula entered	Result
@IRR(B4,B3..F3)	0.102212

The parentheses around the original investment (in cell B3) indicate a negative payment.

@NPV (interest, range)

The Net Present Value (@NPV) function finds the value of a series of future cash flows in today's dollars. A fixed interest rate is used to discount the cash flows that calculate present value. The interest rate must be expressed in the same terms as the payments; an annual interest rate is used with yearly payments, and a monthly interest rate is used with monthly payments. The series of future cash flows is a range representing future receipts or payments. The range must be a single column or row.

The function uses the following formula, where *payment* is the series of cash flows in the range and *n* is the time period, to calculate net present value:

$$NPV = \sum \frac{payment_n}{(1 + interest)^n}$$

The result of the function does not include the initial payment (a single value). To find the overall net present value, add the resulting net present value to the initial payment (as a positive number).

Say you want to find the net present value of an asset that had an initial payment of $1000, a series of $500 payments (shown in row 3), and an annual interest rate of 11%. The two examples show you the net present value if the investment is made at the beginning of year one (B6) or at the end of year one (B7). The screen looks like this:

```
B6: (C2) [W12] @NPV(B4,C3..F3)+B3                                    READY

           A                 B          C         D         E         F
1 Time Period:              1 yr      2 yr      3 yr      4 yr      5 yr
2
3 Annual Payments:      -1000.00    500.00    500.00    500.00    500.00
4 Interest Rate:           11.00%
5
6 NPV (now):             $551.22
7 NPV (after 1 yr):     $1551.22
8
```

The formulas look like this:

Formula entered	Result
@NPV(B4,C3..F3)+B3	551.22
@NPV(B4,C3..F3)	1551.22

@PMT (principal, interest, term)

The Payment (@PMT) function calculates mortgage payments based on principal, interest rate per period, and the number of periods. Even if you use zero as an interest rate, the function yields correct results. You may use numbers or cell references for values.

The function uses the following formula to calculate payments, where n is the number of payments:

$$PMT = principal * \frac{interest}{1 - (1 + interest)^{-n}}$$

Say you are planning to buy a house, on which you can spend from $150,000 to $200,000. If the current interest rates range from 9½% to 12% and you take out a 30-year mortgage, you can use the following formula to calculate mortgage payments:

```
C4: _(C2)_ [W10] @PMT($A4,C$2/12,360)                              READY
```

	A	B	C	D	E	F	G	H
1					Interest Rates:			
2	Principal:		9.50%	10.00%	10.50%	11.00%	11.50%	12.00%
3								
4	$150,000		$1,261.28	$1,316.36	$1,372.11	$1,428.49	$1,485.44	$1,542.92
5	$160,000		$1,345.37	$1,404.11	$1,463.58	$1,523.72	$1,584.47	$1,645.78
6	$170,000		$1,429.45	$1,491.87	$1,555.06	$1,618.95	$1,683.50	$1,748.64
7	$180,000		$1,513.54	$1,579.63	$1,646.53	$1,714.18	$1,782.52	$1,851.50
8	$190,000		$1,597.62	$1,667.39	$1,738.00	$1,809.41	$1,881.55	$1,954.36
9	$200,000		$1,681.71	$1,755.14	$1,829.48	$1,904.65	$1,980.58	$2,057.23
10								
11	Term = 30 years 14-Feb-91 08:00 AM							

The formula looks like this:

Formula entered	Result
@PMT($A4,C$2/12,360)	1261.28

Note the use of mixed-cell references in this example. In the first variable ($A4), the column is absolute and the row is relative; in the second variable (C$2), the column is relative and the row is absolute. With this combination, you can copy the contents of cell C4 to the rest of the payment range (C4..H9).

@PV (payment, interest, term)

The Present Value (@PV) function finds the present value of an investment, assuming a fixed interest rate and an equal number of payments made at the end of each period. You need to specify a payment, an interest rate (per period), and a number of payment periods. You may use numbers or cell references for values.

The function uses the following formula to calculate the present value, where *n* is the term:

$$PV = payment * \frac{1 - (1 + interest)^{-n}}{interest}$$

Say you want to find the present value of an investment with a $1200 monthly payment, a 6% annual interest rate, and a 12-month term:

```
B4: (C2) [W14] @PV(B1,B2/12,B3)                                    READY

              A                    B              C           D
1 Monthly payments:          $1,200.00
2 Interest rate:                    6%
3 Term:                             12
4 Present value:
```

The formula looks like this:

Formula entered	Result
@PV(B1,B2/12,B3)	13942.72

@RATE (future value, present value, term)

The Rate (@RATE) function computes the periodic interest rate that must be earned for a present value to increase to a future value over a specified number of periods.

The function uses the following formula to calculate the interest rate, where n is the number of periods:

$$Rate = (future\ value/present\ value)^{1/n} - 1$$

Say you want to calculate the monthly interest rate of an asset that holds a current value of $8000, a future value of $15,000, and a five-year term:

```
B4: (P0) [W14] @RATE(B1,B2,B3)                            READY


1Future value:              $15,000.00
2Present value:              $8,000.00
3Term:                               5
4Interest rate:                    13%
5
6
```

The formula looks like this:

Formula entered	Result
@RATE(B1,B2,B3)	0.13

@SLN (cost, salvage, life)

The Straight-Line Depreciation (@SLN) function returns the depreciation of an asset for one period. This method returns an even depreciation of an asset over its useful life.

The function uses the following formula to compute depreciation:

$$SLN = \frac{cost - salvage}{life}$$

Say you want to calculate a year's depreciation of a $10,000 asset that salvages $2000 after five years:

```
C2: (C2) [W14] @SLN($F$2,$F$3,$F$4)                                    READY

 1 Period:        Value:           SLN:
 2      1      $8,400.00        $1,600.00      Cost of asset: $10,000.00
 3      2      $6,800.00        $1,600.00      Salvage value:  $2,000.00
 4      3      $5,200.00        $1,600.00      Life of asset:          5
 5      4      $3,600.00        $1,600.00
 6      5      $2,000.00        $1,600.00
```

The formula looks like this:

Formula entered	Result
@SLN(10000,2000,5)	1600.00

@SYD (cost, salvage, life, period)

The Sum-of-the-Years-Digits Depreciation (@SYD) function returns the depreciation of an asset over a period of time. This method accelerates the rate of depreciation; that is, more depreciation occurs in earlier periods than in later ones.

The function uses the following formula to compute depreciation:

3

$$SYD = \frac{(cost - salvage) * (life - period + 1)}{(life * (life + 1) / 2)}$$

where *cost* is the purchase price of the asset, *salvage* is its value at the end of depreciation, *period* is the period during which you are calculating depreciation, and *life* is the asset's useful life.

Say you want to calculate the depreciation each year for an asset that costs $10,000 and salvages $2000 after five years:

```
C2: (C2) [W14] @SYD(F$2,$F$3,$F$4,A2)                          READY

  1 Period:        Value:          SYD:
  2     1       $7,333.33      $2,666.67      Cost of asset:  $10,000.00
  3     2       $5,200.00      $2,133.33      Salvage value:   $2,000.00
  4     3       $3,600.00      $1,600.00      Life of asset:            5
  5     4       $2,533.33      $1,066.67
  6     5       $2,000.00        $533.33
```

The formulas look like this:

Formula entered	Result
@SYD(10000,2000,5,1)	2666.67
@SYD(10000,2000,5,2)	2133.33
@SYD(10000,2000,5,3)	1600.00
@SYD(10000,2000,5,4)	1066.67
@SYD(10000,2000,5,5)	533.33

@TERM (payment, interest, future value)

The Term (@TERM) function returns the number of payment periods necessary to accumulate a future value on your original investment (payment), using a fixed interest rate and equal payments.

The function uses the following formula, where *LN* is the natural logarithm, to compute payment periods:

$$\text{TERM} = \frac{\text{@LN}(1 + (\text{interest} * \text{future value})/\text{payment})}{\text{@LN}(1 + \text{interest})}$$

Say you want to know how many payments it takes to earn $30,000 if you invest $300 a month at a 12% interest rate:

```
B5: (F2) [W14] @TERM(B1*12,B2,B3)                                    READY

              A                    B          C        D        E
1Monthly payments:              $300.00
2Interest rate:                  12.00%
3Expected future value:      $30,000.00
4
5Term:                             6.12 years
6                                 69.66 months
7
```

The formulas look like this:

Formula entered	Result
@TERM(B1*12,B2,B3)	6.12
@TERM(B1,B2/12,B3)	69.66

Logical Functions

3

Logical functions test other values and formulas or just represent the values
of true or false. Like the logical operators discussed earlier in this chapter,
logical functions produce one of two values: true (1) or false (1). In addi-
tion, logical functions can use these true or false values to perform other
tasks.

Here are a few notes about logical functions:

■ Logical functions may be used with logical operators. For example,
@ IF(A5<20,5,10).

■ The functions @TRUE and @FALSE do not take arguments.

■ The functions @ISERR, @ISNA, @ISNUMBER, and @ISSTRING
allow you to check for ERR and NA values.

@FALSE

The @FALSE function yields the value of 0 (false). This function is a sub-
stitute for zero in formulas and is often used within formulas that contain
other @ functions, @IF and @CHOOSE primarily.

Say you want to display a 0 (false) under specified conditions. In these examples, B5 is 50 and A13 is 250:

Formula entered	Result
@IF(B5<100,B5,@FALSE)	50
@IF(A13<100,A13,@FALSE)	0

The @FALSE function is the reverse of @TRUE.

@IF (condition, first value, second value)

The @IF function tests a condition, and then returns either the first value (if the condition is true) or the second value (if the condition is false).

Say the value of cell B2 equals 7%, and the value of cell B3 equals 10%:

Formula entered	Result
@IF(B2>B3,B3,B2)	7

Due to the way binary floating-point arithmetic is done, some combinations of numbers return the value 0 (false) incorrectly. To produce a valid result, you may have to use the @ROUND function in the formula.

In the following example, the values in cells A1, B1, and C1 are compared
to the sum value in cell D1. This @IF function needs @ROUND within the
formula to obtain an accurate result:

```
E1: @IF(A1+B1+C1=D1,1,0)                                          READY

        A         B         C        D         E      F      G      H
  1   310.68    464.25    20.5     795.43            0
  2                                                  1
```

Cell E1 contains the formula using the @IF function alone and returns an
inaccurate result. Cell E2 contains the formula using @ROUND with @IF
to round off the values and return the correct answer:

Formula entered	Result
@IF(A1+B1+C1=D1,1,0)	0
@IF(@ROUND(A1+B1+C1,2)=@ROUND(D1,2),1,0)	1

@ISERR (value)

The @ISERR function tests the specified value to see if it has the value
ERR (that is, if the cell contains the function @ERR or if it contains an
error). If so, the function returns the value of 1 (true); otherwise, it returns
the value of 0 (false).

Say the value of cell A5 is 5:

Formula entered	Result
@ISERR(A5)	0
@ISERR(A5/0)	1

The @ISERR function is similar to @ISNA, except @ISNA tests for the value of NA instead of ERR.

@ISNA (value)

The @ISNA function tests the specified value to see if it has the value NA (not available). The function returns the value of 1 (true) if the specified value has the value NA; otherwise, it returns the value of 0 (false). This function is often used with the @IF function to prevent values of NA from rippling through your worksheet formulas.

In the following example, where F2 is 20, the formula is saying, "If the contents of A2 are NA, then display a zero; otherwise, display their contents."

Formula entered	Result
@IF(@ISNA(F2),0,F2)	20

The @ISNA function is similar to @ISERR, except @ISERR tests for the value of ERR instead of NA.

@ISNUMBER (x)

The @ISNUMBER function tests for a numeric value in a cell. If the value (x) is a number or a formula that results in a numeric value, this function returns a 1, for true; if not, it returns a 0, for false.

In the first example, the value is a number; in the second, it is a string:

Formula entered	Result
@ISNUMBER(447)	1
@ISNUMBER("447")	0

This function is similar to @ISSTRING, except that @ISSTRING tests for a string instead of numeric values.

@ISSTRING (x)

The @ISSTRING function tests for a string value in a cell. If the value (x) is a string, this function returns a 1; if not, it returns a 0.

In the first example, the value is a number; in the second, it is a string:

Formula entered	Result
@ISSTRING(447)	0
@ISSTRING("447")	1

3

This function is similar to @ISNUMBER, except that @ISNUMBER tests for numeric instead of string values.

@TRUE

The @TRUE function yields the value of 1 (true).

Say you want to display a one (true) under specified conditions. In these examples, B5 is 50 and A13 is 250:

Formula entered	Result
@IF(B5<100,@TRUE,B5)	1
@IF(A13<100,@TRUE,A13)	250

The @TRUE function is the reverse of @FALSE. This function is a substitute for one in formulas, and is often used within formulas that contain other @ functions, @IF and @CHOOSE primarily.

Mathematical Functions

The mathematical functions are mainly useful for engineering and scientific calculations. These functions cover many different areas of pure mathematics, including trigonometric and algebraic expressions. The functions are listed in alphabetical order.

Here are a few guidelines to using mathematical functions:

- The functions @PI and @RAND do not require arguments.

- Angles are expressed in radians for the functions @ACOS, @ASIN, @ATAN, @TAN2, @COS, @SIN, and @TAN.

- To calculate angles in degrees, multiply the radians by 180/@PI.

- The screen display of the resulting values is limited by the worksheet format for the cell. That is, the number of decimal places displayed is determined by the /Worksheet Column command and the /Range Format command. If the column is not wide enough, the screen displays a list of asterisks (*).

@ABS (value)

The @ABS function calculates the positive, or absolute, value of its argument.

Say the formula in cell A1 is +6-8 (which ordinarily results in -2):

Formula entered	Result
@ABS(A1)	2

@ACOS (cosine of the angle)

The @ACOS function calculates the inverse cosine (arc cosine), in radians, of the angle whose cosine is listed in the argument. The cosine value, which must be between -1 and +1, can be entered as a number or a cell reference.

The result of the function is always between 0 and π radians; otherwise, the result is indicated by the value ERR.

3

Say you want to know the arc cosine for an angle whose cosine value is .3:

Formula entered	Result
@ACOS(.3)	1.266103

To convert the @ACOS result from radians to degrees, multiply the answer by 180/π.

@ASIN (sine of the angle)

The @ASIN function calculates the inverse sine (arc sine), in radians, of the angle whose sine is listed in the argument. The sine value must be between -1 and +1. It can be entered as a number or a cell reference. The function's result is always between -π/2 and +π/2; otherwise, the result is indicated by the value ERR.

Say you want to know the arc sine for an angle whose sine value is .5:

Formula entered	Result
@ASIN(.5)	0.523598

To convert the @ASIN result from radians to degrees, multiply the answer by 180/π.

@ATAN (tangent of the angle)

The @ATAN function calculates the inverse tangent (arc tangent), in radians, of the angle whose tangent is listed in the argument. The function's result is always between $-\pi/2$ and $+\pi/2$; otherwise, the result is indicated by the value ERR.

Say you want to know the arc tangent for an angle whose tangent value is 1:

Formula entered	Result
@ATAN(1)	.785398

To convert the @ATAN result from radians to degrees, multiply the answer by $180/\pi$.

@ATAN2 (first value, second value)

The @TAN2 function calculates the four-quadrant inverse tangent (arc tangent), in radians, of an angle whose tangent is expressed by the ratio of the argument second value/first value. This function is entered differently than @TAN because it considers the signs of the first value and the second value to have separate values for all four quadrants, from $-\pi$ to $+\pi$. If both values of the argument equal zero, the result is displayed as ERR.

Say you want to know the arc tangent of an angle whose tangent is -.5/1:

Formula entered	Result
@ATAN2(-.5,1)	2.034443

@COS (radians of the angle)

The @COS function calculates the cosine of an angle. The angle must be expressed in radians in the argument; otherwise, a cell reference can be used. The resulting value is between -1 and +1.

Say you want to know the cosine of an angle whose radians are .5:

Formula entered	Result
@COS(.5)	.877582

To convert the @COS result from degrees to radians, multiply the answer by @PI/180.

3

@EXP (value)

The @EXP function calculates the natural base (2.718281) raised to the specified value. The function uses the formula e^n, where e = the natural base and n = value. If the value is greater than 230, the result is displayed as ERR.

Here is an example of @EXP:

Formula entered	Result
@EXP(10)	22026.46

This function is the reverse of @LN.

@INT (value)

The @INT function returns only the integer part of a value.

Say the formula in cell A1 reads +3-.6 (where the result is 2.4):

Formula entered	Result
@INT(A1)	2

@LN (value)

The @LN function calculates the natural (or base e) logarithm of the value. The result is displayed as ERR if the value equals zero or is negative.

Here is an example:

Formula entered	Result
@LN(10)	2.302585

This function is the reverse of @EXP.

@LOG (value)

The @LOG function calculates the common, or base ten, logarithm of the value. The result ERR is displayed if the value is zero or negative.

Here is an example:

Formula entered	Result
@LOG(5)	.698970

@MOD (first value, second value)

The @MOD (modulator) function returns the remainder from the first value after it has been divided by the second value.

Say you want to know the modulator of 30/4:

Formula entered	Result
@MOD(30,4)	2

@PI

The @PI function returns the value of π. It is frequently used to convert degrees to radians. One degree equals @PI/180 (radians). This function does not require an argument.

Say you want to calculate π divided by 2:

Formula entered	Result
20*(@PI/2)	31.41592

@RAND

The @RAND function returns a random decimal value distributed uniformly between 0.0 and 1.0. This function does not use an argument. A new random number is generated for each cell that contains @RAND every time SCO Professional recalculates.

Here are a few examples:

Formula entered	Result
@RAND	.414100
@RAND	.690568

@ROUND (value, number of decimal places)

The @ROUND function rounds off a value to a specified number of decimal places.

Say the formula in cell F2 reads 2.34*2.456:

Formula entered	Result
@ROUND(F2,2)	5.75

@SIN (radians of the angle)

The @SIN function calculates the sine of an angle. The angle must be expressed in radians in the argument; otherwise, a cell reference can be used. The resulting value is between -1 and +1.

Say you want to know the sine of an angle whose radians are 1.5:

Formula entered	Result
@SIN(1.5)	.997494

@SQRT (value)

The @SQRT function calculates the square root of a value. If the value is negative, the result of this function is displayed as ERR.

Say you want to know the square root of 169:

Formula entered	Result
@SQRT(169)	13

@TAN (radian of the angle)

The @TAN function calculates the tangent of an angle. The value ERR is displayed if Angle-In-Radians=$\pi/2+\pi*n$ (n being any integer). The resulting value is between plus and minus infinity.

Say you want to know the tangent of an angle whose radians are 1.5:

Formula entered	Result
@TAN(1.5)	14.10141

Special Functions

Special functions do not relate to any particular category. Instead, special functions help you to define or find values on your worksheet.

@@(cell)

The @@ function references a cell indirectly; that is, the function refers to one cell that points to another cell. The argument of the @@ function must be the cell address of the cell containing the value that is being referenced. This function is especially useful for worksheets in which a number of formulas depend on one value that may change.

In the following example, the commissions listed in column D are dependent on reference cell E3. The reference cell, in turn, depends on one of the commission rates in column B. Using the @@ function, the user need only change the cell reference (in cell E3) to alter the values in the entire Commission column:

```
D3:  (C2)  [W14]  +C3*@@($E$3)                                    READY

            A              B          C            D           E
  1 Name:            District:    Sales:     Commission:   Ref Cell:
  2
  3 Abrahms, Leon        J1     $1,299,667.00  $64,983.35      b14
  4 Brown, Leslie        F2     $2,314,764.00  $115,738.20
  5 Hill, Catherine      A6     $2,778,432.00  $138,921.60
  6 Jamieson, Jack       D3     $1,332,887.00   $66,644.35
  7 Johnson, Andy        B2     $2,332,778.00  $116,638.90
  8 Roberts, Ted         L1     $1,112,343.00   $55,617.15
  9 Smith, Samantha      G7     $2,884,928.00  $144,246.40
 10 Stevens, Julie       H4     $2,473,343.00  $123,667.15
 11                                            ------------
 12 TOTAL:                     $16,529,142.00  $826,457.10
 13
 14 COMMISSION RATE:    0.05
 15                     0.06
 16                     0.07
 17                     0.08
 18                     0.09
 19
 14-Feb-91  08:00 AM
```

The formula looks like this:

Formula entered	Result
+C3*@@(E3)	$64,983.35

If you change the value of the reference cell (E3), then the entire column changes. In the next screen, because the cell reference was changed from B14 to B17, the values in column D are altered to reflect the 8% interest rate:

```
D3: (C2) [W14] +C3*@@($E$3)                                          READY

              A              B           C            D           E
 1 Name:              District:    Sales:      Commission:   Ref Cell:
 2
 3 Abrahms, Leon         J1      $1,299,667.00   $103,973.36    b17
 4 Brown, Leslie         F2      $2,314,764.00   $185,181.12
 5 Hill, Catherine       A6      $2,778,432.00   $222,274.56
 6 Jamieson, Jack        D3      $1,332,887.00   $106,630.96
 7 Johnson, Andy         B2      $2,332,778.00   $186,622.24
 8 Roberts, Ted          L1      $1,112,343.00    $88,987.44
 9 Smith, Samantha       G7      $2,884,928.00   $230,794.24
10 Stevens, Julie        H4      $2,473,343.00   $197,867.44
11
12 TOTAL:                       $16,529,142.00 $1,322,331.36
13
14 COMMISSION RATE:      0.05
15                       0.06
16                       0.07
17                       0.08
18                       0.09
19
14-Feb-91   08:00 AM
```

The formula looks like this:

Formula entered	Result
+C3*@@(E3)	$103,973.36

@CELL (string, range)

The @CELL function returns a specified attribute of the top-left cell of a range. This function is especially useful in macros. The range can be specified either by a range name (COMRATE, for instance) or by cell addresses (D1..D12, for example). The string of the @CELL function must be enclosed in quotations marks and can be any of the following nine attributes:

3

Cell Attributes

Name	Description
address	cell address
col	column number (from 1 to 256)
contents	label or value contents
format	format, as specified by the /Range Format commands
prefix	label prefix (', ^, or ")
protect	protection status (0 for protected; 1 for unprotected)
row	row number (from 1 to 8192)
type	datatype (b for blank; v for value; l for label)
width	column width (from 1 to 240)

The following example uses each of the @CELL attributes to return different characteristics of cell B2:

```
B2: (P0) [W14] 0.06                                              READY

  1 Monthly payments:              $1,200.00
  2 Interest rate:
  3 Number of payment periods:            12
  4 Future value:                 $20,243.93
  5 ========================================
  6 @CELL("address",$B$2..$B$4)        $B$2
  7 @CELL("col",$B$2..$B$4)               2
  8 @CELL("contents",$B$2..$B$4        0.06
  9 @CELL("format",$B$2..$B$4)           P0
 10 @CELL("prefix",$B$2..$B$4)
 11 @CELL("protect",$B$2..$B$4)           1
 12 @CELL("row",$B$2..$B$4)               2
 13 @CELL("type",$B$2..$B$4)              v
 14 @CELL("width",$B$2..$B$4)            14
14-Feb-91  08:00 AM
```

The formulas look like this:

Formula entered	Result	Meaning
@CELL("address",B2..B4)	B2	absolute
@CELL("col",B2..B4)	2	2nd column
@CELL("contents",B2..B4)	0.06	contents
@CELL("format",B2..B4)	P0	percent
@CELL("prefix",B2..B4)		
@CELL("protect",B2..B4)	1	protected
@CELL("row",B2..B4)	2	2nd row
@CELL("type",B2..B4)	v	value type
@CELL("width",B2..B4)	14	width

@CELLPOINTER (string)

The @CELLPOINTER function returns a specified attribute of the current cell, which is the one the cell pointer rested on the last time the worksheet was recalculated. If you move the cursor or recalculate the worksheet the @CELLPOINTER returns different results. Like @CELL, this function is especially useful in macros. The string of the @CELLPOINTER function must be enclosed in quotations marks and can be any of the nine attributes described in the @CELL section.

The following example uses each of the @CELLPOINTER attributes to return different characteristics of the current cell (B4, in this case):

```
B4: (C2) [W14] @ V(B1,B2,B3)                              READY

              A                   B              C           D
 1 Monthly payments:          $1,200.00
 2 Interest rate:                   6%
 3 Num er of payment periods:       12
 4 Future value:
 5 ================================================
 6 @CELLPOINTER("address")         $B$4
 7 @CELLPOINTER("col")               2
 8 @CELLPOINTER("contents")  20243.9294367
 9 @CELLPOINTER("format")           C2
10 @CELLPOINTER("prefix")
11 @CELLPOINTER("protect")          1
12 @CELLPOINTER("row")              4
13 @CELLPOINTER("type")            v
14 @CELLPOINTER("width")           14
14-Feb-91  08:00 AM
```

The formulas look like this:

Formula entered	Result
@CELLPOINTER("address")	B4
@CELLPOINTER("col")	2
@CELLPOINTER("contents")	20243.9294367
@CELLPOINTER("format")	C2
@CELLPOINTER("prefix")	
@CELLPOINTER("protect")	1
@CELLPOINTER("row")	4
@CELLPOINTER("type")	v
@CELLPOINTER("width")	14

@CHOOSE (x, set of values)

The @CHOOSE function selects a value from a list of values. Using x as the placement number to choose from, the function selects that value from the set. The first item in the "set of values" is numbered zero, not one.

In the first example, the first value in the argument (2) tells @CHOOSE which value to select from the list; in the second example, 3 tells the function to select the value 6.

Formula entered	Result
@CHOOSE(2,"apples","oranges","pears","bananas")	pears
@CHOOSE(3,2,2.5,4,6,8)	6

@COLS (range)

The @COLS function returns the number of columns in the specified range.

The following example uses @COLS to determine the number of columns in the range A1..F9:

	A	B	C	D	E	F
1					Interest Rates:	
2	Principal:	|	9.50%	10.00%	10.50%	11.00%
3		|———				
4	$150,000	|	164250 ·	165000	165750	166500
5	$160,000	|	175200	176000	176800	177600
6	$170,000	|	186150	187000	187850	188700
7	$180,000	|	197100	198000	198900	199800
8	$190,000	|	208050	209000	209950	210900
9	$200,000	|	219000	220000	221000	222000
10						
11	@COLS(A1..G9)		6			

The formula looks like this:

Formula entered	Result
@COLS(A1..G9)	6

@ERR

The @ERR function in a cell returns the value ERR; it also displays the ERR value in any other cells that reference the cell. This function is often combined with @IF.

Say you want to flag any cell that could otherwise calculate a commission rate of greater than 10%. In the following example, if B5=20, the worksheet displays an ERR value to indicate this.

The formula looks like this:

Formula entered	Result
@IF(B5>10,10,@ERR)	@ERR

@HLOOKUP (x, range, row offset)

The @HLOOKUP function searches a table horizontally for a specific value. First, the function scans the top row to x, which is the test value in the first row of the table; the function then searches down the x column to the row listed in *row offset*. The range you specify consists of the area to be searched (usually the entire table). The row offset determines how many rows below the top row the result of the function is located. The first row of the range is offset number 0, not 1.

In the first row of the range, values cannot be duplicated and must be in ascending order. If the first value in the row exceeds x, then the result is displayed as ERR. If the exact value x does not appear in the first row, then @HLOOKUP goes to the column immediately left of the first value that exceeds x.

In the first example below, the function looks for the first value that equals or exceeds *3* in the first row of the specified range (A1..D3); then it returns the value from position 1 in the column.

In the second example, the function looks for the first value that equals or exceeds *2.5* in the first row of the specified range (A1..D3). Not finding 2.5, it goes to the next highest value (3), and then back one column (to value 2). Then it returns the value from position 2 in the column.

```
B5: @HLOOKUP(3,A1..D3,1)
```

	A	B	C	D
1	1	2	3	4
2	5	10	15	20
3	2.5	4.5	6.5	8.5
4				
5		15		
6		4.5		

he formulas look like this:

Formula entered	Result
@HLOOKUP(3,A1..D3,1)	15
@HLOOKUP(2.5,A1..D3,2)	4.5

The @HLOOKUP function is similar to @VLOOKUP, except that @VLOOKUP searches vertically, along columns, instead of horizontally.

3

@INDEX (range, column number, row number)

he @INDEX function returns the value of a cell that is within a range that you specify along with its column and row number. Both the first row and the first column are numbered zero. his function is useful for quoting rates within a large table.

he following example uses the @INDEX function in the range A2..G9 to pull out the rate for a $180,000 principal with a 10.5% interest rate:

```
D14:  (C2)  [W12]  @INDEX(A2..G9,3,5)                                    READY

 1                                  Interest Rates:
 2 Principal:|    9.50%       10.00%      10.50%      11.00%      11.50%
 3          |-------------------------------------------------------------
 4 $150,000 |   164250       165000      165750      166500      167250
 5 $160,000 |   175200       176000      176800      177600      178400
 6 $170,000 |   186150       187000      187850      188700      189550
 7 $180,000 |   197100       198000      198900      199800      200700
 8 $190,000 |   208050       209000      209950      210900      211850
 9 $200,000 |   219000       220000      221000      222000      223000
10
11 Number:
12     3       |Principal:    $180,000
13     5       |Rate:           10.50%
14             |Total:         $198,000
14-Feb-91   08:00 AM
```

The formula looks like this:

Formula entered	Result
@INDEX(A2..G9,3,5)	$198,000

@NA

The @NA function in a cell returns the value NA (Not Available); it also displays the NA message in any other cells that reference the cell. This function is often combined with @IF.

In this example, the value for B2 is @NA (Not Available), so the total for the column (in B6) also returns an NA value.

```
B7: @SUM(B1..B5)

       A        B        C
1       1        5      2.5
2       2       NA      4.5
3       3       15      6.5
4       4       20      8.5
5       5       25     10.5
6-------------------------------
7      15       NA     32.5
```

The formula looks like this:

Formula entered	Result
@SUM(B1..B5)	NA

@ROWS (range)

The @ROWS function returns the number of rows in the specified range.

The following example uses @ROWS to determine the number of rows in the range A1..F9:

	A	B	C	D	E	F
1					Interest Rates:	
2	Principal:	I	9.50%	10.00%	10.50%	11.00%
3		I				
4	$150,000	I	164250	165000	165750	166500
5	$160,000	I	175200	176000	176800	177600
6	$170,000	I	186150	187000	187850	188700
7	$180,000	I	197100	198000	198900	199800
8	$190,000	I	208050	209000	209950	210900
9	$200,000	I	219000	220000	221000	222000
10						
11	@ROWS(A1..G9)		9			

3

The formula looks like this:

Formula entered	Result
@ROWS(A1..G9)	9

@VLOOKUP (x, range, column offset)

The @VLOOKUP function searches a table vertically for a specific value. First, the function scans the left-most column to x, which is the test value in the first column of the range; the function then searches across the x row to the column listed as *column offset*. The range you specify consists of the area to be searched (usually the entire table). The column offset determines how many columns beyond the first one in the range the result of the function is located. The first column of the range is offset number 0, not 1.

In the first column of the range, values cannot be duplicated and must be in ascending order. If the first value in the column exceeds x, then the result is displayed as ERR. If the exact value x does not appear in the first column, then @VLOOKUP goes to the next higher value in the column, and selects the value in the row immediately above it.

In this example, the function looks for the first value that equals or exceeds 2 in the first column of the specified range (A1..C4); then, it returns the value from position 1 in the column.

In the second example, the function looks for the first value that equals or exceeds 2.5 in the first column of the specified range (A1..C4). Not finding 2.5, it goes to the next highest value (3), and then back one row (to value 2). Then, it returns the value from position 2 in the row.

```
A6: @VLOOKUP(2,A1..C4,1)
```

	A	B	C
1	1	5	2.5
2	2	10	4.5
3	3	15	6.5
4	4	20	8.5
5			
6	10		

The formulas look like this:

Formula entered	Result
@VLOOKUP(2,A1..C4,1)	10
@VLOOKUP(2.5,A1..C4,2)	4.5

The @VLOOKUP function is similar to @HLOOKUP, except that @HLOOKUP searches horizontally, along rows, instead of vertically.

Statistical Functions

Statistical functions are similar to database functions in that both perform statistical analyses on specified values. The difference is that data functions (discussed in Chapter 11, "Working with Databases") work on a distinct section of a database, while statistical functions work with a list of values.

Here are a few notes about statistical functions:

■ The list specified can be a range, a series of individual values, or a combination of both.

■ If blank ranges (or a blank cell) are part of the list, the cells are converted to zeros. If blank cells occur within a range, those cells are ignored (not turned into zeros).

■ Except for @COUNT, statistical functions work only with numeric values.

@AVG(list)

The @AVG function averages all the values of the list. The function works by adding the sum of all values, and then dividing the sum by the number of entries in the list. If the list is a range, empty cells are ignored.

Say you want to know the average high temperature this week:

```
K3: @AVG(C3..I3)                                                READY

     A   B  C    D     E    F    G     H    I   J  K    L    M
1Day:   | Sur.  Mon  Tues  Wed  Thur  Fri  Sat  | AVG
2───────|────────────────────────────────────────|
3Temp:  |  65   72    77   81   78    75   80  | 75.42
```

The formula looks like this:

Formula entered	Result
@AVG(65,72,77,81,78,75,80)	75.42

@COUNT(list)

The @COUNT function counts all the nonblank items in a list and uses that number as its value. If the list consists of one cell, the result of the function is always 1, even if the cell is blank. In all other cases, blank cells are not counted. The list can also be a range.

The first example counts the number of entries in the range from A1 to C4. The second example counts the number of values in the list.

```
A6: @COUNT (A1..C4)

        A         B         C
   1        1         5      2.5
   2        2        10      4.5
   3        3        15      6.5
   4        4        20      8.5
   5
   6       12
```

The formulas look like this:

Formula entered	Result
@COUNT(A1..C4)	12
@COUNT(2,4,6,8)	4

@MAX(list)

The @MAX function returns the largest value it finds in the list. If the list is a range, empty cells are ignored.

The first example returns the largest value from the range from B1 to B4. The second example returns the largest value from the specified list.

```
A6:  @MAX(B1..B4)

        A           B           C
1        1           5         2.5
2        2          10         4.5
3        3          15         6.5
4        4          20         8.5
5
6       20
```

The formulas look like this:

Formula entered	Result
@MAX(B1..B4)	20
@MAX(2,4,6,8)	8

@MIN(list)

The @MIN function returns the smallest value it finds in the list. If the list is a range, empty cells are ignored.

The first example returns the smallest value from the range from B1 to B4. The second example returns the smallest value from the specified list.

```
A6:  @MIN(B1..B4)


        A           B         C
 1          1         5      2.5
 2          2        10      4.5
 3          3        15      6.5
 4          4        20      8.5
 5
 6          5
```

The formulas look like this:

Formula entered	Result
@MIN(B1..B4)	5
@MIN(2,4,6,8)	2

@STD(list)

The @STD function returns the standard deviation of all the values in the list. Otherwise known as the square root of the variance, the standard deviation is the amount that the values in the list vary from the average in the list. The function returns the value ERR if there are no values in the list. Blank entries in the list are ignored.

The function uses the following formula, where χ_i is the ith item in the list and n is the number of items in the list.

$$\sqrt{\frac{\sum (\chi_i - AVG)^2}{n}}$$

Another way to calculate the standard deviation, using @ functions, is to use the following formula: @SQRT(@VAR(list)).

The first example returns the standard deviation of the range A1 to A4. The second example returns the standard deviation of the values in the specified list.

```
A6: @STD(A1..A4)
```

	A	B	C
1	1	5	2.5
2	2	10	4.5
3	3	15	6.5
4	4	20	8.5
5			
6	1.118033		

The formulas look like this:

Formula entered	Result
@STD(A1..A4)	1.118033
@STD(2,4,6,8)	2.236067

@SUM(list)

The @SUM function adds all the cell values of the list. If the list is a range, empty cells, or cells with labels, are ignored.

The first example adds together all the values from the range B1 to B4. The second example returns the sum of the values from the specified list.

```
B6: @SUM(B1..B4)

        A        B        C
1       1        5        2.5
2       2        10       4.5
3       3        15       6.5
4       4        20       8.5
5
6                50
```

The formulas look like this:

Formula entered	Result
@SUM(B1..B4)	50
@SUM(2,4,6,8)	20

@VAR(list)

The @VAR function returns the variance of all the values in the list. This formula calculates the degree to which single values vary from the average of all values in the list. The function returns the value ERR if @COUNT(list)=0. Blank entries in the list are ignored.

The function uses the following formula, where χ_i is the ith item in the list and n is the number of items in the list.

$$\frac{\sum (\chi_i - AVG)^2}{n}$$

Another way to calculate the variance, using @ functions, is to use the following formula:

@STD(list)*@STD(list)

The first example returns the variance of the range C1 to C4. The second example returns the variance of the values in the specified list.

```
C6: @VAR(C1..C4)
```

	A	B	C
1	1	5	2.5
2	2	10	4.5
3	3	15	6.5
4	4	20	8.5
5			
6			5

The formulas look like this:

Formula entered	Result
@VAR(C1..C4)	5
@VAR(2,4,6,8)	5

String Functions

String functions provide much of the same flexibility for manipulating text entries as the other functions do for manipulating numbers. With string functions, you can manipulate series of characters called STRINGS, make calculations using strings, and produce string values. Strings can contain letters, numbers, and special characters.

Here are a few guidelines to using string functions:

■ You can enter string values in one of two ways: when you enter string values as arguments in a string function, enclose them in double quotation marks (" "); when you reference string values in label cells by using arguments that are cell addresses or range names, however, do not enclose the cell address or range name in quotation marks.

For example, if you want a cell to display the first five characters of the string *Annual Budget*, which is stored in B5, enter either **@LEFT("Annual Budget",5)** or **@LEFT(B5,5)**.

■ Characters in a string follow a position numbering system in which the far left position is regarded as position 0, not position 1. Moving to the right of the string, the position numbering proceeds from 0 to 1 to 2, and so on. In the string *Annual Budget*, for example, the *A* is at position 0 and the *t* is at position 12, although the entire string contains 13 characters.

■ String position numbers can be from 0 to 239 for each string value, because 240 is the maximum number of characters in a string.

■ Numeric arguments must be expressed as positive integers. A negative integer returns an ERR value in the cell. A number with a decimal is truncated to the whole number, without first rounding it. For example, 3.7 is truncated to 3.

■ The functions @N and @S require range values as arguments.

@CHAR(x)

3

The @CHAR function returns the character that corresponds to the ASCII code number x. The value x can be any number from 1 to 255. The codes 32 to 127 are on the keyboard, including letters, numbers, and special characters. The codes 128 to 255 are ASCII characters, such as foreign language symbols, graphic characters, and other special characters that your monitor may not be able to display. The codes 1 to 31 are nonprintable, and they are returned as blanks.

Say you want to know the character that corresponds to ASCII 52:

Formula entered	Value
@CHAR(52)	4

@CODE(string)

The @CODE function returns the ASCII code number of the first character in a string. The value of the ASCII code number returned is from 1 to 255. The @CODE function does the reverse of @CHAR.

Say you want to know the ASCII code number for capital *A*:

Formula entered	Result
@CODE("A")	65

@EXACT(string1, string2)

The @EXACT function tests whether two string values (string 1 and string 2) are identical. The strings must match exactly, character for character, including blank spaces and capitalization. If the two values are equal, @EXACT returns a 1; if not, it returns a 0.

If you do not want to distinguish between lower- and uppercase letters, the equals (=) operator. Using the preceding example, the formula +"Annual Budget"="annual budget" returns *1* (for *true*).

Here is an example of @EXACT:

Formula entered	Result
@EXACT("Annual Budget", "annual budget")	0

@FIND(search string, string, start number)

The @FIND function searches a character string and returns the location at which the first occurrence of the specified substring (search string) appears within it. The function begins the search at the start number and returns a number that tells you where the first occurrence begins.

Suppose you decide to locate all the occurrences of the space character in the string *The Santa Cruz Operation*, which occupies cell A1. The first example uses 0 as the start number and returns 3 as the position. To find the next occurrence, add 1 to the result of the original function; then add 1 to the result of that function, and so on, until you get an ERR value, which indicates that there are no more occurrences of the search string.

The formulas look like this:

Formula entered	Result
@FIND(" ",A1,0)	3
@FIND(" ",A1,4)	9
@FIND(" ",A1,10)	14
@FIND(" ",A1,15)	ERR

3

@LEFT(string, n)

The @LEFT function returns a specified number of characters (n) from the left side of a string. This function is similar to @MID and @RIGHT, in that all three help you to extract characters from a specified place within a string.

Here are a few examples:

Formula entered	Result
@LEFT("584-4212",3)	584
@LEFT("The Santa Cruz Operation",9)	The Santa

@LENGTH(string)

The @LENGTH function returns the number of characters found in a specified string. This function determines the length of a string.

Say you want to know the length of the following strings:

Formula entered	Result
@LENGTH("584-4212")	8
@LENGTH("The Santa Cruz Operation")	24

@LOWER(string)

The @LOWER function converts all the characters in a specified string to lowercase letters. This function is the reverse of @UPPER, in which all the characters are converted to uppercase.

Say you want to change the following string to lowercase:

Formula entered	Result
@LOWER("SCO Professional")	sco professional

@MID(string,start number,n)

The @MID function extracts a specified number of characters (n) from a string beginning at a start number. This function is similar to @LEFT and @RIGHT, in that all three help you to extract characters from a specified place within a string.

Here is an example to show how only five characters from the middle of the string can be returned:

Formula entered	Result
@MID("The Santa Cruz Operation",4,5)	Santa

@N(range)

The @N function returns the numeric value of the upper-left corner cell in the specified range. The function returns a 0 for a cell that contains a string or a blank. It returns the value for a cell that contains a number or formula. The function @N is similar to @S, except that @S returns string instead of numeric values.

Say that the cells A1 through A3 contain the values Jan, Feb, and March, respectively:

Formula entered	Result
@N(A1..A3)	0

Or, suppose the cells B1 through B4 contain the values 15, 20, 25, and 30, respectively:

Formula entered	Result
@N(B1..B4)	15

@PROPER(string)

The @PROPER function converts the first letter of each word in the specified string to uppercase and converts the remaining letters to lowercase.

This example converts the following string to its proper case:

Formula entered	Result
@PROPER("the SANTA cRUz OperaTion")	The Santa Cruz Operation

@REPEAT(string,n)

The @REPEAT function duplicates a character string a specified number of times (n). This function can be useful for improving the appearance of a worksheet (to create horizontal lines, for instance).

Here are a few examples:

Formula entered	Result
@REPEAT("*",15)	***************
@REPEAT("la", 3)	la la la

@REPLACE
(original string,start location,n,new string)

The @REPLACE function removes a specified number of characters (n) from the original string, beginning at the start location, and replaces it with the new string. With this function, you can insert, remove, or replace characters in a string without having to retype the original string.

Say that cell A1 contains the string Month of January. Here is an example for changing the name of the month in a string:

Formula entered	Result
@REPLACE("A1",9,3,"February")	Month of February

@RIGHT(string,n)

The @RIGHT function returns a specified number of characters (n) from the right side of a string. This function is similar to @LEFT and @MID, in that all three help you to extract characters from a specified place within a string.

Here are a few examples:

Formula entered	Result
@RIGHT("584-4212",4)	1422
@RIGHT("The Santa Cruz Operation",9)	Operation

@S(range)

The @S function returns the string value of the upper-left corner cell in the specified range. If the cell contains a numeric value, @S returns a blank. The function @S is similar to @N, except that @N returns numeric instead of string values.

Say that the cells A1 through A3 contain the values Jan, Feb, and March, respectively:

Formula entered	Result
@S(A1..A3)	Jan

Or, suppose the cells B1 through B4 contain the values 15, 20, 25, and 30, respectively:

3

Formula entered	Result
@S(B1..B4)	

In the second example, the @S function returns a blank, because the upper-left cell in the specified range contains a numeric value.

@STRING(x, n)

The @STRING function converts a numeric value (x) to a string, with a specified number (n) of decimal places. If the result exceeds the number of decimal places, the value is rounded to the specified decimal place (n). With this function, you can combine both a string and a value in a string formula. The @STRING function is the reverse of @VALUE, in which a string number is converted into a value.

Here is an example of converting a numeric value into a string:

Formula entered	Result
@STRING(1234.5678,2)	1234.57
@STRING(1234.5678,0)	1235
@STRING(123,2)	123.00

@TRIM(string)

The @TRIM function eliminates extra leading and trailing space characters from a string.

Here is an example in which @TRIM comes in handy:

Formula entered	Value
@TRIM(" The Santa Cruz Operation ")	The Santa Cruz Operation

@UPPER(string)

The @UPPER function converts a specified string to uppercase. This function is the reverse of @LOWER, in which all the characters are converted to lowercase.

Say you want to change the appearance of the following string to uppercase:

Formula entered	Result
@UPPER("SCO Professional")	SCO PROFESSIONAL

@VALUE(string)

The @VALUE function converts the string number (a numeric label) in a specified string to its numeric value. The string must look like a number; that is, it can have only numerical or mathematical symbols. The @VALUE function is the reverse of @STRING, in which a number value is converted into a string.

Say you want to know the numeric value of the string 1/4:

Formula entered	Result
@VALUE("1/4")	.25

≣ Chapter 4

Copying and Moving Worksheet Data

4

Copying and Moving Worksheet Data

SCO Professional allows you to move information easily and restructure your worksheet with a minimum of retyping. By using the appropriate commands, you can copy, move, or transpose (rearrange) all types of worksheet data.

In this chapter, you are introduced to the /Copy command, which duplicates worksheet data and replicates it in new locations; the /Move command, which transfers worksheet information to a different location; the /Range Transpose command, which changes horizontal ranges to vertical ones (or vice versa); and the /Range Value command, which copies the currently displayed values produced by formulas (not the formulas themselves) from one range to another.

Contents of This Chapter

This chapter is organized into the following sections:

- ■ "Using Ranges" defines basic terms used by each command in this chapter, and outlines the procedure for specifying source and destination ranges.

- ■ "Copying Worksheet Data" explains how to copy existing values, labels, and formulas from one area of your worksheet to another.

- ■ "Moving Worksheet Data" describes how to move existing values, labels, and formulas from one area of your worksheet to another.

- ■ "Transposing Rows and Columns" shows you how to take a horizontal range and turn it into a vertical range and vice versa.

- ■ "Copying the Values Produced by Formulas" tells you how to copy the resulting value of a formula from one area of the worksheet to another, and how to convert a formula to its value.

Using Ranges

Each command in this chapter requires an understanding of ranges and how to specify them by name or by typing or pointing to cell coordinates. Information on how to specify and name ranges is found in Chapter 2, "Worksheet Basics," of this guide.

To use these commands, both source and destination ranges will need to be designated. A SOURCE range is the area of your worksheet you want to copy or move data from. A DESTINATION cell or range is the area you want to copy or move the source range to.

- **IMPORTANT:** Any data in the destination range is overwritten by the copied or moved source range. Be careful not to overwrite any data you want to retain.

Designating Ranges

The procedure for designating source and destination ranges is central to each of the commands discussed in this chapter. To designate these ranges:

1. Select the appropriate command (/Copy, /Move, /Range Transpose, or /Range Value) from an SCO Professional menu.

2. SCO Professional prompts you for a source range. Your current anchor cell is highlighted. You can now specify your source range in one of four ways:

    - You can use the cursor movement keys to move the free cell, pressing ⟨Return⟩ when done. If your source range is only one cell, you do not have to move it before pressing ⟨Return⟩.

    - You can type the source range by typing the anchor cell, one or two periods, and the free cell (example: A1..A12). Press ⟨Return⟩ when done.

    - You can type the name of a previously defined range. See Chapter 2, "Worksheet Basics," on how to define and list range names. Press ⟨Return⟩ when done.

- You can also change your anchor cell by pressing ⟨Escape⟩. You are now free to move your cursor to a new anchor cell. When there. type a period. You are now able to use the arrow keys to move to the free cell. Press ⟨Return⟩ when done.

3. SCO Professional then prompts you for a destination range. You can now enter the destination range. Each command is slightly different. For some commands, it is not necessary to specify a free cell. For other commands. designating different free cells affects data differently. See the individual command procedures for more information. To enter a destination range. choose one of the following procedures:

- Move the cursor to the anchor cell with the arrow keys. If it is not necessary to specify a free cell, press ⟨Return⟩. If it is necessary, type a period, then move to the free cell and press ⟨Return⟩.

- Enter a destination range by typing the address of the anchor cell and pressing ⟨Return⟩, or the anchor cell, two periods and the address of the free cell followed by ⟨Return⟩, if a free cell is necessary.

- Type the name of a previously defined range. Press ⟨Return⟩ when done.

Your command is now executed.

Copying Worksheet Data

The /Copy command duplicates the contents of a range and place the results in a range of the same or a larger size. Values, labels. and formulas can all be copied, although copying formulas may require special handling, as explained later in this chapter. When copying, remember that any data that is overwritten is lost.

The \ character repeats the cell's contents across the cell. For instance, you can repeat a hyphen (-) across a cell or range of cells to form a line. When used with the /Copy command, this feature is especially handy for entering dashed lines across your worksheet.

Copying Values and Labels

To execute the /Copy command, move the cursor to the upper left corner of the range that you want copied. Then, use the following procedure to copy labels and values to new locations:

1. Select /Copy from the Main menu. SCO Professional prompts you for a source range.

2. Specify a source range and press ⟨Return⟩. SCO Professional prompts you for a destination range.

3. Specify a destination range and press ⟨Return⟩. SCO Professional creates a duplicate of the data you specified and copies it to the range that you designated.

If the destination range is larger than the source range, SCO Professional creates as many complete copies as possible and places them in the destination range. The source range must have either a length (in rows) or width (in columns) of one cell, or multiple copies cannot be made.

This example shows you how to copy the contents of a one-celled source range A1 to a multi-celled destination range B2..B8:

```
A1: "Jan91                                                    READY

        A        B        C        D        E        F        G        H
   1   Jan91
   2
   3
   4
   5
   6
   7
   8
```
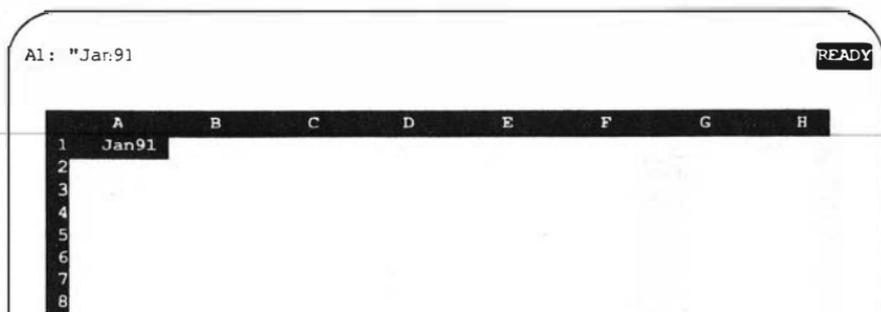
4

Source and destination ranges are entered, and this is the resulting worksheet:

```
A1: "Jan91                                                    READY

        A        B        C        D        E        F        G        H
   1   Jan91
   2            Jan91
   3            Jan91
   4            Jan91
   5            Jan91
   6            Jan91
   7            Jan91
   8            Jan91
```
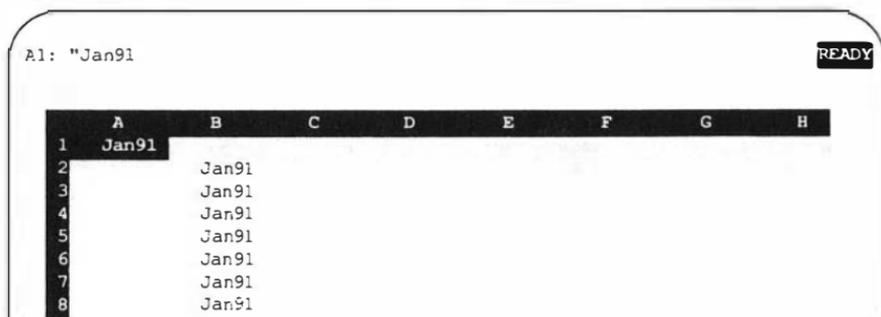
Notice how both the format and data are duplicated with "Jan91" right justified.

This example shows how to copy the contents of a multi-celled source range B2..B8 to a multi-celled destination range C2..C8:

```
B8: "Mar91                                                    POINT
Enter range to Copy from: B2..B8

 1    Mar91
 2         Mar91
 3         Mar91
 4         Mar91
 5         Mar91
 6         Mar91
 7         Mar91
 8         Mar91
```
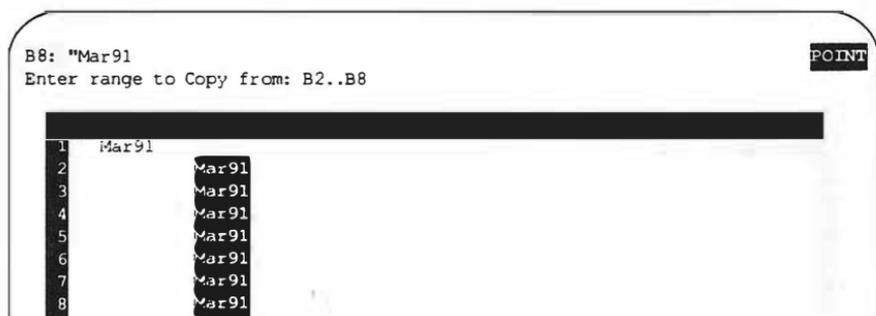
Source and destination ranges are entered. The contents of cells B2..B8 are copied to cells C2..C8:

```
C2: "Mar91                                                    READY


 1    Mar91
 2         Mar91    Mar91
 3         Mar91    Mar91
 4         Mar91    Mar91
 5         Mar91    Mar91
 6         Mar91    Mar91
 7         Mar91    Mar91
 8         Mar91    Mar91
 9
```
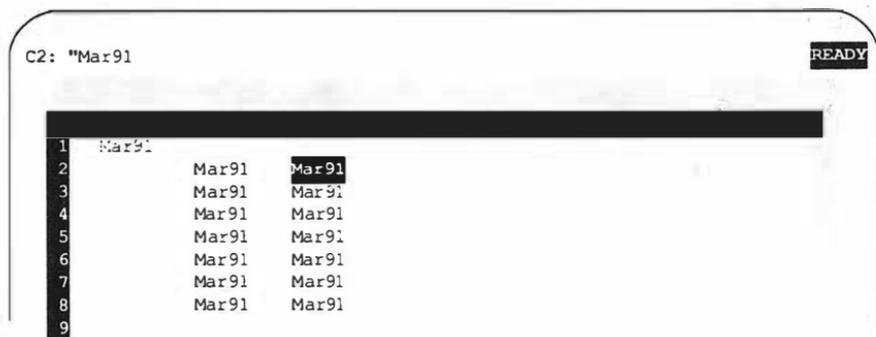
The same procedure can be followed for copying a source range to a destination range of a larger size.

Copying Formulas

When you copy formulas, you have to pay particular attention to any cell-address references because these references are adjusted automatically to fit the new location. Copying a formula, in other words, can change cell references in the formula. How well the copied cell formula matches the original cell formula depends on whether you use absolute cell references, relative cell references (which are the default type), or mixed cell references as shown in Chapter 3 of this guide, "Using Formulas and Functions."

ABSOLUTE CELL REFERENCES always remain constant, even if you copy the formula that contains an absolute cell reference to another area of your worksheet.

4

RELATIVE CELL REFERENCES change with the location of the cell as the formula is copied to its new location.

MIXED CELL REFERENCES are half absolute and half relative. In a mixed cell reference, the absolute element remains constant no matter where the formula is moved.

It is possible to cycle a formula through absolute, relative, and mixed cell references by use of the ⟨Absolute⟩ key. See Chapter 1, "Getting Started," for more information on this special key.

This example shows the results of copying a formula that contains an absolute cell reference, as shown in cell C15:

```
C15: [W12] @SUM($C$7..$C$13)                                    READY

  1                    XYZ Corporation
  2             ─────────────────────────
  3                 ADD Revenues by Source
  4
  5                              ADD
  6
  7     REVENUES
  8     Distributors      $50,432
  9     Dealers            22,641
 10     Telemarketing      19,760
 11     Mail Order        129,443
 12     Strategics         19,995
 13     Retail            199,874
 14                       =========
 15       TOTAL REVENUES  $442,145
 16                                     TAXABLE  REVENUE
 17
 18
 19
14-Feb-91  08:00 AM
```

Because the cell reference in this formula is absolute, copying it to cell F16 causes an identical copy to be placed in F16, as shown below:

```
F16: [W12] @SUM($C$7..$C$13)                                        READY

          A       B    C        D        E        F        G      H
     1                    XYZ Corporation
     2
     3                  ADD Revenues by Source
     4
     5
     6                          ADD
     7     REVENUES
     8     Distributors      $50,432
     9     Dealers            22,641
    10     Telemarketing      19,760
    11     Mail Order        129,443
    12     Strategics         19,995
    13     Retail            199,874
    14                       =========
    15      TOTAL REVENUES   $442,145
    16                            TAXABLE REVENUE   $442,145
    17
    18
    19
   14-Feb-91  08:00 AM
```

This example shows how to copy a formula that contains relative cell references, as shown in cell B9:

```
B9: +B5+B6+B7                                                    READY

1                          XYZ Corporation
2
3 EXPENSES                              REIMBURSEMENTS
4 =================                     =================
5 AUTO RENT  $500.00                    AUTO RENT $300.00
6 MEALS      $300.00                    MEALS     $200.00
7 FUEL       $125.00                    FUEL      $ 75.00
8 =================                     =================
9 TOTAL      $925.00                    TOTAL
```

Notice how, if you copy this formula from B9 to F9, the formula in F9 becomes +F5+F6+F7. The cell references in the formula have changed to reflect its new relative location:

```
F9: +F5+F6+F7                                                   READY

1                          XYZ Corporation
2
3 EXPENSES                              REIMBURSEMENTS
4 =================                     =================
5 AUTO RENT  $500.00                    AUTO RENT $300.00
6 MEALS      $300.00                    MEALS     $200.00
7 FUEL       $125.00                    FUEL      $ 75.00
8 =================                     =================
9 TOTAL      $925.00                    TOTAL     $575.00
```

This next example shows how to copy a formula that contains mixed cell references, as shown in cell G17:

```
G17: [W10] 0.5*G$15                                              READY
```

	A	B	C	D	E	F	G	H
2								
3			Revenues by Selected Products					
4								
5								
6			ADD	WRITE	DRAW	CALC	Total	
7	REVENUES							
8	Distributors		$50,432	$6,865	$35,920	$43,876	$137,093	
9	Dealers		22,641	4,512	32,741	3,246	63,140	
10	Telemarketing		19,760	92,736	53,876	47,247	213,619	
11	Mail Order		129,443	65,003	102,906	38,390	335,742	
12	Strategics		19,995	15,987	59,876	875	96,733	
13	Retail		199,874	87,965	399,865	63,404	751,108	
14			==					
15	TOTAL REVENUES		$442,145	$273,068	$685,184	$197,038	$1,597,435	
16								
17							798,718	
18								
19	Taxable Revenue							

```
14-Feb-91   08:00 AM
```

4

When the formula is copied to cell C19, the cell reference becomes C$15:

```
C19:  [W10] 0.5*C$15                                                  READY

            A        B     C         D        E        F         G      H
   2
   3                         Revenues by Selected Products
   4
   5
   6                       ADD      WRITE     DRAW     CALC     Total
   7  REVENUES
   8  Distributors     $50,432    $6,865   $35,920  $43,876   $137,093
   9  Dealers           22,641     4,512    32,741    3,246    63,140
  10  Telemarketing     19,760    92,736    53,876   47,247   213,619
  11  Mail Order       129,443    65,003   102,906   38,390   335,742
  12  Strategics        19,995    15,987    59,876      875    96,733
  13  Retail           199,874    87,965   399,865   63,404   751,108
  14                  =================================================
  15      TOTAL REVENUES $442,145 $273,068 $685,184 $197,038 $1,597,435
  16
  17                                                           798,718
  18
  19  Taxable Revenue   221,073
14-Feb-91  08:00 AM
```

The absolute part of a mixed cell reference, in this case row 15, remains
unchanged. The relative part of a mixed cell reference, in this case column
G, changes to reflect its new location. Also, note that the resulting value in
cell C19 differs from that in cell G17, due to the change in the address each
formula is referencing.

Moving Worksheet Data

The /Move command enables you to reorganize your worksheet by moving
data from one location to another. Moving cell entries is just like picking
them up from one location and placing them in another. Data that is
transferred with the /Move command disappears from its original location.

If only labels and values are moved, the resulting moved data corresponds
exactly to the data that was found in the previous location. All formats
attached to those labels and values in the previous location follow the data

to their destination. If formulas are moved, each formula is updated appropriately as per its reference type (absolute, relative, or mixed).

To move your worksheet data:

1. Select /Move from the Main menu. SCO Professional prompts you for a source range.

2. Enter a source range and press ⟨Return⟩. SCO Professional prompts you for a destination range.

3. Enter a destination range. You do not need to specify a free cell. Press ⟨Return⟩. SCO Professional moves the entries from the source range to the destination range. It automatically adjusts all formulas in your worksheet, as appropriate, to reflect the move.

4

This example shows how to redesign your worksheet by moving a block of labels and formulas to a new location. The range A15..G15 is transferred to cells A18..G18. This range consists of a label and several absolute formulas:

```
C15: (C0) [W12] @SUM($C8..$C13)                                    READY

        A         B    C         D          E         F          G       H
 1                          XYZ Corporation
 2
 3                      Revenues by Selected Products
 4
 5
 6                          ADD       WRITE      DRAW      CALC     Total
 7  REVENUES
 8   Distributors        $50,432    $6,865    $35,920   $43,876   $137,093
 9   Dealers              22,641     4,512     32,741     3,246    63,140
10   Telemarketing        19,760    92,736     53,876    47,247   213,619
11   Mail Order          129,443    65,003    102,906    38,390   335,742
12   Strategics           19,995    15,987     59,876       875    96,733
13   Retail              199,874    87,965    399,865    63,404   751,108
14                    =================================================
15      TOTAL REVENUES $442,145  $273,068   $685,184  $197,038 $1,597,435
16
17
18
19
14-Feb-91   08:00 AM
```

Notice how the original range, A15..G15, is transferred to a new location. Since the cell addresses were not changed, the resulting values stayed the same:

```
C18: (C0) [W12] @SUM($C8..$C13)                                    READY

  1                         XYZ Corporation
  2                      ─────────────────────
  3                    Revenues by Selected Products
  4
  5
  6                 ADD      WRITE     DRAW     CALC     Total
  7  REVENUES
  8  Distributors  $50,432  $6,865   $35,920  $43,876  $137,093
  9  Dealers        22,641   4,512    32,741    3,246    63,140
 10  Telemarketing  19,760  92,736    53,876   47,247   213,619
 11  Mail Order    129,443  65,003   102,906   38,390   335,742
 12  Strategics     19,995  15,987    59,876      875    96,733
 13  Retail        199,874  87,965   399,865   63,404   751,108
 14                ══════════════════════════════════════════════
 15
 16
 17
 18  TOTAL REVENUES $442,145 $273,068 $685,184 $197,038 $1,597,435
 19
14-Feb-91  08:00 AM
```

4

Transposing Rows and Columns

The /Range Transpose command enables you to reorder ranges in your worksheet, shifting data from a horizontal to a vertical arrangement or vice versa. This command makes it possible for you to turn your worksheet into a database format, with headings on top and data in columns. /Range Transpose is similar to /Copy, in that your original range remains on the worksheet along with your newly transposed range.

■ **IMPORTANT:** You should not use /Range Transpose if your range contains formulas with relative cell addresses, as these formulas are not adjusted when transposed. Instead, it is recommended that you first use /Range Value to convert formulas in a range to their values; then transpose the range. This command is discussed in the section "Copying the Values Produced by Formulas" later in this chapter.

To reorder ranges in your worksheet from columns to rows or from rows to columns:

1. Select **/Range** Transpose. SCO Professional prompts you for a source range.

2. Specify a source range to transpose. Press ⟨Return⟩. SCO Professional prompts you for a destination range.

3. Specify a destination range. It is not necessary to specify a free cell. Press ⟨Return⟩.

   SCO Professional creates a transposed version of the entire source range. The original range remains unchanged. See /Range Erase in Chapter 2, "Worksheet Basics," if you want to remove the original range. /Range Transpose will not work correctly if the upper left corner of the source and destination ranges are the same.

This example shows how to transpose three vertical columns of data into three horizontal rows of data. The original, horizontal range A2..C4 is transposed into a vertical range A12..C14 with labels above each column:

```
A1:                                                          READY

      A           B          C        D       F       G
  1
  2 SALARIES              $125,000.00
  3 BENEFITS               $75,000.00
  4 TRAVELEXPENSES          $1,500.00
  5
  6
  7
  8
  9
 10
 11
 12 SALARIES    BENEFITS   TRAVELEXPENSES
 13
 14 $125,G00.00 $75,000.00  $1,500.00
 15
 16
 17
 18
 19
14-Feb-91  08:00 AM
```

4

Copying the Values
Produced by Formulas

The /Range Value command copies the results produced by formulas, not the formulas themselves, to a specified location in your worksheet. Use /Range Value, for example, when you wish to "freeze" current formula values in a separate area of your worksheet while you try out new calculations. Alternatively, you may want to convert certain formulas permanently to their current values by specifying the same source and destination ranges. Once the conversion takes place, it cannot be reversed.

To convert formulas in a range to their values so that you can copy only the values to a specified location:

1. Select /Range Value. SCO Professional prompts you for a source range.

2. Specify a source range. Press ⟨Return⟩ when done. SCO Professional prompts you for a destination range

3. Specify the destination range. It is not necessary to specify a free cell. Press ⟨Return⟩ when done.

SCO Professional copies the values produced by formulas to the specified location.

This example shows how to convert the formula C3-C4, found in range C5, to its value and copy that value to a new location.

```
C13: 29696                                                          READY

         A          B          C          D          E          F
 1     CALC                  June 1991
 2
 3   NET SALES             $197,038.00
 4 COST OF GOODS           $167,342.00
 5 GROSS MARGIN             $29,696.00
 6
 7
 8
 9     CALC                  June 1991
10
11   NET SALES             $197,038.00
12 COST OF GOODS           $167,342.00
13 GROSS MARGIN             $29,696.00
14
15
16
17
18
19
14-Feb-91  08:00 AM
```

As shown above, the /Range Value command transfers the value of the formula 29696 to the destination range C13. The formula in range C5 remains unchanged.

≡ Chapter 5

Changing the Worksheet Format

5

Changing the Worksheet Format

Using the /Worksheet Global Format and the /Range Format commands, you can determine the formats in which SCO Professional displays the information in cells. The /Worksheet Global Label-Prefix commands determine the formats for how labels and values are displayed in cells.

It is important to make a distinction between the effects of the /Worksheet Global commands and the /Range commands. /Worksheet Global commands affect the entire worksheet, while /Range commands affect only a part of the worksheet; that is, a specified range of cells. The formats that you choose from the /Worksheet Global menu determine the default settings for the entire worksheet. The /Worksheet Global commands do not affect previously entered values; only the data that you enter after you set the global commands are affected. Use the /Range commands to override the default worksheet commands. The /Range commands affect previously entered data.

Contents of This Chapter

This chapter is divided into the following sections:

- ■ "Determining the Default Worksheet Settings" describes how to use the /Worksheet Status and the /Worksheet Global Default Other Status commands to display and change the current global format, label-prefix, recalculation, column width, and international settings for the worksheet.

■ "Formatting Numbers, Dates, and Times" explains how to use the /Worksheet Global Format and /Range Format commands to change the way SCO Professional displays values in the worksheet. This section also describes how you can use the /Worksheet Global Label-Prefix and /Range Layout commands to change the justification of labels (and some values) in each cell.

■ "Formatting Labels" tells how to use the /Range Layout and /Worksheet Global Label-Prefix commands to change the justification of worksheet labels and to format lines of text in label cells.

■ "Changing the Overall Appearance of the Worksheet" describes how you can change the appearance of the worksheet by changing the widths of columns; inserting and deleting rows and columns; hiding data in cells, columns, and ranges; splitting the display into two windows; freezing ranges of cells for titles; configuring the worksheet clock; and returning range format settings to the default global settings.

Determining the Default Worksheet Settings

Use the /Worksheet Global and /Worksheet Global Default Other commands to display the defaults for the settings that SCO Professional uses automatically each time you retrieve a worksheet. The /Worksheet Global and /Worksheet Global Default Other International commands set, among other things, the default display format for values and labels in the worksheet and the default international formats. Since they are defaults, these commands remain throughout the worksheet until you change them.

You can change all the international formats (Punctuation, Currency, Date, and Time) from the /Worksheet Global Default Other International menu. You can change the default formats of values and labels for the worksheet from the /Worksheet Global menu. The section "Formatting Numbers, Dates, and Times" explains how to change these default settings using different commands later in this chapter.

The following table shows the default worksheet settings and the control panel display for each format:

Worksheet Default Settings

Setting	Default	Options	Control Panel Display
Recalculation	Automatic	Manual	
	Natural	Columnwise	
		Rowwise	
	Iterations (1)	Iterations (1-50)	
Format	General (G)	Fixed	(Fx)
		Scientific	(Sx)
		Currency	(Cx)
		, (comma)	(,x)
		Percent	(Px)
		+/-	(+)
		Date1	(D1)
		Date2	(D2)
		Date3	(D3)
		Date4	(D4)
		Date5	(D5)
		Time1	(D6)
		Time2	(D7)
		Time3	(D8)
		Time4	(D9)
		Text	(T)
		Hidden	(H)
Label-Prefix	' (align left)	" (align right)	
		^ (center)	
		\ (repeat)	
Column-Width	9	1-240	(Wz)
Zero Suppression	Off	On	
Global Protection	Off	On	(PR)
Clock on screen	Standard	International	
		None	

In this table, x represents the number of decimal places (1-15) and z is the width of the column in characters.

Viewing Worksheet Global Settings

The /Worksheet Status command gives information about the global settings on your current worksheet.

To view the current global settings on your worksheet:

1. Select /Worksheet Status. The screen displays a table listing the setting types and the selections that are currently in effect. The mode indicator changes to STATUS.

2. When you finish viewing the table, press any key to return to your worksheet in the READY mode.

The following screen is an example of a /Worksheet Status screen:

```
A1:                                                            Status

   Memory Used (bytes):              8763

   Math Coprocessor:                 (Present)

   Recalculation:
     Method...............................Automatic
     Order................................Natural
     Iterations...........................1

   Circular Reference:               (None)

   Cell Display:
     Format...............................(G)
     Label-Prefix.........................'
     Column-Width.........................9
     Zero Suppression.....................Off

   Global Protection:                Off


Press any key to continue:
```

The status screen gives information about the following global settings on your current worksheet: the amount of memory currently being used; whether your machine has a math coprocessor; the recalculation defaults; circular reference settings; global format (the default format in which SCO Professional displays the worksheet values); global label-prefix (the default position in which SCO Professional places the labels in the worksheet—left, center, or right); global column-width (the default width of the columns in the worksheet); and zero suppression (whether SCO Professional displays values that evaluate to zero).

The Circular Reference and Recalculation settings are discussed in Chapter 3, "Using Formulas and Functions." The Cell Display settings are discussed in the section "Formatting Numbers, Dates, and Times" later in this chapter.

Viewing Global International Settings

5

The /Worksheet Global Default Status command gives information on the current international formats.

To view the current global international settings:

1. Select /Worksheet Global Default Status.

2. Press any key to return to the worksheet display.

The following example shows the status screen that SCO Professional displays when you select the /Worksheet Global Default Status command.

```
A1:                                                                Status

    Printer:                          International:
      Name........lp                      Punctuation......A
                                                   Point (.) Dot
                                              Argument (,) Comma
      Margins                             Thousands (,) Comma
        Left   4  Top    2
        Right 76 Bottom 2                Currency.....$ (PREFIX)

      Page Length.......66
      Setup String..                    Date format    D4..A (MM/DD/YY)
                                         Time format    D8..A (HH:MM:SS)
      Directory at Startup:  /u/test

      Clock on screen:  Standard




Press any key to continue:
```

The right half of the screen shows the current international global settings: punctuation (the punctuation characters that are used to separate arguments, indicate decimal points, and separate thousands), currency (the currency indicator and its position), date, and time. These global settings are discussed later in this chapter.

The left half of the screen shows page (margins, page length, and setup string) and printer settings. See Chapter 10, "Printing Worksheets," for more information about these settings.

Saving the Current Settings

Once you use the /Worksheet Global and /Worksheet Global Default Other International commands (described in the following sections in this chapter), you can use the /Worksheet Global Default Update command to update the default settings. If you do not update the settings, they revert back to the original settings the next time you start SCO Professional.

To save the selected settings as the default, select /Worksheet Global Default Update.

SCO Professional saves the current configuration settings.

Formatting Numbers, Dates, and Times

5

SCO Professional uses separate commands to set the formats for values and labels in the worksheet. You can change the display of the numerical values in each cell of your worksheet using the Format commands that are discussed in this section. The command used to set the format for displaying labels in the worksheet is discussed in the section "Formatting Labels" later in this chapter.

The Format commands determine how SCO Professional displays values; they do not change the values themselves. SCO Professional can remember the values you enter to 15 decimal places. This is important to remember because, at some point, you may want to compare values by rounding your worksheet values to a certain number of decimal places. If a number such as 314.3235671984 is formatted with General and two decimal places, SCO Professional then displays it as 314.32.

If you decide to change the format display setting to four decimal places, at a later point, SCO Professional remembers the original numerical value and displays the number as 314.3235. SCO Professional displays the actual number on the status line. In addition, if a format makes a value too long to be displayed within a cell, the asterisk characters appear in place of the values. To display the value, you must change the format to shorten the display or widen the column width to accommodate the value in the cell.

The /Worksheet Global Format command can be used with the /Range Format command. When both are used, the /Range Format command setting takes precedence. For example, a worksheet might include columns of values that you want to display in dollars and cents and numbered with a column of positive integers. To set the format of the columns of dollar values, select /Worksheet Global Format Currency first. Then, select /Range Format General and specify the column of positive integers as the range. SCO Professional displays the column of numbers as positive integers while it displays the other values of the worksheet as currency.

Each of the commands for formatting data within cells, with one exception, apply to both the /Worksheet Global Format and the /Range Format commands. The exception, /Range Format Reset, returns a specified /Range Format command to the default /Worksheet Global Format command.

If you choose a format command from the /Range Format menu, SCO Professional prompts you for a range. The default starts at the cell in which the cell pointer currently is located. Select a range either by entering the cell numbers at the prompt, entering a named range, or by using the cursor movement keys to highlight the desired cells, and pressing the ⟨Return⟩ key. See Chapter 2, "Worksheet Basics," for more information about how to select a range.

Changing the Number of Displayed Decimal Places

You can set the number of decimal places to the right of the decimal point that you want to display for each of the values in a range or in the entire worksheet. The Fixed command displays numbers with no punctuation, other than the decimal marker. Once you select a command from either the /Worksheet Global Format or the /Range Format menus, SCO Professional prompts you to enter the number of decimal places that you want to display.

To change the number of digits displayed to the right of the decimal point:

1. Select the appropriate Fixed format command (**/WGFF** or **/RFF**). SCO Professional prompts you for the number of decimal places.

2. Enter a number between zero and 15 to indicate the number of decimal places that you wish to display for each worksheet value and press the ⟨Return⟩ key. To accept the default value of two decimal places, press the ⟨Return⟩ key.

3. If you selected **/RFF**, define the range that you want to format.

This example shows the difference between how you enter a number and how SCO Professional displays it, formatted with one, two, or three fixed-decimal places.

Fixed-Decimal Places

Number entered	Fixed 1	Fixed 2	Fixed 3
55000	55000.0	55000.00	*********
4670.76	4670.8	4670.76	4670.760
22.07	22.1	22.07	22.070
.88	0.9	0.88	0.880
-37.33	-37.3	-37.33	-37.330

If the columns are not wide enough to accommodate the number of decimal places indicated, SCO Professional displays asterisks in place of the numbers. To display the numbers, you must change the format to shorten the number of displayed decimal places or widen the column width to accommodate the number in the cell using /Worksheet Column Set-Width. For information on how to do this, see "Setting Column Widths" later in this chapter.

If the number of displayed decimal digits is larger than the numbers that appear in the worksheet, SCO Professional adds zeros to the right of the decimal point. See the first number in the Fixed 1 column of the previous table for an example of this. If there are no digits to the left of the decimal point, SCO Professional adds a leading digit. See the fourth number in the Fixed 2 column of the table for an example.

Displaying Data in Scientific Notation

You can display the values in your entire worksheet, or in a specified range, in scientific or exponential notation. To do this, choose either the /Worksheet Global Format Scientific or the /Range Format Scientific commands. The Scientific format is useful for displaying very large and very small numbers in cells with small column-widths.

■ **NOTE:** The Scientific format command differs from the General format command in that when you select General, SCO Professional displays very large and very small numbers in scientific notation and determines the number of displayed multiplier decimal places. When you choose Scientific, you determine the number of decimal places.

To display the values as scientific exponentials:

1. Select the appropriate Scientific format command (/**WGFS** or /**RFS**). SCO Professional prompts you to enter the number of decimal places.

2. Enter a number between zero and 15 to indicate the number of decimal places in the multiplier portion of the expression of the value that you want to display and press the ⟨Return⟩ key. To accept the default value of two multiplier decimal places, press the ⟨Return⟩ key.

This example shows the difference between how you enter a number and how SCO Professional displays it, formatted with zero, one, or two scientific decimal places.

Scientific Format

Number entered	Scientific 0	Scientific 1	Scientific 2	General Format
55000	6E+04	5.5E+04	5.50E+04	55000
4670.76	5E+03	4.7E+03	4.67E+03	4670.76
22.07	2E+01	2.2E+01	2.21E+01	22.07
.88	9E-01	8.8E-01	8.80E+01	0.88
-37.33	-4E+01	-3.7E+01	*********	-37.33

If the columns are not wide enough to accommodate the number of decimal places indicated, SCO Professional displays asterisks in place of the numbers. Use /Worksheet Column Set-Width to widen the column width. For information on how to do this, see "Setting Column Widths" later in this chapter.

Showing Data in Currency Format

You can choose a specific currency format for the data in your entire worksheet or in a specified range. Both standard ($) currency and international currency formats are available.

Displaying Values as Currency

You can display all your worksheet values in standard $ currency format by choosing either the /Worksheet Global Format Currency or the /Range Format Currency command.

5

To change the format of the values to the standard currency format:

1. Select the appropriate Currency format command (/WGFC or /RFC). SCO Professional prompts you for the number of decimal places.

2. Enter a number between zero and 15 to indicate the number of decimal places that you wish to display and press the ⟨Return⟩ key. To display the values as dollars and cents, press the ⟨Return⟩ key. To display the values as whole dollars, enter 0 and press the ⟨Return⟩ key.

This example shows the difference between how you enter a number and how SCO Professional displays it, formatted with zero, two, or three currency decimal places.

$ Currency Format

Number entered	Currency 0	Currency 2	Currency 3
55000	$55,000	$55,000.00	*********
4670.76	$4,671	$4,670.76	4,670.760
22.07	$22	$22.07	$22.070
.88	$1	$0.88	$0.880
-37.33	($37)	($37.33)	($37.330)

If the columns are not wide enough to accommodate the number of decimal places indicated, SCO Professional displays asterisks in place of the numbers. SCO Professional displays negative values in parentheses.

Displaying Values in International Currency Format

You can change the currency format of your worksheet values to an International format using the /Worksheet Global Default Other International Currency command.

To change the format of the values to an international currency format:

1. Select the /Worksheet Global Default Other International Currency command. SCO Professional prompts you for a currency sign.

2. Enter the international currency symbol that you wish to display. The default currency symbol is $, which displays the worksheet values as dollars and cents. To accept the default, press the ⟨Return⟩ key.

3. When you press the ⟨Return⟩ key after entering a currency symbol, SCO Professional displays the Currency menu. Select Prefix or Suffix. If you select Prefix, SCO Professional displays the currency symbol before the value in each cell. Select Suffix to display the currency symbol after the number.

The following example shows how you can change the international currency symbol to be a word or a line of text indicating a unit of measurement.

■ **NOTE:** The columns in this example are 22 characters wide, and the number of displayed decimal points is two.

SCO Professional displays negative values in parentheses.

International Currency Format

Number entered	$	Yen	Square Feet
55000	$55,000.00	Yen 55,000.00	55,000.00 square feet
4670.76	$4,670.76	Yen 4,670.76	4,670.76 square feet
22.07	$22.07	Yen 22.07	22.07 square feet
.88	$0.88	Yen 0.88	0.88 square feet
-37.33	($37.33)	(Yen 37.33)	(37.33 square feet)

5

Displaying Data as Percentages

You can display the data values as percentages in a range or in your entire worksheet using either the /Worksheet Global Format Percent or the /Range Format Percent command.

To express values as percentages:

1. Select the appropriate Percent format command (**/WGFP** or **/RFP**). SCO Professional prompts you for the number of decimal places.

2. Enter a number between zero and 15 to indicate the number of decimal places that you wish to display, and press the ⟨Return⟩ key. To display the default number of two decimal places, press the ⟨Return⟩ key.

This example shows the difference between how you enter a number and how SCO Professional displays it as a percentage, formatted with zero, one, or three decimal places.

Percent Format

Number entered	Percent 0	Percent 1	Percent 3
55000	5500000%	5500000.0%	5500000.000%
4670.76	467076%	467076.0%	*********
22.07	2207%	2207.0%	2207.000%
.88	88%	88.0%	88.000%
-37.33	-3733%	-3733.0%	*********

When you choose to display data in Percent format, SCO Professional multiplies each entry by 100 and follows the value with a % character. You must, therefore, enter **.08** to display **8%**. If you enter **8** in a cell and display the cell using the Percent format, SCO Professional displays the values as **800%**. If the columns are not wide enough to accommodate the number of decimal places indicated, asterisks appear in place of the numbers.

Changing Punctuation Indicators

You can format and change the numeric and formula punctuation indicators for a specified range or for your entire worksheet. To display the numeric values using standard United States punctuation, choose either the /Worksheet Global Format , (comma) or the /Range Format , command. The comma command displays values with commas before every third digit to the left of the decimal point, with the specified number of decimal places (0-15), and with negative values in parentheses.

To format worksheet values with the standard United States punctuation:

1. Select the appropriate comma format command (**/WGF,** or **/RF,**). SCO Professional prompts you for the number of decimal places.

2. Enter a number between zero and 15 to indicate the number of decimal places that you wish to display and press the ⟨Return⟩ key. To accept the default number of two displayed decimal places, press the ⟨Return⟩ key.

The following table shows the difference between how you enter a number and how SCO Professional displays it, formatted with zero, one, or three decimal places.

United States Punctuation Format

Number entered	0	1	3
55000	55,000	55,000.0	*********
4670.76	4,671	4,670.8	4,670.760
22.07	22	22.1	22.070
.88	1	0.9	0.880
-37.33	(37)	(37.3)	(37.330)

If the columns are not wide enough to accommodate the number of decimal places indicated, SCO Professional displays asterisks in place of the numbers.

Displaying Values in International Punctuation Format

You may wish to display the numbers and formulas in your worksheet in the format used in a particular country. To change the punctuation format of your worksheet values to an International format, use the /Worksheet Global Default Other International Punctuation command.

To change the format of the values to an international punctuation format:

1. Select /Worksheet Global Default Other International Punctuation.

2. Select the international punctuation symbols that you wish to display. The default United States punctuation indicators display the worksheet values with the decimal point as a period (.), the argument separator (in functions) as a comma (,), and the thousands separator as a comma (,). To accept the symbols ., as the default, press the ⟨Return⟩ key. The following table shows how each of the commands affect the international punctuation.

International Punctuation Format

Command	Decimal Separator	Argument Separator	Thousands Separator
A.	Period	Comma	Comma
B.	Comma	Period	Period
C.	Period	Semicolon	Comma
D.	Comma	Semicolon	Period
E.	Period	Comma	Space
F.	Comma	Period	Space
G.	Period	Semicolon	Space
H.	Comma	Semicolon	Space

The following table shows how SCO Professional formats the number 4670.76, using the eight different international punctuation formats.

Formatting Example

Command	Display
A.	4,670.76
B.	4.670,76
C.	4,670.76
D.	4.670,76
E.	4 670.76
F.	4 670,76
G.	4 670.76
H.	4 670,76

Showing Data as Standard Integers

5

You can display the values in a range or in the entire worksheet as standard integers using the General command.

To display worksheet values as standard integers:

1. Select the appropriate General format command (**/WGFG** or **/RFG**).

The following table illustrates how SCO Professional formats numbers in the General format:

General Format

Number entered	Display
55000.00	55000
4670.76	4670.76
22.07	22.1
.88	0.88
-37.33	-37.33

The General format displays very large and very small numbers in scientific notation without rounding. This format also suppresses trailing zeros after the decimal point, and it adds leading zero integers if there are no digits to the left of the decimal point. Numeric values are displayed in the General format by default.

Displaying Data in Date Format

Using the Date formats, you can indicate to SCO Professional that the values in your worksheet are SERIAL DATES. When you do this, the positive numbers are interpreted as serial numbers for dates from 1 (January 1, 1900) to 73050 (December 31, 2099). The Date formats in the /Worksheet Global Format Date and /Range Format Date menus allow you to format these serial numbers as dates.

Once you format a worksheet cell with the /Worksheet Global Format Date or /Range Format Date command, there are two ways you can enter a date into the cell. One way is to enter a serial number between 1 and 73050. The corresponding date then appears in the cell. The second way does not require that you know the serial number. You can use functions such as @TODAY, which enters the current system date, @NOW, which enters both the current system date and time, and @DATE, which translates a date that you enter into a serial number that SCO Professional can understand. For a complete description of the functions for entering dates, see the section "Date and Time Functions" in Chapter 3, "Using Formulas and Functions."

■ **NOTE:** If the system date and time are incorrect, values that rely on these date functions are also wrong.

To translate worksheet values into serial numbers and display them in date format:

1. Select the appropriate Date command (**/WGFD** or **/RFD**).

2. Select a format from the Date menu by typing the number of the selection and pressing the (Return) key. The following table shows the date formats and gives an example of how SCO Professional displays each format:

Date Formats

Command	Format	Example
1.	DD-MMM-YY	26-Nov-63
2.	DD-MMM	26-Nov
3.	MMM-YY	Nov-63
4.	MM/DD/YY (long international)	11/26/63
5.	MM/DD (short international)	11/26

5

■ **NOTE:** When SCO Professional displays values in the DD-MMM, DD-MMM-YY, and MMM-YY formats, the month names are displayed with initial capital letters.

Configuring International Date Formats

You can further configure the default values for the long and short international date formats. The new format that you select is then used whenever you select the international date formats (D4 and D5) from the /Worksheet Global Format or /Range Format menus.

To change the default values for the international dates:

1. Select /Worksheet Global Default Other International Date.

2. Select a format from the Date menu. The following table shows the international date formats and gives an example of how SCO Professional displays each format:

International Date Formats

Command	Long (D4)	Example	Short (D5)	Example
A.	MM/DD/YY	11/26/63	MM/DD	11/26
B.	DD/MM/YY	26/11/63	DD/MM	26/11
C.	DD.MM.YY	26.11.63	DD.MM	26.11
D.	YY-MM-DD	63-11-26	MM-DD	11-26

The first column shows the menu command, and the second column shows the default long international format. The third column gives an example of how SCO Professional displays the date when you select the long international format (/WGFD4 or /RFD4) command. The fourth column shows the default short international format. The fifth column gives an example of how SCO Professional displays the date when you select the short international format (/WGFD5 or /RFD5) command.

Displaying Data in Time Format

Using the Time formats, you can indicate to SCO Professional that the values in your worksheet are fractional parts of serial numbers. SCO Professional interprets the times from 12:00 midnight to 12:00 noon as serial number fractions from .000 to .5. The /Worksheet Global Format Date Time and /Range Format Date Time commands allow you to format these serial numbers as times.

SCO Professional allows you to enter times in worksheet cells, using these Time formats. You can also access the system time using the @NOW function, which gets the current system date and time. Use the Date and Time functions with date arithmetic. For more information about the Date and Time functions, see Chapter 3, "Using Formulas and Functions."

■ **NOTE:** If the computer system's time is incorrect, values that rely on the @NOW function are also wrong.

To format values as serial numbers and display them in time format:

1. Select the appropriate Time format command (**/WGFDT** or **/RFDT**).

2. Select a format from the Time menu. The following table shows the time formats and gives an example of how SCO Professional displays each format:

Time Formats

Command	Format	Example
1.	HH:MM:SS AM/PM	01:33:12 AM
2.	HH:MM AM/PM	12:00 PM
3.	HH:MM:SS 24-hour (long international)	13:25:11
4.	HH:MM 24-hour (short international)	20:30

Configuring International Time Formats

You can further configure the default values for the long and short international time formats. The new format that you select is then used whenever you select the international time formats (D8 and D9) from the /Worksheet Global Format Date Time and /Range Format Date Time menus.

To change the default values for the international times:

1. Select /Worksheet Global Default Other International Time.

2. Select a format from the Time menu. The following table shows the international date formats and gives an example of how SCO Professional displays each format.

International Time Formats

Command	Long (D8)	Example (Long)	Short (D9)	Example (Short)
A.	HH:MM:SS	12:43:44	HH:MM	12:43
B.	HH.MM.SS	12.43.44	HH.MM	12.43
C.	HH,MM,SS	12,43,44	HH,MM	12,43
D.	HHhMMmSS	12h43m44s	HHhMMm	12h43m

The first column shows the menu command. The second column shows the default long international format. The third column gives an example of how SCO Professional displays the time when you select the long international format (D8) from the /WGFDT or /RFDT menus. The fourth column shows the default short international format. The fifth column gives an example of how SCO Professional displays the time when you select the short international format (D9) from either the /WGFDT or /RFDT menus.

Displaying Text in Worksheet Cells

Using the Text format, SCO Professional allows you to display the information in your worksheet exactly as you entered it. This feature is important when you want to display formulas, and not their values.

To display formulas as you entered them, select the appropriate Text command (/**WGFT** or /**RFT**).

The following screen example shows the range A1..A5 formatted using the /Range Format Text command.

```
A3:  (T)  [W20] @REPEAT("woogie", 5)                              READY

        A                    B        C
  1    @PV(100000, 1,15)              99996.94
  2    @RAND                          0.389629
  3    REPEAT("woogie", 5)            woogie woogie woogie woogie woogie
  4    @NOW                           32427.64
  5
  6
  7
  8
```
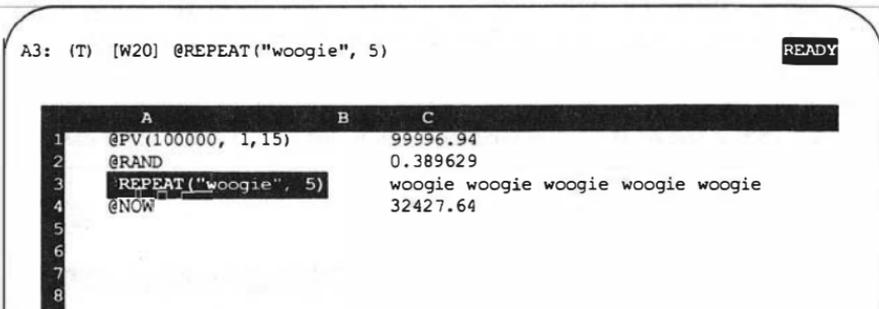
Note in the example above that the format of the text in the cell pointer and the format of the same text in the status area are identical.

Suppressing the Display of Zero Values

SCO Professional gives you the option of suppressing the display of all worksheet values that are equal to zero, including formulas that evaluate to zero.

■ **NOTE:** If SCO Professional suppresses the display of zero values, you may inadvertently write over cells that contain zero values. To protect the values that evaluate to zero from being overwritten, use the /Worksheet Global Protection or /Range Protection functions. See Chapter 6, "Protecting Data," for information about these commands.

To suppress the display of worksheet values of zero:

1. Select /Worksheet Global Zero.

2. To suppress the display of zero values, select the **Yes** command. When you choose **Yes**, SCO Professional suppresses the display of all zero values, including zero values that are the results of formulas, in the worksheet. Select **No** to display all values that are equal to zero.

The first screen shows worksheet values with the zeros included, and the second screen shows the same worksheet with the zero values suppressed.

```
C9: 0                                                              READY

          A        B     C        D         E         F         G     H
   1                            XYZ Corporation
   2
   3                         Revenues by Selected Products
   4
   5
   6                         ADD     WRITE     DRAW      CALC        Total
   7  REVENUES
   8  Distributors        $50,432   $6,865   $35,920   $43,876    $137,093
   9  Dealers                   0    4,512         0     3,246       7,758
  10  Telemarketing        19,760   92,736         0    47,247     159,743
  11  Mail Order          129,443   65,003         0    38,390     232,836
  12  Strategics           19,995   15,987    59,876       875      96,733
  13  Retail              199,874   87,965   399,865    63,404     751,108
  14                    =====================================================
  15     TOTAL REVENUES  $419,504 $273,068  $495,661  $197,038  $1,377,513
  16
  17
  18
  19
  14-Feb-91   08:00 AM
```

```
C9: 0                                                              READY

 1                            XYZ Corporation
 2
 3                      Revenues by Selected Products
 4
 5
 6                      ADD      WRITE      DRAW      CALC      Total
 7   REVENUES
 8    Distributors    $50,432    $6,865   $35,920   $43,876   $137,093
 9    Dealers         [     ]     4,512              3,246       7,758
10    Telemarketing    19,760    92,736             47,247     159,743
11    Mail Order      129,443    65,003             38,390     232,836
12    Strategics       19,995    15,987    59,876       875      96,733
13    Retail          199,874    87,965   399,865    63,404     751,108
14                    ==================================================
15       TOTAL REVENUES $419,504 $273,068 $495,661  $197,038 $1,377,513
16
17
18
19
14-Feb-91  08:00 AM
```

5

Formatting Labels

SCO Professional uses separate commands to set the formats for values and labels in the worksheet. You can change the alignment of the labels in each cell of your worksheet using the /Worksheet Global Label-Prefix. In addition, you can use the /Range Layout command to change the alignment of both values and labels in a range. The commands used to set the format for displaying numerical values in the worksheet are discussed in the section "Formatting Numbers, Dates, and Times" in this chapter.

To change the default settings for label alignment, use the /Worksheet Global Label-Prefix command. A label-prefix is one of the four characters (', ", ^, and \) that determine the format or appearance of a label in a cell.

■ **NOTE:** The backslash character (\) label-prefix is not available as a global label-prefix.

The label-formatting information is stored with the individual labels. However, with the /Worksheet Global Label-Prefix and the /Range Layout commands, SCO Professional inserts a default label-prefix (left, right, or center) when a label is entered. Since label alignment initially defaults to the left, each of your labels is preceded by an apostrophe ('), which aligns it to the left in the cell.

To change the default left alignment setting to be right or center alignment, use the /Worksheet Global Label-Prefix command.

Changing Label Justification

The /Range Layout command and the /Worksheet Global Label-Prefix command are similar. The two major differences between them are that /Worksheet Global Label-Prefix justifies only new labels and does not affect existing values or labels in the worksheet. /Range Layout specifies the justification of existing labels and values within the designated range. Where both are used, the Range justification has precedence over the existing worksheet specification.

Any new label or value that you add to the range is not affected by prior /Range Layout commands; SCO Professional aligns it according to the position indicated in /Worksheet Global Label-Prefix.

■ **NOTE:** When you use the /Range Layout command to change the alignment of numerical values within a cell, the alignment of decimal points specified by the /Range Format command can be adversely affected. It is, therefore, recommended that you not use the /Range Layout command on ranges that require decimal point alignment.

To change the alignment of labels in their cells:

1. Select either the /Worksheet Global Label-Prefix or /Range Layout command.

2. Choose **Left, Right,** or **Center** to indicate the alignment of your labels. To accept the default global alignment (left), press the ⟨Return⟩ key.

The following example shows how SCO Professional formats entries with different label-prefixes.

```
C5: [W14] \Repeat                                              READY


1
2                    Left
3                         Center
4                               Right
5
6
7
```
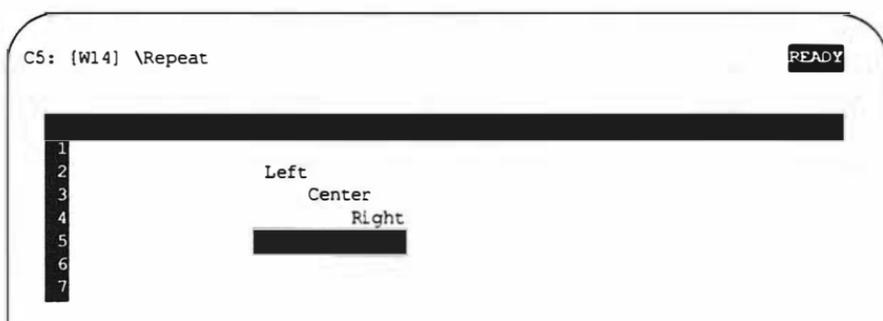
Any time you begin a label with a number or any other character that SCO Professional might interpret as a value instead of a label, you must specifically precede it with a label-prefix character (', ", ^, or \) to let SCO Professional know that the entry is a label. If you are creating a keyboard macro that begins with a slash (/) or a value prefix, you must precede it with a label-prefix. For more information about macros, see Chapter 8, "Using Macros."

If the label is as long or longer than the width of its cell, SCO Professional fills the cell and continues the contents into the cell to the right. If it fills that cell, it moves on to the next cell to the right and so on (as long as the adjacent cells are blank) until the entire label is displayed. If this is the case, the alignment of the cell does not matter. Although a cell can contain as many as 240 characters, the display shows only as many characters as can fit across the screen at one time.

Formatting Lines of Text

You can add sentences or even paragraphs of explanatory text to your worksheet, by entering labels. When you enter a label, you are in LABEL mode. A label can contain more characters than can be displayed in one cell. A long label automatically displays in the adjacent cells to the right, and the display is only interrupted by cells containing data.

Once you enter long labels in your worksheet, you can make it fit into a range of columns that are left-justified and have a ragged-right margin. SCO Professional sets the left margin by the cell in which the labels began. Using the /Range Justify command, you can change the right margin of a long label (or consecutive set of labels) to a ragged-right margin of your own specified range of columns. The /Range Justify command reformats your text to your columns by shortening or lengthening each label individually. All words that extend beyond the margin you set are carried down to the row below. This way of breaking sentences between words to suit margin lengths is similar to the paragraph format feature found in many text processors.

To format paragraphs in your worksheet using the /Range Justify command:

1. Place the cell indicator over the first cell in the first label of your range.

2. Select /Range Justify.

3. When prompted for a range, move the cell indicator across the row until you reach the desired right margin and press the ⟨Return⟩ key.

SCO Professional reformats the first label, and all labels that follow it until the first non-label cell, according to the number and width of the columns that you specified.

The following example shows a long label formatted with different margin lengths of five and three columns.

```
B3: 'Here is an example of a very long line of text that continues i READY

 1
 2
 3    Here is an example of a very long line of text that continues i
 4
 5
 6    Here is an example of a very long line of
 7    text that continues in the cells adjacent.
 8    Notice that the first sentence above has run
 9    off the display screen.
10
11
12    Here is an example of a
13    very long line of text
14    that continues in the
15    cells adjacent. Notice
16    that the first sentence
17    above has run off the
18    display screen.
19
14-Feb-91  08:00 AM
```

If you decrease the column-widths by moving the columns closer together (resulting in narrower paragraphs), SCO Professional uses more rows to accommodate all the label text. If you increase the column-widths by moving the columns further apart for wider paragraphs, SCO Professional uses fewer rows. In each case, SCO Professional adjusts the rest of your worksheet automatically to make room for these changes. If the labels need more rows as a result of closer margins, SCO Professional moves the rest of the worksheet down an equivalent number of rows. If the labels need fewer rows because of wider margins, SCO Professional moves the rest of the worksheet up an equivalent number of rows.

Displaying Label Text Unjustified

To return the display to one row, you can specify the justification as a wider range of rows using /Range Justify.

To increase the width of the paragraphs:

1.   Select /Range Justify.

2.   At the prompt for a range, move the cell indicator across the row to the desired right-margin setting and press the ⟨Return⟩ key.

Changing the Justification Range

You can specify a depth as well as a width when you use /Range Justify to justify labels.

To specify a depth and width:

1.   Place the cell indicator over the first cell in the first label of your range.

2.   Select /Range Justify.

3.   Move the cell indicator across the row to the desired right-margin setting. Then move the cell indicator straight downward until it is positioned over the last cell that you want to include in your range of label text. Now press the ⟨Return⟩ key.

If the series of labels fits into the range that you specified, then the only area of your worksheet that is affected is the area that you specified as your range. If the series of labels overflows the range parameters after justification, then you receive an error message letting you know that the range was filled. After you remove the message (by pressing the ⟨Return⟩ key or ⟨Escape⟩), you see that the area that does not fit into the specified range continues below the range, and it is not set at the margin you specified with the /Range Justify command.

The following example shows what happens when a series of labels overflow the range parameters that you defined.

```
B3: 'Here's an example of a very long                    READY

          A        B         C         D        E        F        G        H
      1
      2
      3
      4          line of text that continues in the
      5          cells adjacent.  Notice
      6
      7          that this sentence has run
      8          off the display screen.
```
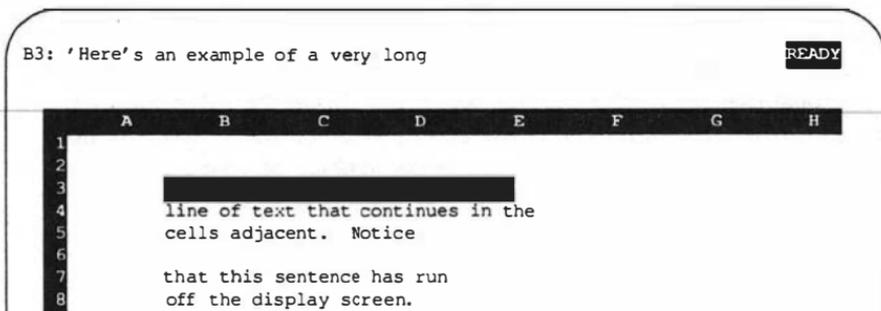
When you add or delete words from labels after you have used the /Range Justify command, SCO Professional does not adjust the label to fit the specified margins automatically. To retain the margin settings, you must use the /Range Justify command again.

5

Changing the Overall Appearance of the Worksheet

In addition to changing the appearance of the information in each cell, SCO Professional allows you to modify the overall appearance of the worksheet. Using /Worksheet and /Range commands, you can change the widths of columns, insert and delete columns and rows, insert rows of specific characters, hide the information in cells or columns, use two windows, freeze titles, and configure the worksheet clock.

Setting Column Widths

The term COLUMN WIDTH refers to the number of characters that SCO Professional displays in a column. The column width is initially set to nine characters. This means that when the column width is set to nine characters, SCO Professional displays up to eight numbers in each value cell. SCO Professional uses the ninth character space to separate the value from the contents of the cell to the right. If you enter a value of nine or more numbers in a cell, SCO Professional displays asterisks in place of your entry. However, you can enter a label of nine or more characters in a cell because SCO Professional displays long label cells by continuing them into the cell(s) to the right.

Changing the Widths of All the Columns

To change the width of all of the columns of your worksheet, use the /Worksheet Global Column-Width command.

To change the width of all the columns in your worksheet:

1. Select /Worksheet Global Column-Width. SCO Professional displays the current global width setting.

2. Select a new column width by typing a number at the prompt (the number of characters) or by using the Right (to add one space at a time to the width) and Left keys (to subtract one space at a time). On most systems, the Right key is configured to ⟨Ctrl⟩l and the Left key is ⟨Ctrl⟩h. When you reach the desired width, press the ⟨Return⟩ key to set it.

The first example shows a worksheet formatted with the default column width of nine characters. Notice how cell G15 displays asterisks. In the second example, the widths of each of the columns in the worksheet have been changed to 12 characters.

```
A8: [W9] '  Distributors                                            READY

                         XYZ Corporation

                    Revenues by Selected Products


                      ADD     WRITE    DRAW     CALC    Total
     REVENUES
     Distributors   $50,432   $6,865  $35,920  $43,876 $137,093
     Dealers         22,641    4,512   32,741    3,246   63,140
     Telemarketing   19,760   92,736   53,876   47,247  213,619
     Mail Order     129,443   65,003  102,906   38,390  335,742
     Strategics      19,995   15,987   59,876      875   96,733
     Retail         199,874   87,965  399,865   63,404  751,108

     TOTAL REVENUES$442,145 $273,068 $685,184 $197,038 *********


14-Feb-91   08:00 AM
```

```
A8: [W12] '  Distributors                                              READY

        A              B          C          D          E          F
    1                             XYZ Corporation
    2
    3                      Revenues by Selected Products
    4
    5
    6                            ADD        WRITE      DRAW       CALC
    7   REVENUES
    8   Distributors           $50,432     $6,865    $35,920    $43,876
    9   Dealers                 22,641      4,512     32,741      3,246
   10   Telemarketing           19,760     92,736     53,876     47,247
   11   Mail Order             129,443     65,003    102,906     38,390
   12   Strategics              19,995     15,987     59,876        875
   13   Retail                 199,874     87,965    399,865     63,404
   14                       ==================================================
   15      TOTAL REVENUES     $442,145   $273,068   $685,184   $197,038
   16
   17
   18
   19
14-Feb-91   08:00 AM
```

If you use /Worksheet Global Column-Width while the worksheet is split
into two windows, the Column-Width command affects only the window in
which the cell indicator is located. For example, if you split the screen into
two windows horizontally, and the cell indicator was in the top window
when you issued the /Worksheet Global Column-Width command, then the
Column-Width command affects only the columns in the top window. For
more information about multiple windows, see the section "Using Two
Windows with One Worksheet" later in this chapter.

Changing the Width of a Single Column

You can change the width of a single column using the /Worksheet
Column-Width command. This command is similar to the /Worksheet Glo-
bal Column-Width command, except that it sets the column width on single
columns and allows you to reset column widths to the global format. The
/Worksheet Column-Width command overrides the /Worksheet Global
Column-Width command.

To change the width of one column, select /Worksheet Column-Width.

SCO Professional displays two commands: Set and Reset.

■ To set the column width choose Set. Use the Left key to subtract or the Right key to add, one space at a time. On most systems, Left is configured to ⟨Ctrl⟩h and Right is ⟨Ctrl⟩l. Press the ⟨Return⟩ key when you reach the desired width.

■ You can also enter a number to indicate the number of spaces in the column width.

The following example shows a screen with the first column of the worksheet set to a column width of 18 characters. The width of all of the other columns is set to nine characters.

```
A8: [W18] '  Distributors                                      READY


                              XYZ Corporation
                              ──────────────────
                         Revenues by Selected Products


                          ADD     WRITE     DRAW     CALC     Total
        REVENUES
        Distributors    $50,432   $6,865  $35,920  $43,876 $137,093
        Dealers          22,641    4,512   32,741    3,246   63,140
        Telemarketing    19,760   92,736   53,876   47,247  213,619
        Mail Order      129,443   65,003  102,906   38,390  335,742
        Strategics       19,995   15,987   59,876      875   96,733
        Retail          199,874   87,965  399,865   63,404  751,108
                        ==================================================
           TOTAL REVENUES $442,145 $273,068 $685,184 $197,038 *********


14-Feb-91   08:00 AM
```

5

Resetting the Width of a Single Column

You can return the width of a single column to the global column-width setting using the /Worksheet Column-Width Reset command.

To return a column-width to the global column-width setting:

1.   Select /Worksheet Column-Width Reset.

The column width returns to the default setting.

Inserting and Deleting Columns and Rows

There are two commands that you can use to add columns or rows for additional data or to make your worksheet more legible. Use the /Worksheet Insert Row command to insert one or more rows, and the /Worksheet Insert Column command to insert one or more columns in your worksheet.

To insert rows in your worksheet:

1.   Select /Worksheet Insert Row. SCO Professional prompts you for a range.

2.   Move the cell indicator with your arrow keys down the number of times you want a row to be inserted and press the ⟨Return⟩ key.

To insert columns in your worksheet:

1.   Select /Worksheet Insert Column. SCO Professional prompts you for a range.

2.   Move the cell indicator with your arrow keys down the number of times you want a row to be inserted and press the ⟨Return⟩ key.

The following screen shows a worksheet after a blank row and column was added at cell D10.

```
D10:                                                              READY

              A       B    C    D      E       F       G
     1                               XYZ Corporation
     2
     3                          Revenues by Selected Products
     4
     5
     6                   ADD                WRITE    DRAW    CALC
     7   REVENUES
     8    Distributors  $50,432            $6,865  $35,920  $43,876
     9    Dealers        22,641             4,512   32,741    3,246
    10
    11    Telemarketing  19,760            92,736   53,876   47,247
    12    Mail Order    129,443            65,003  102,906   38,390
    13    Strategics     19,995            15,987   59,876      875
    14    Retail        199,874            87,965  399,865   63,404
    15                   ========          ========================
    16       TOTAL REVENUES  $442,145      $273,068 $685,184 $197,038
    17
    18
    19
   14-Feb-91   08:00 AM
```

When you add a row or column, the other rows or columns move downward or to the right to accommodate the inserted areas. SCO Professional automatically adjusts cell references in moved rows or columns to correspond with their new locations. Initially, the inserted areas use the global format settings (for value and label displays and for column width). If there is no more room in the worksheet for additional rows or columns, SCO Professional sounds a tone and warns Worksheet Full.

Deleting Rows and Columns

To delete one or more complete rows or columns from your worksheet, use the two commands /Worksheet Delete Row and /Worksheet Delete Column.

To delete rows from your worksheet:

1. Select /Worksheet Delete Row and press the ⟨Return⟩ key. SCO Professional prompts you for a range.

2. Use the arrow keys to move the cell indicator over the rows that you want to delete, or enter the range from the keyboard and press ⟨Return⟩.

To delete columns from your worksheet:

1. Place the cell indicator over the first column that you want to delete.

2. Select /Worksheet Delete Column. SCO Professional prompts you for a range.

3. Use the arrow keys to indicate the number of columns, or type the range to delete and press ⟨Return⟩.

After deleting a row or a column, the remaining rows and columns move up or to the left to fill the gap made by the deletion. If any cell references in your worksheet refer to one of the deleted cells, the formulas depending on them display the "ERR" value.

Displaying Integers as Rows of Characters

You can create a horizontal bar graph with rows of plus (+), minus (-), and period (.) characters, using values from a range or from the entire worksheet. SCO Professional displays a series of characters equal to the value in the cell. If the value of a cell is zero, SCO Professional displays a period (.) character.

The integers in each cell refer to the number of symbols. The /Worksheet Global Format +/- command formats all the values in the worksheet that you enter after issuing the command. The /Range Format +/- command affects only those pre-existing values in the range that you specify.

The + character indicates positive integers, - indicates negative integers, and . indicates values that are equal to zero.

To display numbers as a series of plus or minus characters, choose the appropriate +/- command (/**WGF+/-** or /**RF+/-**).

If the number of plus or minus characters is too long to fit in the cell, SCO Professional displays a series of asterisk characters.

The following table shows integers and the +/- format for each:

| | +/- **Format** |
Integer	**Display**
0	.
6	++++++
-2	--
+8	++++++++
-11.6	-----------
22	***********

The following shows a worksheet with the values in column C in the +/- format. The values in column A are the same values formatted with the Fixed format command.
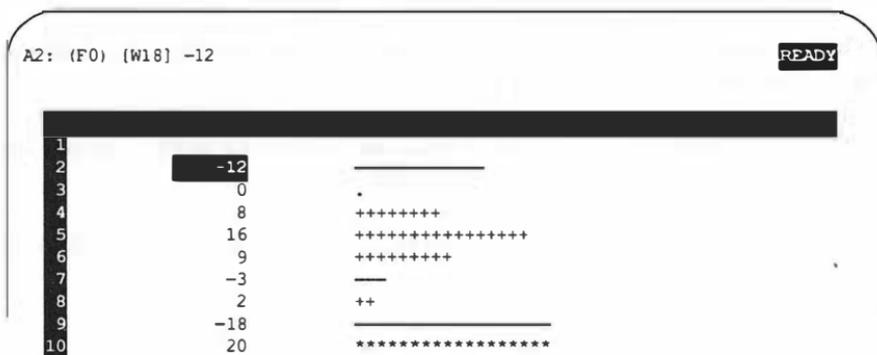
```
A2:  (F0)  [W18] -12                                                    READY

   1
   2              -12          _____
   3                0          .
   4                8          ++++++++
   5               16          +++++++++++++++
   6                9          +++++++++
   7               -3          ___
   8                2          ++
   9              -18          _____
  10               20          ******************
```

Freezing Titles

You can lock rows, columns, or both in place on your screen so that as you scroll through your worksheet, the row or column titles remain visible on the screen. To do this, use the /Worksheet Titles command.

On your screen, column letters and row numbers form a border near the top and at the left edge of the screen. When you move the cell indicator down or to the right, you can choose to keep these borders on the screen. When you do this, the borders are said to be "frozen."

Sometimes, it is convenient to maintain a vertical or horizontal section of your worksheet in one place while you scroll through and make changes in other sections of your worksheet. SCO Professional allows you to keep rows and columns that identify information in the worksheet on the display at all times. Just as the borders at the left and top of the worksheet display are "frozen," you can "freeze" the worksheet sections horizontally, vertically, or both. This is known as TITLE LOCKING or FREEZING TITLES.

To freeze a row or column of titles:

1. Move the cell pointer to the cell to the right of (or beneath) the columns (or rows) that you want to freeze.

2. Select /Worksheet Titles and press the ⟨Return⟩ key.

3. Choose Vertical, Horizontal, or Both to indicate which titles you want to freeze.

In the following example, the horizontal titles are locked at row 6. Note that rows 7 through 12 are not visible because the worksheet has been scrolled down, leaving the titles locked.

```
C13: (,0) [W10] 199874                                              READY

                  A        B    C        D          E         F        G      H
       1                            XYZ Corporation
       2
       3                        Revenues by Selected Products
       4
       5
       6                         ADD      WRITE     DRAW       CALC       Total
      13   Retail             199,874    87,965   399,865    63,404     751,108
      14                     ==================================================
      15    TOTAL REVENUES  $442,145  $273,068  $685,184  $197,038  $1,597,435
```

SCO Professional freezes the titles on the screen from the position of the cell indicator to the left edge of the worksheet (Vertical); or to the top edge of the worksheet (Horizontal); or both (Both). The frozen area remains in place as you scroll through your worksheet in any direction.

Entering Frozen Titles Area

SCO Professional does not allow you to move the cell indicator into the frozen area. This protection feature guards the Titles area from accidental alteration. You may, however, need to enter the Titles area. To do this, use the ⟨GoTo⟩ key.

Using this method, you can alter the entries in the Titles area, even though you cannot use the movement keys to enter the area. The worksheet Titles area reflects any changes you make to the frozen Titles area. Once you scroll the worksheet Titles area off the screen, the worksheet no longer displays them.

Unfreezing Titles

You may wish to unfreeze frozen titles. You can do this with the /Worksheet Titles Clear command.

1. Select /Worksheet Titles Clear.

The /Worksheet Titles Clear command unfreezes both the horizontally and vertically frozen titles. The worksheet display returns to normal.

Using Two Windows with One Worksheet

You can split the screen into two segments, or windows, so that you can simultaneously view different, unconnected areas of your worksheet using the /Worksheet Window command. Using the /Worksheet Window command, you can create split windows horizontally or vertically.

All commands, with the exception of printing and saving, that work on the worksheet as a whole, work separately on each of the windows. Although you now view two sections of your worksheet rather than one solid section, it is still the same worksheet.

In some ways, the windows are independent from one another. You can use the cell indicator to move around each screen area. You can set global display formats, and global or individual column widths, for each window of the worksheet. You can even use the split-window feature to view the same area differently in both windows.

To create a vertical or horizontal window:

1. Place the cell indicator in the column to the left or the row below where you want to divide the worksheet.

2. Select /Worksheet Window.

3. Select Vertical or Horizontal.

The following example shows a screen that has been split into two horizontal windows. Note that the cell indicator is in the last row of the first window.

5

```
 D9: (,0) [W10] 4512                                              READY

             A      B    C       D        E        F        G    H
  1                            XYZ Corporation
  2                            ─────────────────
  3                        Revenues by Selected Products
  4
  5
  6                    ADD       WRITE     DRAW     CALC      Total
  7  REVENUES
  8   Distributors    $50,432   $6,865   $35,920  $43,876   $137,093
  9   Dealers          22,641    4,512    32,741    3,246     63,140
             A      B    C       D        E        F        G    H
 10   Telemarketing    19,760   92,736    53,876   47,247   213,619
 11  Mail Order       129,443   65,003   102,906   38,390   335,742
 12  Strategics        19,995   15,987    59,876      875    96,733
 13  Retail           199,874   87,965   399,865   63,404   751,108
 14                   ═══════════════════════════════════════════════
 15    TOTAL REVENUES $442,145 $273,068  $685,184 $197,038 $1,597,435
 16
 17
 18
 14-Feb-91  08:00 AM
```

SCO Professional divides the display into two windows. The cell indicator reappears in the last row of the source window (the first window).

The window in which the cell indicator is located is the active window. You can move the cell indicator from one window to the other by using the ⟨Window⟩ key. For more information on how to use split windows, see Chapter 7, "Using Multiple Worksheets."

Unifying Split Windows

You can return the display to one window using the /Worksheet Window Clear command.

To unify the split windows, select /Worksheet Window Clear.

The display returns to one window.

Synchronized Scrolling

When you split the screen, SCO Professional synchronizes the windows automatically horizontally or vertically (depending on which type of split-screen window you use). Horizontal windows scroll to the left or right together, but do not scroll together when you move up or down in either of the windows. The same holds true for vertical windows: scrolling up and down in one window affects the other. Horizontal scrolling remains independent.

To unlink the synchronized scrolling, select /Worksheet Window Unsynchronize.

This unlinks the scrolling of the two windows.

To reactivate synchronized scrolling, select /Worksheet Window Synchronize.

The scrolling is now relinked from left to right for horizontal split-screen windows and up and down for vertical split-screen windows.

Configuring the Worksheet Clock

You can change or remove the display of the clock from the worksheet, using the /Worksheet Global Default Other Clock command.

To change or remove the worksheet clock from the display:

1. Select /Worksheet Global Default Other Clock.

2. Select Standard to display the clock in the United States long date format (DD-MM-YY) and in short time format (HH:MM AM/PM).

   Select International to display the clock in the currently configured long international date format and in short international time format (as configured in the /Worksheet Global Default Other International Date and Time.) For more information on international time formats, see "Configuring International Date Formats" and "Configuring International Time Formats" earlier in this chapter.

   Select None to remove the clock from the worksheet display.

The following example shows the clock at the bottom of the screen. Note that the clock is displayed in Standard format.

```
    Strategics          19,995    15,987    59,876        875     96,733
    Retail             199,874    87,965   399,865     63,404    751,108
                      =======================================================
    TOTAL REVENUES    $442,145  $273,068  $685,184   $197,038  $1,597,435



14-Feb-91   08:00 AM
```

Resetting the Format Range

You can return a range to the global format (as set by the /Worksheet Global Format command) using the the /Range Format Reset command. The Reset command negates the effect of the /Range Format command.

To return a range to the global format:

1. Select **/R**ange Format **R**eset. SCO Professional prompts you for a range to reset.

2. Use the arrow keys to highlight a range, or type the range that you want to reset and press ⟨Return⟩.

SCO Professional resets the indicated range to the global format.

▤ Chapter 6

Protecting Data

≡ 6

Protecting Data

Worksheets are often created for users who have varied skill levels. Because of this, you may decide to limit access to certain areas of your worksheet: formulas and macros, for instance, or columns of information that you wish to remain constant. SCO Professional provides different levels of protection for your worksheets. You can protect cells from change or erasure; you can restrict cursor movement to specified cells only; you can hide the contents of cells from view; and you can prevent access to an entire worksheet. This chapter describes the commands that enable you to protect your worksheets using these methods.

Contents of This Chapter

This chapter is organized into the following sections:

- ■ "Protecting Cells in Worksheets" describes the step-by-step procedure for protecting specified cells or ranges of cells in your worksheet.

- ■ "Hiding Data in Your Worksheet" explains how to hide specified data from the printouts or from the user's view.

- ■ "Restricting Access to a Worksheet" shows you how to assign a password to a worksheet.

6

Protecting Cells in Worksheets

With worksheet protection, users can *view* the data in cells, but they cannot erase or change them. Protection helps prevent accidental change to the worksheet. SCO Professional follows a specific procedure for protecting parts of your worksheet, assuming that the worksheet is already set up with all the necessary data, formulas, and macros.

The first step in this procedure is to select the /Worksheet Global Protection Enable command to activate worksheet protection. With this command, you are restricting all cells in the worksheet from change. Unless this first step is performed, the next step is ineffective. If necessary, use the /Range Unprotect command to open up specified areas of the worksheet for data modification. This command allows changes to any cells in a protected worksheet. Then, use the /Range Protect command to reset protection for those unprotected areas you created using /Range Unprotect. Finally, use the /Range Input command to further protect parts of your worksheet by restricting cursor movement to unprotected cells only.

Although the /Range Protect and /Range Unprotect commands are used in connection with the /Worksheet Global Protection commands, the /Range commands override the /Worksheet commands. This lets you have both protected and unprotected cells in your worksheet. With the /Range Input command in protected cells, not only are users restricted from changing those cells, they are also prohibited from even accessing them.

Each part of this procedure is described in detail in the next four sections.

Protecting the Entire Worksheet

The first step in protecting specific parts of your worksheet is to enable protection for the entire worksheet using the /Worksheet Global Protect command. Without this step, the /Range Unprotect command is ineffective.

You may also decide to restrict an entire worksheet from use. In this way, users can look at the data, but they cannot change any of it. When you try to change protected cells, you get the message `Cell Protected` in the message area. To proceed, you must press ⟨Return⟩ or the Break key.

To protect the entire worksheet:

1. Select the /Worksheet Global Protection command. You are offered two choices: Enable (on) or Disable (off).

2. Select Enable to enable protection (prohibit changes) for the whole worksheet.

If you later decide to open up the entire worksheet to changes again, select D to turn off protection altogether.

In the following example, the /Worksheet Global Protection Enable command has been issued. Note that the cell description in cell A1 includes the message PR (for protected). With this command invoked, each cell in the worksheet displays the message PR.

```
A1: PR 'Lastname                                               READY
Last Name

          A          B          C          D          E        F
 1Lastname   Firstname   Empcode     Deptcode     Salary
 2
 3Pauper     Mildred     003-39-9876      96    $51,357.00
 4James      Peggy       098-98-1267      96    $73,897.00
 5Burton     Lester      136-09-8564      96    $48,345.00
 6Stavinsky  Jewel       369-76-2573      62    $74,563.00
 7Thomas     Burt        247-92-3471      38    $52,980.00
 8Turner     Brian       279-64-3561      38    $73,789.00
 9Alberts    Susan       901-00-1262      38    S50,921.00
10
11
12
13
14
15
16
17
18
19
14-Feb-91   08:00 AM
```

6

If you try to modify any cell in a protected worksheet, as was attempted in cell A1 in this example, SCO Professional sounds a tone and displays the error message `Cell protected` at the bottom of the screen. Press the Break key to continue.

Removing Protection from Parts of a Worksheet

Once you have protected the entire worksheet, you can remove protection from specified parts of the worksheet by using the /Range Unprotect command. The cells that are unprotected can be changed, removed, and copied or moved to other unprotected parts of the worksheet.

To open up ranges for use:

1. Select the /Range Unprotect command.

2. Specify the range (or ranges) that you want to be unprotected.

3. Enter the range by pressing ⟨Return⟩.

SCO Professional unprotects that range and allows any cell in that range to be changed. The contents of unprotected cells are highlighted. For more information on setting up ranges, see the section "Using Ranges" in Chapter 2.

Using the preceding example, you can unprotect all of the cells *except* the header with the /Range Unprotect command. Note that the cell description in cell A3, the first unprotected cell in the range, includes the message U (for unprotected). With this command invoked, each cell in the unprotected range is highlighted and displays the message U.

```
A3: U 'Pauper                                                    READY

         A            B            C            D            E         F
1 Lastname    Firstname    Empcode       Deptcode      Salary
2
3 Pauper      Mildred      003-39-9876        96      $51,357.00
4 James       Peggy        098-98-1267        96      $73,897.00
5 Burton      Lester       136-09-8564        96      $48,345.00
6 Stavinsky   Jewel        369-76-2573        62      $74,563.00
7 Thomas      Burt         247-92-3471        38      $52,980.00
8 Turner      Brian        279-64-3561        38      $73,789.00
9 Alberts     Susan        901-00-1262        38      $50,921.00
```

Re-Protecting Parts of a Worksheet

If you have a range that was previously unprotected, you may protect it using /Range Protect. This command is usually used within a larger range that was left unprotected (using /Range Unprotect). The cells that are protected cannot be changed or removed.

The /Range Protect and /Range Unprotect commands are used to counteract one another. Again, these commands are ineffective unless the /Worksheet Global Protection command is first enabled. When /Worksheet Global Protection is disabled, the /Range Unprotect command highlights the contents of the cells in the specified range.

6

To protect a range from use:

1. Select the /Range Protect command.

2. Specify the range (or ranges) that you want to be protected.

3. Enter the range by pressing ⟨Return⟩.

Any time you try to modify a protected cell, SCO Professional sounds a tone and displays the error message Cell Protected at the bottom of the screen.

Using the preceding example, let us say that you have decided to protect the columns for Empcode and Salary using the /Range Protect command. Now, the cell description in cell C3, the first newly protected cell in the range, includes the message PR (for protected).

```
C3: PR '003-39-9876                                              READY

        A            B            C            D            E           F
1Lastname     Firstname    Empcode      Deptcode      Salary
2
3Pauper       Mildred      003-39-9876      96      $51,357.00
4James        Peggy        :98-9b-1267      96      $73,897.00
5Burton       Lester       136-09-8564      96      $48,345.00
6Stavinsky    Jewel        369-76-2573      62      $74,563.00
7Thomas       Burt         247-92-3471      38      $52,980.00
8Turner       Brian        279-64-3561      38      $73,789.00
9Alberts      Susan        901-00-1262      38      $50,921.00
10
11
12
13
14
15
16
17
18
19 Cell protected
14-Feb-91   06:00 AM
```

If you try to modify any cell in the protected range, as was attempted in cell C3 in this example, SCO Professional sounds a tone and displays the error message Cell protected at the bottom of the screen. Press the Break key to continue. For more information on setting up ranges, see the section "Using Ranges" in Chapter 2.

Restricting Cursor Movement to Parts of the Worksheet

You can also restrict the cursor movement to specified ranges with the /Range Input command. Working only in unprotected ranges, this command prohibits cursor movement from all cells *except* those within the specified input range until you press ⟨Return⟩. This form of protection is especially useful with macros.

The /Range Input command is useful for worksheets that are used as data input forms. With an input range established, you can access only those parts of the form that need data input; all other areas are restricted, because the cursor cannot take you there.

To set up an input range:

1. Select the /Range Input command.

2. Specify the range that you want to be used for data input. Make sure the area that you want to set up as an input range is part of an unprotected range.

    If you try to set up an input range in a protected area, your computer beeps at you and displays the error message Cell protected.

3. Enter the Input range by pressing 〈Return〉. The movement keys enter the specified range only. All cells outside of the input range are bypassed when you move around in the worksheet.

4. Exit the Input range by pressing 〈Return〉.

While /Range Input is in effect, only certain functions and types of commands are active. You can use the 〈Help〉 key. For editing, you can use the 〈Edit〉 key. In LABEL mode, the 〈Backspace〉 key is used to erase the character preceding your cell indicator. To cancel an entry while in LABEL mode, VALUE mode, or EDIT mode, press the Break key once. All other functions and types of commands are inactive.

Commands cannot be issued while /Range Input is in effect. The / key acts like any other character. The arrow keys move up-and-down and back-and-forth within the Input range only. The 〈Home〉 key goes to the top-left cell of the Input range; the 〈End〉 key goes to the bottom-right cell of the Input range.

To cancel the /Range Input command, press the Break key or 〈Return〉 without first typing or editing an entry (that is, in the READY mode). SCO Professional returns you to where you were in the worksheet before you issued the /Range Input command. Both the worksheet window and the cell indicator are returned to their original positions.

Using the preceding example, say that you want to update the data in the columns for Lastname and Firstname. To do so quickly, use the /Range Input command to restrict cursor movement to these two columns only. Now, you can move quickly from one cell to another within the range A3..B9 to make the necessary changes.

A3: U 'Pauper   READY

A	B	C	D	E	F
3Pauper	Mildred	303-39-9876	96	$51,357.00	
4James	Peggy	098-98-1267	96	$73,897.00	
5Burton	Lester	136-09-8564	96	$48,345.00	
6Stavinsky	Jewel	369-76-2573	62	$74,563.00	
7Thomas	Burt	247-92-3471	38	$52,980.00	
8Turner	Brian	279-64-3561	38	$73,789.00	
9Alberts	Susan	901-00-1262	38	$50,921.00	

When you are finished making changes to this range, press the Break key to
cancel the input range. The worksheet then returns to its position before
you issued the /Range Input command.

Checking Worksheet Protection Status

If you want to check the protection status of your worksheet, use the
/Worksheet Status command. This helpful on-line reminder lists the status
of global protection. For more information on worksheet status, see the
section "Determining the Default Worksheet Settings" in Chapter 5.

Using the preceding example, you can check the protection status of the worksheet by selecting /Worksheet Status:

```
A3: U 'Pauper                                          STATUS


Memory Used (bytes):         8516

Recalculation:
   Method.................. Automatic
   Order................... Natural
   Iterations.............. 1

Circular Reference:          (None)

Cell Display:
   Format.................. (G)
   Label-Prefix............ '
   Column-Width............ 12
   Zero Suppression........ Off

Global Protection:           On



Press any key to continue:
```

6

Hiding Data in Your Worksheet

Another way to protect data is to hide from view specified parts of the worksheet. In this way, other users have access to the worksheet, but are not able to *see* the parts you want protected. The following commands are especially useful for hiding macros, formulas, or sections of worksheets that contain confidential data.

With these commands, the contents of specified ranges do not appear on the screen even though they exist in the worksheet:

- The /Worksheet Global Format Hidden command hides the entire worksheet from view, without erasing the data.

- The /Range Format Hidden command hides a specified cell or range of the worksheet without erasing the data.

- The /Worksheet Column Hide command hides one or more columns from the worksheet without permanently erasing the data.

- The /Worksheet Global Zero Yes command hides all cells in the worksheet evaluating to zero.

When you hide the information in a cell, the cell appears to be empty. However, SCO Professional is really storing the information for that cell internally. You can still access the information in a hidden cell using formulas. The information in a hidden cell is used when formulas and values change.

Hiding Cells, Ranges, and Worksheets

Use the Hidden format of either the /Worksheet Global Format Hidden command or the /Range Format Hidden command to hide a cell, a range, or the entire worksheet.

If you choose /Worksheet Global Format Hidden to set the default global format to hidden, SCO Professional hides all cells that do not have a /Range Format set. With the global format set to hidden, SCO Professional suppresses the display of any information you add. To redisplay those parts of the worksheet, you must select a new global format from the /Worksheet Global Format menu.

- **NOTE:** If you enter long labels to the left of a hidden cell, SCO Professional does not write over the contents of the hidden cell.

To hide the contents of a cell, a range of cells, or the entire worksheet:

1. Select the appropriate Hidden format (/Worksheet Global Format Hidden or /Range Format Hidden) and press ⟨Return⟩.

2. If you used /Range Format Hidden, SCO Professional prompts you to select a range. Select a range and press ⟨Return⟩.

The following example shows a hidden range (C8) with the cell pointer positioned over the hidden cell. Note that the status display shows that the cell is in Hidden format (H).

```
C8: (H) [W10]                                                    READY

    1                          XYZ Corporation
    2                          ───────────────
    3                     Revenues by Selected Products
    4
    5
    6                    ADD      WRITE      DRAW      CALC     Total
    7  REVENUES
    8   Distributors  ████████  $6,865    $35,920   $43,876   $137,093
    9   Dealers         22,641   4,512     32,741    3,246     63,140
```

Hiding Columns

Use the /Worksheet Column Hide command to hide single columns or ranges of columns.

To hide the contents of cells in a column or range of columns:

1. Select /Worksheet Column Hide. SCO Professional prompts you to enter the column that you want to hide.

2. To select the column in which the cell pointer currently resides, press ⟨Return⟩, or enter the range from the keyboard and press ⟨Return⟩.

The following example shows a worksheet with a hidden column (C). Note that the column header for column C is missing.

```
D8:  (CO)  [W10]  6865                                              READY

1                         XYZ Corporation.
2
3
4
5
6                        WRITE     DRAW      CALC      Total
7  REVENUES
8   Distributors        $6,865   $35,920   $43,876   $137,093
9   Dealers              4,512    32,741     3,246     63,140
```

With this command, you cannot move your cursor to the hidden column to
see any data, because the column disappears from the screen. Instead, the
cursor skips from column B to column D, as the example shows.

Redisplaying Hidden Cells and Ranges

You can redisplay the contents of a hidden cell or range of cells using the
/Range Format Reset command.

To redisplay a hidden cell or range:

1. Select **/R**ange **F**ormat **R**eset.

2. SCO Professional prompts you to select a range. Select the cell or
    range that you want to redisplay and press ⟨Return⟩.

The Reset command returns the format of the particular range to the default
global format.

Redisplaying Hidden Columns

Use the /Worksheet Column Display command to redisplay a single hidden column or a range of columns.

To redisplay a hidden column or range of columns:

1. Select /Worksheet Column Display.

2. To redisplay the column in which the cell pointer currently resides, simply press ⟨Return⟩. To redisplay a range of columns, enter the range and press ⟨Return⟩.

Restricting Access to a Worksheet

You can restrict use of an entire worksheet by assigning a password to it with the /File Save command. When you create a password for a worksheet, no one else may retrieve that worksheet unless they know the password.

■ **IMPORTANT:** Make certain that you remember the passwords that you assign to worksheets. If you forget a password, you cannot retrieve the protected worksheet.

You can use the /File Save command to create a password for a file, to change the password, or to delete the password. You can also use the /File Xtract command to assign a password to that portion of a worksheet that you extracted into a separate file.

Creating a Password

When you assign a password to a file, you cannot see that password in the directory. You also cannot see the password on the prompt line when you type it in at the /File Retrieve prompt.

To create a password for a worksheet:

1. Select the **/File Save** command.

2. If you are saving a file for the first time, type the filename, the ⟨Space⟩ bar, and the letter **P** (uppercase or lowercase). For an existing file, type a ⟨Space⟩ bar and the letter **P**.

3. Press ⟨Return⟩. You are prompted to enter a password.

4. At the prompt, type in the password of your choice. The password can be up to 15 characters long and can be composed of any combination of uppercase or lowercase letters as well as any numbers or symbols on your keyboard.

   When you type in the password, the characters are not displayed on the screen. Instead, you see underline symbols (_) for each character of the password that you type in. This is a further protection, to prevent people walking by from reading your password.

5. Press ⟨Return⟩. You are prompted to verify your password.

6. Type the password again, exactly as you typed it the first time. If you make a spelling error, press ⟨Return⟩ and begin the procedure over again from step 1.

7. Press ⟨Return⟩. For an existing file, press ⟨Return⟩ and select **Replace**.

The next time you save this file, the message [PASSWORD PROTECTED] is displayed after the filename.

Using the preceding examples of this chapter, if you create a password for the file *filename.wk1*, the next time that you save it, this message appears:

```
F3: PR Enter name of file to Save: filename.wk1 (PASSWORD PROTECTED)
```

Changing a Password

You may decide to change your password, either because you are afraid someone has learned what it is, or because you decide upon one that is easier to remember or more appropriate to the worksheet.

To change a password:

1. Select the /File Save command. The [PASSWORD PROTECTED] prompt is displayed.

2. Press the ⟨Escape⟩ key, the ⟨Space⟩ bar, and the letter **P**. Then press the ⟨Return⟩ key. You are prompted to enter a password.

3. Repeat the steps in the preceding procedure, starting at step 4, to change the current password.

The next time you try to access this file, you must type in the new password.

6

Retrieving a File with a Password

Once you have created a password for a file, you can retrieve that file only by using the password. If you forget the password, you cannot retrieve the file.

To retrieve a file that has a password:

1. Select the /File Retrieve command.

2. Use the arrow keys to select the file that has a password.

3. At the prompt, type in the password. The file appears on the screen.

If you mistype the password, you hear a beep. Simply repeat the procedure above.

Deleting a Password

You may decide that you no longer need a password for a file. The worksheet may no longer be confidential or the password may be more of an effort to remember and enter than it is worth.

To delete the password, but save the file:

1. Select the /File Save command.

2. Press the ⟨Escape⟩ key, and then press ⟨Return⟩.

3. Select Replace.

The next time you access this file with the /File Retrieve command, you do not see the [PASSWORD PROTECTED] message. Instead, you go into the worksheet immediately. For more information, see the section "Saving a Range to a Separate Worksheet" in Chapter 7.

Chapter 7

Using Multiple Worksheets

7

Using Multiple Worksheets

Often while you are working in a worksheet, you need to compare the information in that worksheet with information from another worksheet. SCO Professional allows you to do this easily using windows to display two different worksheets on your screen simultaneously. Once you have the two worksheets displayed on your screen, you can then scroll them separately or together for comparison and change information, if necessary.

Displaying two worksheets on the screen simultaneously is particularly useful when you are combining information from two different worksheets. This chapter describes how to use the /File Combine commands to bring information from one worksheet into the current worksheet; add or subtract the values from one worksheet to another; and create links between ranges in the two worksheets.

Contents of This Chapter

This chapter is organized into the following sections:

- "Displaying Two Worksheets Simultaneously" describes the two modes, Resident and External, for working with multiple worksheets simultaneously. You can split your screen into two horizontal or vertical windows and display a different worksheet in each window, move the cell pointer between the two windows, load new worksheets in the external window, erase the external window, and return the display to one window.

- "Combining Information from Two Different Files" describes how to use the Copy, Add, and Subtract commands from the /File Combine menu to bring information from one worksheet into another.

- "Linking and Unlinking Data between Worksheets" explains how to use the Link and Unlink commands from the /File Combine menu to establish permanent links between data in one worksheet and data in another.

Displaying Two Worksheets Simultaneously

SCO Professional uses the Resident and External modes to display two windows simultaneously. In the default mode, Resident, you can view two different parts of the same worksheet in separate windows. In External mode, you can load a different worksheet into the right or lower window, depending upon how you split the windows. You invoke these two modes using the External and Resident commands from the /Worksheet Window menu.

For the remainder of this discussion, the window at the top of the display when you split your screen horizontally, or on the left of the display when you split your screen vertically, is called the RESIDENT window. The window on the bottom, or right, of the display is called the EXTERNAL window.

SCO Professional displays the original, resident worksheet in the resident window. To load a second worksheet while in External mode, you must position the current cell pointer in the external window. SCO Professional displays the second worksheet in the external window. If you load another worksheet while in Resident mode, SCO Professional replaces the worksheet in the resident window with the new worksheet.

While in External mode, the resident and external worksheets share the following global settings:

- printer margins and settings,

- default directory, and

- memory usage.

The /Worksheet Window commands, such as Horizontal, Vertical, Sync, and Unsync, work the same way in External mode as they do in Resident mode.

While in External mode, the following information is specific to each worksheet:

- all cell data,

- graph and range names,

- link ranges,

- default range values,

- global recalculation methods,

- protection settings, and

- default label formats.

Restrictions in External Mode

The following restrictions apply while you are using External mode:

- You cannot split an external window into further horizontal or vertical windows.

- You can work with only one worksheet at any given time. The position of the cell pointer determines the active worksheet. For example, formulas may not reference across the two sheets unless the cells are linked using /File Combine Link, and source and destination ranges cannot span across both worksheets. You can use the Clipboard to transfer data between the two worksheets. For more information, see Chapter 12, "Exchanging Data between Applications."

- You cannot use the ⟨Window⟩ key to move the cell pointer between the worksheets while in POINT mode.

- In general, macros do not work across different windows in External mode because the two worksheets do not share the same data. See Chapter 8, "Using Macros" for more information about macro format.

7

Dividing the Screen into Two Windows

You can view two worksheets on the screen using two horizontal or two vertical windows. The size of each of the windows depends upon the location of the cell pointer at the time you split the screen. When you split the screen horizontally, the dividing line replaces one of the rows in the resident worksheet. When you split the screen vertically, the dividing line replaces one of the columns in the resident worksheet.

To split the current display into two horizontal or two vertical worksheet windows:

1. To split the screen horizontally, place the cell pointer in the row immediately below the row where you want to divide the window. To split the screen vertically, place the cell pointer in the column immediately to the right of the column where you want to divide the window.

2. Select the /Worksheet Window Horizontal or /Worksheet Window Vertical command. The display is divided into two windows.

3. Select /Worksheet Window External. When you select External, no apparent change occurs in the worksheet. The status indicators for each window displays the current mode: RES for the resident window, and EXT for the external window.

When you split the screen horizontally, the screen looks like the following:

```
C10: (, 0) [W8] 19760                                                      READY

RES        A        B    C       D        E        F        G        H
 1                              XYZ Corporation
 2                              ──────────────
 3                          Revenues by Selected Products
 4
 5
 6                      ADD       WRITE      DRAW      CALC     Total
 7  REVENUES
 8   Distributors     $50,432    $6,865    $35,920   $43,876  $137,093
 9   Dealers           22,641     4,512     32,741     3,246    63,140
10   Telemarketing    19,760     92,736     53,876    47,247   213,619
EXT        A        B        C        D        E        F        G        H
11
12
13
14
15
16
17
18
19
14-Feb-91  08:00 AM
```

If you split the screen vertically, the display looks like the following:

```
D10: (,0) [W10] 92736                                           READY

RES         A         B    C       D     EXT    E       F       G
 1                                 XYZ Cor   1
 2                                           2
 3                          Revenues by Sel  3
 4                                           4
 5                                           5
 6                        ADD    WRITE       6
 7 REVENUES                                  7
 8  Distributors    $50,432   $6,865         8
 9  Dealers          22,641    4,512         9
10  Telemarketing    19,760   92,736        10
11  Mail Order      129,443   65,003        11
12  Strategics       19,995   15,987        12
13  Retail          199,874   87,965        13
14                 ===================       14
15   TOTAL REVENUES $442,145 $273,068        15
16                                          16
17                                          17
18                                          18
19                                          19
14-Feb-91  08:00 AM
```

Note that the external window in both examples contains a blank worksheet.

4. Move the cell pointer from the resident window to the external window by pressing the ⟨Window⟩ key.

5. Load a second worksheet into the external window by choosing /File Retrieve and selecting the new worksheet. The external window now contains the new worksheet, while the resident window displays the original worksheet.

If you split the screen horizontally, the display now looks like the following:

```
A4: '   Pauper                                                              READY

RES        A        B    C        D          E         F        G      H
  1                               XYZ Corporation
  2
  3                         Revenues by Selected Products
  4
  5
  6                      ADD      WRITE      DRAW      CALC     Total
  7  REVENUES
  8  Distributors      $50,432   $6,865   $35,920   $43,876  $137,093
  9  Dealers            22,641    4,512    32,741     3,246    63,140
 10  Telemarketing      19,760   92,736    53,876    47,247   213,619
EXT        A        B            C          D          E         F
  1
  2  Lastname  Firstname   Empcode      Deptcode     Salary
  3
  4  Pauper    Mildred     003-39-9876     96     $51,357.00
  5  James     Peggy       098-98-1267     96     $73,897.00
  6  Burton    Lester      136-09-8564     96     $48,345.00
  7  Stavinsky Jewel       369-76-2573     62     $74,563.00
  8  Thomas    Burt        247-92-3471     38     $52,980.00
14-Feb-91   08:00 AM
```

7

If you split the screen vertically, the display now looks like the following:

```
A4: '   Pauper                                                    READY

RES        A        B    C       D      EXT      A          B
 1                            XYZ Cor    1
 2                                        2  Lastname   Firstname
 3                        Revenues by Sel 3  ─────────────────────
 4                                        4  Pauper     Mildred
 5                                        5  James      Peggy
 6                       ADD     WRITE    6  Burton     Lester
 7  REVENUES                              7  Stavinsky  Jewel
 8   Distributors   $50,432   $6,865      8  Thomas     Burt
 9   Dealers         22,641    4,512      9  Turner     Brian
10   Telemarketing   19,760   92,736     10  Alberts    Susan
11   Mail Order     129,443   65,003     11
12   Strategics      19,995   15,987     12
13   Retail         199,874   87,965     13
14                 ==================     14
15     TOTAL REVENUES $442,145 $273,068  15
16                                       16
17                                       17
18                                       18
19                                       19
14-Feb-91   08:00 AM
```

You can also invoke External mode by first selecting **/WWH** or **/WWV**, and then selecting **/WWE**. If you do this, the screen divides into two windows, but the status indicators do not appear in each window until you select External.

Switching between Windows

You can switch between the two worksheets at any time by pressing the ⟨Window⟩ key. Each time you press this key, the cursor moves to the opposite window. SCO Professional displays the name of the active worksheet in the bottom screen to identify the screen that you are currently using.

Loading New Worksheets

Once you display two different worksheets in the resident and external windows, you can easily load new external worksheets to compare with the resident worksheet. To load a new worksheet into the external window:

1. Move the cell pointer to the external window by pressing the ⟨Window⟩ key.

2. Select /File Retrieve, and indicate the name of the worksheet that you want to load.

   ■ **NOTE:** Selecting /**FR** while the cell pointer is in the resident window terminates the External mode, removes the split windows, and loads the new worksheet in Resident mode. In this case, SCO Professional does not save any changes that you made to the external worksheet (as if you selected Yes from the /Quit menu).

Erasing Worksheet Windows

When you have two different worksheets displayed in the resident and external windows, you may wish to erase the contents of the external window before loading a new worksheet.

To erase the information from the external window:

1. Move the cell pointer to the external window by pressing the ⟨Window⟩ key.

2. Select /**W**orksheet **E**rase. SCO Professional erases the contents of the external window.

7

■ **NOTE:** Selecting /WE while the cell pointer is in the resident window terminates the External mode, removes the split windows, and clears the entire screen. In this case, SCO Professional does not save any changes that you made to the external worksheet (as if you selected Yes from the /Quit menu).

Saving Resident and External Worksheets

In addition to allowing you to display and use two worksheets simultaneously, SCO Professional lets you save any changes that you make to either worksheet while in External mode.

To save changes to the worksheet in either the resident or the external window, while in External mode:

1. Using the ⟨Window⟩ key, move the cell pointer to the window that displays the worksheet that you want to save.

2. Select /File Save. The /File Save command saves each worksheet independently, as if the screen were not split into separate windows.

   ■ **NOTE:** Selecting /FS while in Resident mode, saves the resident worksheet (displayed in two different windows) exactly as it appears on the screen. Selecting /FS while in External mode (when two different worksheets are displayed in separate windows), saves only the worksheet in the window where the cell pointer was positioned when you selected /FS.

Returning to Resident Mode

While in External mode, viewing two different worksheets simultaneously, you can return to the default Resident mode. In Resident mode, you can view two different parts of the same worksheet in separate windows. Use the /Worksheet Window Resident command to return to Resident mode from External mode. If you load another worksheet while in Resident mode, SCO Professional replaces the worksheet in the resident window with the new worksheet. To switch to Resident mode while in External mode:

1. Select /Worksheet Window Resident. SCO Professional erases the second worksheet from the external window, and it displays the original worksheet in both the resident and external windows.

Unifying Split Windows

While in Resident or External modes, you can return to a single-window display.

To unify split windows:

1. Select /Worksheet Window Clear. SCO Professional displays the resident worksheet in one window.

The unified window retains the default settings from the resident windows. If you split your screen horizontally, the default resident is the top window; if the split was vertical, the left window is the default resident window.

■ NOTE: Selecting /Worksheet Window Clear while in External mode causes any changes that you made to the external worksheet to be lost. Save your work before selecting /WWC.

Combining Information from Two Different Files

You can incorporate all or part of a saved worksheet with your current worksheet using the commands in the /File Combine menu. The /File Combine commands, Copy, Add, Subtract, and Link, provide you with four ways of bringing information from one worksheet into another. Using these commands, you can copy label and value cells from one worksheet and overwrite the value cells in another. You can also add or subtract the contents of a range of cells in another worksheet to the values of the current sheet. See the section "Linking and Unlinking Data between Worksheets" for a discussion of the /File Combine Link command.

This discussion of how to use the /File Combine Copy, Add, and Subtract commands to combine information from two different files refers to the worksheet that is currently loaded into SCO Professional as the DEPENDENT WORKSHEET and the saved worksheet as the PRINCIPAL WORKSHEET.

If the file that you want to combine was created using Lotus 1-2-3, the number of columns in the worksheet is 256. The default number of columns for worksheets created with SCO Professional is 1024. You can use the -w command line flag to specify the worksheet width for compatibility with Lotus 1-2-3 worksheets. See Appendix B, "Command Line Flags," in this user's guide for more information about the -w option.

The /File Combine commands affect the data in the range of cells to the right of and below the cell pointer in the dependent worksheet. When you use the /File Combine commands, the information in the principal worksheet remains unaffected. These commands affect only the ranges in the dependent worksheet. The /File Combine commands do not affect the settings, such as worksheet, global format, or print settings, in the dependent worksheet.

The following table describes the first three commands on the /File Combine menu:

/File Combine Commands

Command	Description
Copy	Copies labels, values, and formulas from the principal worksheet to the dependent worksheet. The data in each cell from the selected range in the principal worksheet overwrites the information in the affected cells in the dependent worksheet.
Add	Adds values and blank cells from a range in the principal worksheet to the values in the affected range in the dependent worksheet. The Add command converts any formulas from the principal worksheet to values. Add does not affect any cells in the dependent worksheet that contain labels or formulas. Any blank cells in the dependent worksheet are replaced by incoming values.
Subtract	Subtracts values and blank cells from a range in the principal worksheet from the values in the range in the dependent worksheet. The Subtract command converts any formulas from the principal worksheet to values. Subtract does not affect any cells in the dependent worksheet that contain labels or formulas. When you subtract a positive value in the principal worksheet from an empty cell in the dependent worksheet, the result is a negative value.

7

To copy, add, or subtract the contents of cells from the principal to the dependent worksheet:

1. Position the cell pointer at the top left corner of the range where you wish to incorporate information from the principal worksheet. The incoming entries fill the cells to the right and below the cell pointer.

2. Select the /File Combine Copy, /File Combine Add, or /File Combine Subtract command.

3. Select either Entire-File or Named-Range/Coordinates from the displayed menu.

   ■ If you select Entire-File, SCO Professional prompts you for the name of the principal worksheet file that you want to combine with the dependent worksheet. To display a list of filenames, press the Name key. Select the filename from the list, or enter the filename, including the full pathname, from the keyboard and press ⟨Return⟩.

   ■ If you select /Named-Range/Coordinates, SCO Professional prompts you for the name of the range that you want to combine. Type the name of that range or the coordinates of a range and press ⟨Return⟩. SCO Professional then prompts you for the name of the principal worksheet file that you want to combine. Select a filename, or enter the name from the keyboard and press ⟨Return⟩.

The following examples show how you can combine information from a principal worksheet (displayed in the External window) with a dependent worksheet (displayed in the Resident window). The screens show the dependent worksheet after using the Copy, Add, and Subtract commands to combine information from the principal worksheet with the dependent worksheet.

The first screen shows the dependent and principal worksheets before using the /File Combine commands to combine information from the two worksheets.

```
A10: [W18]                                                          READY

RES      A         B    C         D          E         F        G       H
 1                          XYZ Corporation
 2
 3                       Revenues by Selected Products
 4
 5                         ADD      WRITE     DRAW      CALC    Total
 6    REVENUES
 7    Distributors      $50,432   $6,865   $35,920   $43,876  $137,093
 8    Dealers            22,641    4,512    32,741     3,246    63,140
 9    Telemarketing      19,760   92,736    53,876    47,247   213,619
10
11
EXT      A         B    C         D          E         F        G       H
 1
 2    Mail Order        129,443   65,003   102,906    38,390   335,742
 3    Strategics         19,995   15,987    59,876       875    96,733
 4    Retail            199,874   87,965   399,865    63,404   751,108
 5
 6
 7
 14-Feb-91   08:00 AM
```

The next screen shows the dependent worksheet after using the /File Combine Copy command to copy the principal worksheet into the dependent worksheet.

```
A10: [W18] ' Mail Order                                             READY

         A         B    C         D          E         F        G       H
 4
 5                         ADD      WRITE     DRAW      CALC    Total
 6    REVENUES
 7    Distributors      $50,432   $6,865   $35,920   $43,876  $137,093
 8    Dealers            22,641    4,512    32,741     3,246    63,140
 9    Telemarketing      19,760   92,736    53,876    47,247   213,619
10    Mail Order        129,443   65,003   102,906    38,390   335,742
11    Strategics         19,995   15,987    59,876       875    96,733
12    Retail            199,874   87,965   399,865    63,404   751,108
```

The /File Combine Copy command copies the data from the range A2..G4 in the principal worksheet to the range below and to the right of the cell pointer located in cell A10.

The next screen shows the dependent worksheet after using the /File Combine Add command to combine information from the principal worksheet with the dependent worksheet.

```
A7: [W18] '  Distributors                                              READY

            A       B    C        D          E         F       G        H
    1                         XYZ Corporation
    2                     ─────────────────────
    3                      Revenues by Selected Products
    4
    5                    ADD      WRITE      DRAW      CALC      Total
    6  REVENUES
    7  Distributors     179,875   71,868   138,826    82,266   $472,835
    8  Dealers           42,636   20,499    92,617     4,121    159,873
    9  Telemarketing    219,634  180,701   453,741   110,651    964,727
```

The /File Combine Add command adds the values from the range C2..H4 in the principal worksheet to the range below and to the right of the cell pointer (A7..G9). The Add command does not affect label cells.

The next screen shows the results of combining the two worksheets with the /File Combine Subtract command.

```
A7: [W18] '  Distributors                                              READY

            A       B    C        D          E         F       G        H
    1                         XYZ Corporation
    2                     ─────────────────────
    3                      Revenues by Selected Products
    4
    5                    ADD      WRITE      DRAW      CALC      Total
    6  REVENUES
    7  Distributors    (79,011)  (58,138)  (66,986)    5,486  ($198,649)
    8  Dealers           2,646   (11,475)  (27,135)    2,371   (33,593)
    9  Telemarketing   (180,114)   4,771  (345,989)  (16,157)  (537,489)
```

Note that the /File Combine Subtract command subtracts the values from the range C2..H4 in the principal worksheet to the range below, to the right of, and including the cell pointer (A7..G9). The Subtract command does not affect label cells.

Saving Combined Worksheet Files

After using the /File Combine commands to combine information with the principal worksheet, you can save the changes you made to the dependent worksheet using the /File Save command.

To save changes to the dependent worksheet:

1. Select /File Save.

2. Press ⟨Return⟩ to save the dependent worksheet with its original name or enter a new filename and press ⟨Return⟩.

3. Select either Cancel (to cancel the /File Save command and return to READY mode), Replace (to replace the existing file with the new version), or Backup (to create a backup of the existing file).

   If you select /FSR, SCO Professional overwrites the existing dependent worksheet, saving the combined data with the new dependent worksheet.

Linking and Unlinking Data between Worksheets

7

The /File Combine commands, Link and Unlink, allow you to copy data from the principal to the dependent worksheet and establish or remove a link or bond between the two worksheets. A worksheet can have up to 128 links. The Link command is similar to /File Combine Copy except that /File Combine Link copies data and formula values, and creates a link between the copied cells in each worksheet.

When you establish a link, SCO Professional copies the range of data from the principal to the dependent worksheet. When you make a change to the linked range in the principal worksheet, SCO Professional updates the range each time you load the dependent worksheet and each time a recalculation of the dependent worksheet is performed. The Unlink command dissolves an existing link between two worksheets. When you dissolve a link, SCO Professional no longer updates the dependent worksheet each time a

change is made to the corresponding range in the principal worksheet. However, SCO Professional preserves the changes made to the data in the dependent worksheet as a result of the link if it is saved.

The Link and Unlink commands affect the data in the range of cells to the right and below the cell pointer in the dependent worksheet. The data in the principal worksheet remains unaffected by the link.

The following table describes the two remaining commands on the /File Combine menu:

/File Combine Commands

Command	Description
Link	Copies data from a named range of the principal worksheet to the dependent worksheet and establishes a link between the two. The link causes data to be copied from the principal worksheet to the dependent worksheet automatically each time you load the dependent worksheet into SCO Professional. When a formula cell is encountered in the principal worksheet, only the values derived from the formulas are copied; the formulas themselves are not copied. Linked cells are protected: they cannot be erased, split, or copied over because this would destroy the integrity of the link.
Unlink	Unlinks a linked range of data from the principal worksheet. The connection between the values shared by the two worksheets is broken, but the data remains intact.

To link a named range of a principal worksheet to a dependent worksheet:

1. Position the cell pointer at the top left corner of the range where you wish to incorporate information from the principal worksheet. The incoming entries fill the cells to the right, below, and including the current cell pointer position.

2. Select /File Combine Link.

3. SCO Professional prompts you to enter the name of the range that you want to link. Enter the name of the range and press ⟨Return⟩.

4. SCO Professional then prompts you for the name of the file with which you want to link the range. Select the filename from the list, or enter the filename from the keyboard and press ⟨Return⟩.

7

The following example shows the results of linking a range from a principal worksheet (displayed in the External window) with a dependent worksheet (displayed in the Resident window).

```
A10: (F0) [W18] [copy2.wkl woogie] '  Mail Order                                    READY

RES        A        B    C        D         E         F         G        H
 1                                    XYZ Corporation
 2
 3                             Revenues by Selected Products
 4
 5                            ADD       WRITE      DRAW      CALC      Total
 6  REVENUES
 7   Distributors         $50,432     $6,865    $35,920   $43,876   $137,093
 8   Dealers               22,641      4,512     32,741     3,246     63,140
 9   Telemarketing         19,760     92,736     53,876    47,247    213,619
10  Mail Order            129,443
11   Strategics            19,995
12   Retail               199,874
EXT        A        B    C        D         E         F         G        H
 1
 2   Mail Order           129,443     65,003    102,906    38,390    335,742
 3   Strategics            19,995     15,987     59,876       875     96,733
 4   Retail               199,874     87,965    399,865    63,404    751,108
 5
 6
14-Feb-91   08:00 AM
```

In this example, the principal worksheet range with the cell coordinates A2..C4 is named *woogie*. This range is linked to the range below and to the right of the cell pointer (positioned in cell A10) in the dependent worksheet. The information about the link is displayed in the control panel for cell A10 of the dependent worksheet.

To unlink a named range of a principal worksheet to a dependent worksheet:

1. Select /File Combine Unlink.

2. SCO Professional prompts you to enter the name of the file that you want to unlink. SCO Professional displays a list of all the files that are currently linked to the current worksheet. Select the filename from the list and press ⟨Return⟩.

3. SCO Professional then prompts you for the name of the range (in the file that you chose in step 2) that you want to unlink. SCO Professional displays a list of all the range names that are currently linked. Select a range name from the list.

The next example shows the result of dissolving the link in the previous example.

```
A10: (F0) [W18] '  Mail Order                                              READY

RES        A        B    C       D         E         F         G       H
 1                              XYZ Corporation
 2
 3                       Revenues by Selected Products
 4
 5                           ADD      WRITE     DRAW      CALC      Total
 6  REVENUES
 7  Distributors        $50,432    $6,865   $35,920   $43,876   $137,093
 8  Dealers              22,641     4,512    32,741     3,246     63,140
 9  Telemarketing        19,760    92,736    53,876    47,247    213,619
10  Mail Order          129,443
11  Strategics           19,995
12  Retail              199,874
EXT        A        B    C       D         E         F         G       H
 1
 2  Mail Order          129,443    65,003   102,906    38,390    335,742
 3  Strategics           19,995    15,987    59,876       875     96,733
 4  Retail              199,874    87,965   399,865    63,404    751,108
 5
 6
14-Feb-91  08:00 AM
```

The link between the range coordinates A10..C12 in the dependent worksheet and the principal worksheet has been dissolved. The information about the link in cell A10 of the dependent worksheet is no longer displayed in the control panel. SCO Professional no longer updates the dependent worksheet each time a change is made to the corresponding range in the principal worksheet. After the worksheets have been unlinked, any changes made to the data in the dependent worksheet as a result of the link are retained.

≡ Chapter 8

Using Macros

≡ 8

Using Macros

MACROS allow you to replace a single key sequence with a stored series of keystrokes. Instead of typing a series of keystrokes over and over again, you simply type the series once, associate it with a shorter letter sequence, and type the letter sequence whenever you need to use the whole series. Keyboard macros are used for such diverse operations as formatting text, entering values, or directing the movement and position of entries in the worksheet. You can also create repetitive letters or forms by using the /Range Input command in macros to indicate areas where a form requires different entries. For more information about /Range Input, see Chapter 6, "Protecting Data."

Macros can be quite simple or very complex. You can create some extremely sophisticated and powerful macros, which are responsible for specialized applications.

To create these specialized applications, SCO Professional implements a rich macro command language. Many of the characteristics of a programming language are available, such as the ability to create subroutines, pass arguments to subroutines, set variables, and so on.

In fact, the macro feature created by Lotus 1-2-3 has inspired a multitude of application programs that turn SCO Professional into a dedicated program for specific purposes. These applications are on sale at major computer stores. We encourage you to investigate them to see if any would be suitable for you. There are also books devoted to the creation of specialized macros.

8

As you learn to use macros and become skilled in their construction, you will become familiar with the more advanced uses of macros and the concepts behind them. Interactive macros and macro commands are two of the more sophisticated forms of macro usage, with the command language macros being the most powerful. However, with this power comes complexity. Be prepared to spend considerable time learning macros.

This chapter opens with examples of creating simple macros, discusses the more advanced topics involving keyboard macros, and finishes with a discussion of the uses of command language macros.

Contents of This Chapter

This chapter is organized into the following sections:

- "Creating Simple Macros" describes the five steps to designing and using macros (planning, entering, naming, executing, and debugging).

- "Using LEARN Mode" describes how to use the Learn utility to record keystrokes.

- "Using Simple Interactive Macros" explains how to use the {?} command to create interactive macros.

- "Using Auto-Execute Macros" gives the procedure for creating macros that execute each time the worksheet is loaded using /File Retrieve.

- "Using Macro Command Language" discusses the advanced macro command syntax and the five types of advanced macro commands (program flow, data manipulation, keyboard interaction, file manipulation, and screen control).

- "Controlling Program Flow" describes the commands used to change the flow of macro execution, set up conditions, execute subroutines, capture errors, and stop subroutine loops.

- "Manipulating Worksheet Data" discusses the commands used to clear sections of the worksheet, put information in cells, and recalculate rows and columns of information.

■ "Using Keyboard Interaction Macros" explains the commands used to disable and enable the ⟨Break⟩ key, display a prompt and wait for input, pause the macro for a specified length of time, create and use a custom SCO Professional menu, and check the type-ahead buffer for single keystrokes.

■ "Manipulating ASCII Files" describes the commands used to open and close an ASCII file, determine the position of the file pointer, report on the size of the file, and read and write information to and from an ASCII file.

■ "Controlling the Worksheet Screen" explains the commands used to sound the computer's bell, modify the mode indicator, and disable and enable the control panel update and screen redraw functions.

■ "Using /X Commands" discusses the /X macro commands and their functions.

Creating Simple Macros

Developing and using macros are a five-step process:

1. Plan and design the macro.

2. Enter the macro as a label or series of labels in a column.

3. Name the macro using the /Range Name Create command.

4. Invoke the macro by name.

5. Debug the macro (if necessary).

The following sections describe these five steps in more detail.

8

Planning Macros

The first step in using a macro is determining what you want the macro to accomplish. Once you determine the effect you want the macro to have on your worksheet, you must then ascertain the keystrokes required to accomplish it. Test the planned macro by going through each of the steps, entering the keystrokes manually. Record each of the keystrokes (including special keys, cursor-movement keys, and the ⟨Return⟩ key) on a piece of paper as you enter them.

For complicated macros, you may want to construct a flowchart of the macro, documenting the macro's task, determining where decisions are made within the macro, and directing the control of the macro based·on these decisions. Manuals describing accepted procedures for creating and using flowcharts are available at most bookstores.

Once you determine that the sequence of keystrokes accomplishes your task, you are ready to record it as a macro.

Entering Macros

Once you decide what you want the macro to accomplish, you must pick an empty area in your worksheet where you can place the macro. Enter the sequence of keystrokes in label format (preceded by a label-prefix character) into an empty cell. Regardless of whether the keystrokes of the macro are commands or numeric formulas, you must enter the sequence itself in a label cell. Macro cells can also contain string formulas.

When text starts a macro while in the READY mode, SCO Professional recognizes the cell contents as a label and assigns them the /Worksheet Global Label-Prefix or the /Range Layout setting automatically, depending on which setting controls the cell. You can use any of the three standard label-prefixes: ' for left-aligned labels, " for right-aligned labels, and ^ for centered labels. A general rule about macros is that what appears in the cell is what is used as a keyboard macro. However, label-prefixes are ignored when macros are used.

To use a label-prefix in a macro as an instruction to align the text, you must begin the macro with two label-prefixes. The first label-prefix is necessary for the definition of a macro but is ignored by the macro itself. The second label-prefix is interpreted as an ordinary label-prefix when you run the macro.

Using Special Keys in Macros

In addition to numbers and letters, you can also use any one of the special key combinations and cursor movement commands in macro sequences. Almost any keyboard key in a label can be used by the macro. We call these keys SPECIAL KEYS because they cannot be interpreted by single characters.

The following chart lists the key names and functions.

Special Key Functions

Key	Function
~	Return
{?}	Pauses for input until you press Return
{{}	Left brace appears as {
{}}	Right brace appears as }
{~}	Tilde appears as ~
{Abs} or {Absolute}	Absolute function
{Backspace} or {Bs}	Backspaces one character
{Bigleft}	Moves left one screen
{Bigright}	Moves right one screen
{Calc} or {Calculate}	Calculate function
{Del} or {Delete}	Deletes previous character
{Down}	Moves down one cell
{Edit}	Edit function
{End}	Moves to end of data
{Escape} or {Esc}	Escapes

(Continued on next page.)

8

Special Key Functions (*Continued*)

Key	Function
{GoTo}	GoTo function
{Go} {Down}	Moves to last data cell in current column
{Go} {Left}	Moves to first data cell in current row
{Go} {Right}	Moves to last data cell in current row
{Go} {Up}	Moves to top data cell in current column
{Graph}	Graph function
{Home}	Moves home
{Left}	Moves left one cell
{Name}	Name function
{PgDn}	Pages down one screen
{PgUp}	Pages up one screen
{Query}	Query function
{Right}	Moves right one cell
{Table}	Table function
{Up}	Moves up one cell
{Window}	Window function

To use these special keys in a macro sequence, simply type their names surrounded by braces. For example, to indicate the left arrow key, use the {Left} special key. SCO Professional interprets both upper- and lowercase letters as the same.

The cursor movement keys accept number arguments. Number arguments repeat the cursor movement x times, where x is the argument. You must use a space to separate the keyword from the argument. For example, to move left two times, instead of entering {Left}{Left}, you can enter {Left 2}.

■ **NOTE:** If you name a subroutine {Go}, SCO Professional executes the subroutine before any {Go} special keys.

The tilde (˜) character in a macro sequence represents the ⟨Return⟩ key. If a tilde is present in a macro sequence, it means that the macro executes a ⟨Return⟩ during the actual running of the macro.

Use the tilde in the midst of a macro sequence to complete a command or to enter data in a cell just as you use the ⟨Return⟩ key when operating SCO Professional. The tilde may be followed by a new command or data entry. You can also use the tilde in the /X-command macro commands. For more information, see the section "Using /X Commands" later in this chapter.

In the following example, the tilde indicates that the information following the {Right} command should be placed one cell to the right of the first one.

'/wcs12˜"Name˜{Right}/wcs25˜˜Address˜

This macro sets the starting column width to 12 spaces and aligns the label "Name" to the right of the starting cell. Then the cell pointer moves one cell to the right, sets the column width to 25, and centers the label "Address" in the cell.

Using a tilde at the end of a macro sequence is the same as pressing ⟨Return⟩ after typing a value or a label. The ⟨Return⟩ key sets an entry and leaves you free to move on to another cell. If you do not use a tilde, you remain in the midst of the last command of the macro, such as LABEL mode in a cell.

You cannot use macros across the two worksheets. If SCO Professional encounters a macro containing a {Window} command while the worksheet is in External mode, the cell pointer moves to the next window. The macro (in the first window) must contain another {Window} command in the same macro line for the macro to return to the original window and continue executing the series of commands in the macro. If the macro does not contain another {Window} command in the same macro line, the cell pointer remains in the second window and SCO Professional does not execute the macro commands following the {Window} command. For more information about using multiple windows with External mode, see Chapter 7, "Using Multiple Worksheets."

8

Multiple Cell Macros

Some longer macro sequences use many keystrokes. Instead of crowding them all into one label or creating a series of macros, SCO Professional allows you to create a macro sequence using as many cells as you need. Such macros must be created as a range of cells in one column and there can be no blank cells between commands. When a macro encounters a blank cell or a cell containing a number or numeric formula, the macro terminates execution. Each cell used in the construction of a macro sequence must be a label or a string formula.

When you invoke a macro, the macro begins reading labels as the top left-hand cell of the range name that you invoked. Once all the keystrokes in that cell have been executed, SCO Professional checks to see if there is another label in the cell directly below it. If there is, SCO Professional executes that label as part of the same macro. This continues until SCO Professional reads a cell that is not a label and is not a string formula. When SCO Professional reads a non-label or blank cell in the column, the macro terminates.

We suggest that you keep macro sequences manageable by dividing them into sections of not more than 20 to 30 characters per cell. You can divide a sequence at any point between keystrokes.

Documenting Macros

A macro executes a column of labels. If you have a column of empty cells to the right or the left of a macro sequence, you can use this space to make notes (in the form of explanatory labels) for your personal use. You can use these notes to document each step of a macro sequence. Programmers call this COMMENTING.

Some macro commands utilize the cells to the right of the macro. In these situations, we suggest that you use the left column for comments.

```
A3: [W8] ' \S                                                        READY

              A                B                C                D
   1
   2
   3 \S         /wcs12~            Set col-width=12
   4            "Name~             Right-align label
   5            {Right}            Move right
   6            /wcs25~            Set col-width=25
   7            ^Address~          Center label
   8
```

In the example above, column A contains the macro name (\S) and column B contains the actual macro commands. Column C contains the macro documentation.

Naming Macros

The third step in creating a macro is the naming process. Because a macro is simply a range of labels, use the /Range Name Create command to name the macro.

SCO Professional allows you to use any single character (preceded by a backslash (\) character) or a sequence of characters (without the backslash character) to name your macro.

SCO Professional accepts any legal range name as a macro name. As with range names, you can use upper- or lowercase letters when naming macros. SCO Professional stores and displays all letters in uppercase. Macro names can be up to 15 characters long. To avoid confusion with formulas, commands, and labels, do not use space characters or the @, +, -, *, /, and ^ characters. For the same reason, avoid using macro names that look like cell addresses.

There are two different procedures for invoking macros, depending upon whether you use a single-character name or a multiple-character name for your macro. If you use more than one character to name your macro, you must use the Name function to invoke it. If you use a backslash and single character to name your macro, you must use the Execute Macro function to invoke it. Both the Name and Execute Macro functions are described in the next section, "Executing Macros."

To name a macro:

1. Select /Range Name Create.

2. To use a single-character name, enter a backslash (\) followed by a single letter (a-z) at the prompt and press ⟨Return⟩. To use a sequence of characters (without the backslash character) to name your macro, enter the characters at the prompt and press ⟨Return⟩. You can use upper- or lowercase letters when naming macros. However, SCO Professional stores and displays all letters in uppercase.

3. Specify either the address of the cell that contains the macro sequence, or the first cell of the range if the macro is more than one cell. Indicate the range by typing the cell address, or by pointing to it using your arrow keys.

4. Press ⟨Return⟩ to enter the label in its cell.

Whether you execute a macro with a specified range-depth of one cell or more than one cell, the macro continues executing instructions until it reaches an empty cell. Because the macro length may change, we suggest that you specify the range as the first cell.

The macro sequence is now attached to the specified name.

You do not need to name macros to use them. However, a lot of flexibility is lost because, to execute a macro with no name, you must position the cell pointer at the cell with the label. See the following section, "Executing Macros," for more information on how to execute macros without names.

Executing Macros

The fourth step in using a macro is to invoke it. There are two different procedures for invoking a macro, depending upon whether it was named using a single character preceded by a backslash or a sequence of characters.

To execute a macro with a single-character name:

1.   Move to the first cell in which you wish to use the macro.

2.   Press the Execute key and type the single-character macro name.

SCO Professional enters the sequence attached to the single-character macro name as if you entered it yourself. To use the macro again, simply move the cell pointer over to the next cell in which you wish to use the macro, and type the Execute key and the macro name again.

To execute a macro with a multiple-character name:

1.   Move to the first cell in which you wish to use the macro.

2.   Press the Execute key, followed by the ⟨Name⟩ key. SCO Professional displays a list of named ranges (both macro names and range names).

3.   Select a macro name by using the arrow keys or by typing the macro name, and press ⟨Return⟩. You can return to READY mode without selecting a macro name by pressing ⟨Escape⟩ twice.

SCO Professional enters the sequence associated with the macro name as if you entered it yourself.

To use the macro again, simply move the cell pointer over to the next cell in which you wish to use the macro, type the ⟨Name⟩ key and choose the macro name from the list again.

You can use a macro that is not associated with a macro name, but the cell pointer must be positioned in the first cell of the macro.

8

To execute an unnamed macro:

1.   Move the cell pointer to the first cell of the macro.

2.   Press Execute and then press ⟨Return⟩.

SCO Professional executes the macro with the cell pointer.

Macros can be invoked (or used) while in any mode, including the MENU, EDIT, and POINT modes.

Debugging Macros

Because you may run into problems during macro execution, SCO Professional includes a special facility for testing and locating errors in a macro. Testing a macro and correcting the errors are what programmers refer to as DEBUGGING the macro. SCO Professional's testing utility is called the Single-Step mode. In Single-Step mode, SCO Professional executes the macro, one keystroke or command at a time. By checking each step, you can find where the flaws or BUGS (if any) exist.

Using Single-Step Mode

Single-Step mode is particularly useful for pinpointing the exact step where the macro malfunctions. Once you determine the error, you can then edit the macro to correct the problem.

To use the Single-Step mode to debug a macro:

1.   Press the Step key. SCO Professional displays STEP in the lower section of the screen.

2.   Execute the macro that you wish to test.

3.   Advance one keystroke or { } command in the execution of the macro by pressing any key except the macro debugging option keys (b, c, d, l, and q).

SCO Professional displays the label that the macro is currently executing at the bottom of the screen. This allows you to determine the exact location of an error.

When you find the error, you must stop macro execution before you can correct it.

To stop macro execution while in Single-Step mode:

1. If the error does not produce an error message, press the ⟨Break⟩ key (on most systems, ⟨Ctrl⟩c).

    If the error in your macro returns an error message, press ⟨Return⟩ or ⟨Escape⟩ to exit ERROR mode.

Once you locate the error, you can then correct the macro. For more information, see the section "Revising Macros" later in this chapter.

SCO Professional does not exit Single-Step mode automatically when macro execution terminates. You must turn Single-Step mode off manually.

To turn the Single-Step mode off:

1. Press the Step key. If a macro is executing when you turn Single-Step mode off, you must press any key (except the macro debugging option keys — **b, c, d, l**, and **q**) for the macro to continue executing normally.

You can also use the Single-Step mode to stop the execution of an auto-execute macro before it runs. To do this, see the section "Using Auto-Execute Macros" in this chapter.

Using Breakpoints

SCO Professional provides a utility for use with the Single-Step mode to debug macros. This macro debugging utility allows you to designate locations, called BREAKPOINTS, within the macro where you want to enter Single-Step mode. When you set a breakpoint, the macro executes normally until it reaches that breakpoint. Then it pauses and enters Single-Step mode. You can set breakpoints from the READY or MENU mode only.

This utility is useful for debugging long macros. Instead of running through the entire macro one keystroke at a time, which may be cumbersome and time-consuming, you can instruct the macro to execute up to a breakpoint. When the macro finds a breakpoint, it pauses for you to use the Single-Step mode to execute the macro one keystroke at a time. When you find the error, you can turn Single-Step mode off and press any key (except the macro debugging option keys — **b**, **c**, **d**, **l**, and **q**) to continue normal macro execution.

You can also use the macro debugging utility to list and clear these breakpoints, and to halt the macro execution at a particular cell address.

The following table lists the macro debugging utility options and gives a brief description of each:

Macro Debugging Options

Option	Description
b	Sets a breakpoint at the current cell address
c	Clears all current breakpoints
d	Deletes a breakpoint
l	Lists all current breakpoints
q	Halts macro execution at the current cell address and returns to READY mode

To set a breakpoint:

1. Enter Single-Step mode by pressing the Step key. The STEP indicator appears at the bottom of the screen.

2. Execute the macro that you wish to debug. Remember that, while in Single-Step mode, you must press any key except the macro debugging option keys (**b**, **c**, **d**, **l**, and **q**) to move through the macro one step at a time.

3. Press the **b** key at the place where you wish to set a breakpoint. SCO Professional prompts you for the cell address where you wish to set the breakpoint.

4. Press ⟨Return⟩ to set the breakpoint at the default cell address (the cell in which the cell pointer currently resides), or select another cell address by moving the cell pointer to the cell, or range, where you want to place the breakpoint, and press ⟨Return⟩.

Once you select a breakpoint, the macro continues executing in Single-Step mode. You can turn Single-Step mode off and continue executing the macro normally by pressing the Step key and then pressing any key (except the macro debugging option keys — **b, c, d, l,** and **q**). You can also terminate macro execution entirely and return to READY mode by pressing the **q** key.

To display a list of all currently set breakpoints, delete a specific breakpoint, or clear all the breakpoints:

1. Enter Single-Step mode.

2. Execute the macro.

3. Press **l** (to list the breakpoints), **d** (to delete a specific breakpoint), or **c** (to clear all the breakpoints) at any point.

4. If you selected **d**, SCO Professional displays a list of the current breakpoints in the control panel. Select a breakpoint to delete by moving the highlight to the desired breakpoint and pressing ⟨Return⟩.

Once you set a breakpoint, you can use it during macro execution to enter Single-Step mode at that location.

8

To use a breakpoint to enter Single-Step mode:

1. Invoke the macro. The macro executes until it reaches a cell address with a breakpoint. When a breakpoint is reached, you enter Single-Step mode for the duration of macro execution.

    ■ NOTE: You remain in Single-Step mode until you press the Step key to turn off Single-Step mode. You must then press any key (except the macro debugging option keys — **b, c, d, l,** and **q**) to continue normal macro execution.

In addition to setting breakpoints, you can use the {?} command to pause a macro at a specific location.

To pause a macro using the {?} command:

1. Insert the {?} command in your macro at the point where you want to pause your macro.

2. Invoke the macro. When the macro reaches the {?} command, macro execution pauses.

3. Enter the Single-Step mode (by pressing the Step key).

4. Press ⟨Return⟩ to continue execution of the macro in Single-Step mode.

Revising Macros

SCO Professional recognizes a macro sequence by its range name (the character or sequence of characters it is associated with) rather than by any special attribute regarding its contents. Because you enter macros as labels in the worksheet, you can reenter and edit them the same way you edit all other worksheet cells.

To edit a macro:

1.   Move the cell pointer to the cell in the macro that you want to edit.

2.   Press the ⟨Edit⟩ key. You enter EDIT mode. Both the edit and status lines display the current value or label, and a cursor appears at the end of the entry in the edit line.

3.   Move the cursor to any character of the entry and edit it.

4.   Press ⟨Return⟩ to enter the newly edited version.

■ NOTE: If you delete a special key, you must delete all characters that define that keystroke. (For example, if you used the macro function { Down }, you must erase the braces as well as the function key.)

Do not delete the label-prefix character.

You can also use the /Move command to move the labels, with their associated named range. For more information, see Chapter 4, "Copying and Moving Worksheet Data."

Interrupting Macros

At any time during the execution of a macro, you can interrupt the macro and return to READY mode. To do this, press the ⟨Break⟩ key.

When you interrupt a macro from executing, the mode indicator changes to ERROR and SCO Professional displays BREAK in the lower left corner of the screen. Press ⟨Return⟩ or ⟨Escape⟩ to return to READY mode.

8

■ NOTE: If your terminal is a Wyse 60, you cannot use the ⟨Break⟩ key to interrupt a macro unless your terminal is plugged in through the modem port.

If your terminal does not have a ⟨Break⟩ key (or your Wyse 60 is not plugged in through the modem port), press ⟨Ctrl⟩c.

If you press ⟨Break⟩ and the macro continues to execute, then the ⟨Break⟩ key has been mapped to a key sequence other than ⟨Ctrl⟩c in the terminal configuration. You must use the new key sequence to stop the macro from executing. See the *SCO Professional Configuration Guide* for more information on terminal configuration and mapping key sequences.

Using LEARN Mode

SCO Professional includes a function that prompts you for a range name, records your keystrokes as labels in cells, and displays these cells in a single-column range. This function is called LEARN mode. LEARN mode dramatically reduces the number of rules and conventions that the user must learn to enter and invoke macros. It also reduces the probability of introducing a bug or unanticipated result of the macro by keyboard entry errors. If you use the LEARN mode to enter and execute macros, you can ignore the sections "Creating Simple Macros" and "Naming Macros" earlier in this chapter.

To set up the LEARN mode parameters, select the /Learn command. SCO Professional displays the Learn menu. The following table lists each of the Learn menu commands.

Learn Menu Commands

Command	Description
Create	Specifies a name and range for your macro
Erase	Removes the contents in a particular range
Appends	Appends new macros to the specified range

Creating Macros with LEARN Mode

To use LEARN mode to specify the macro name and range:

1. Select /Learn Create. SCO Professional prompts you for a single-character macro name.

2. Name the macro by entering a single character at the prompt and pressing ⟨Return⟩. SCO Professional inserts the backslash (\) character automatically. SCO Professional then prompts you for a cell range.

3. Specify a range.

Because each macro must be built in a single column, the range-width always defaults to one column. If you specify a range-width of more than one column while setting LEARN mode parameters, SCO Professional ignores the width.

If you specify the macro range as more than one cell deep while setting LEARN mode parameters, SCO Professional does not record keystrokes outside the multiple-cell address. Therefore, if you plan to expand the macro, specify the range-depth as a single cell (the first cell in your macro range).

> ■ **NOTE:** To ensure that a macro created in LEARN mode terminates properly, the cell immediately below the macro must be blank.

Recording Keystrokes Using LEARN Mode

8

Once you have entered a single-character range name and a cell address for a new macro, you must enter LEARN mode to begin recording keystrokes.

To record your keystrokes in LEARN mode:

1. Press the Learn key. SCO Professional displays LEARN in the bottom portion of the screen. While LEARN is displayed on the screen, SCO Professional records all the keystrokes that you enter and formats them as left-justified labels.

2. Enter the keystrokes that you wish to record in your macro.

3. Exit LEARN mode by pressing the Learn key again.

Macros created in LEARN mode are identical to other macros with single-character names. To execute the macro, press the Execute key and the single-character macro name that you entered using the Create command. For more information on how to invoke macros, see the section "Executing Macros," earlier in this chapter.

Appending Macros in LEARN Mode

Once you have created a macro in the specified range using LEARN mode, you can append additional keystrokes to the range for execution by the macro.

To append keystrokes to an existing macro range:

1. Select /Learn Append.

2. Press the Learn key to append new keystrokes to the current range.

3. Exit LEARN mode by pressing the Learn key again.

Instead of replacing the contents of the current range, the new macro commands are appended to the current macro.

Erasing Macros in LEARN Mode

If you used the Append command to add to a macro in a specified range and you decide later that you want to use that range for another macro, SCO Professional continues to append to the original macro.

To substitute a new set of keystrokes in an existing range:

1. Select /Learn Erase. This erases the current learn range, and moves the cell pointer to the first cell of the range.

2. Enter LEARN mode by pressing the Learn key.

3. Enter the new keystrokes.

4. When you finish, press the Learn key again to exit LEARN mode.

The original macro's name and range are now associated with the new keystrokes.

■ **NOTE:** To create a new macro in a range that has already been specified, you do not need to select Erase unless you previously used the Append command. Erase is the default mode.

Using Simple Interactive Macros

8

You can create simple macros that interact with input from the keyboard. The simplest way to create an interactive macro is to insert a {?} command in your macro sequence. When SCO Professional encounters a {?} command during macro execution, it pauses and waits for input from the keyboard. You can enter anything during the pause. Macro execution is suspended until the ⟨Return⟩ key is pressed. When you press ⟨Return⟩, macro execution resumes with the keystroke immediately following the {?} command.

Whenever SCO Professional encounters the {?} during a macro operation, the letters CMD appear before the mode indicator. When you press ⟨Return⟩, SCO Professional erases CMD and continues to run the macro.

Using Auto-Execute Macros

To invoke a macro every time the file is retrieved, name the range \0, and then save the file. This creates an AUTO-EXECUTE MACRO. Macros using the range name \0 are invoked automatically whenever you load the worksheet using the /File Retrieve command.

Macros assigned to 0 (zero) may also be executed using the Execute key, Execute 0, or by positioning the cell pointer over the label, pressing the Execute key and then pressing ⟨Return⟩.

You can stop the execution of an auto-execute macro before it runs by using the Single-Step mode.

To stop an auto-execute macro from running:

1. Enter Single-Step mode *before* retrieving the worksheet.

2. Retrieve the worksheet by selecting /File Retrieve and indicating the file that you want to retrieve.

3. Because SCO Professional is in Single-Step mode, the auto-execute macro does not run until you press a key on the keyboard. Press ⟨Break⟩ (on most systems, ⟨Ctrl⟩c) to stop the macro from executing. You enter ERROR mode.

4. Press ⟨Escape⟩ or ⟨Return⟩ to return to READY mode.

5. Press the Step key to exit Single-Step mode.

■ **NOTE:** If pressing ⟨Break⟩ does not return you to READY mode, the ⟨Break⟩ key has been mapped to a key sequence other than ⟨Ctrl⟩c. You must use the new key sequence to stop the macro execution. See the *SCO Professional Configuration Guide* for more information on terminal configuration.

Using Macro Command Language

In addition to the keyboard macro sequences commands, SCO Professional includes advanced macro commands. These commands extend the capabilities of SCO Professional macros to allow you to do more than simply repeat keystrokes. Use these advanced commands to create command language macros.

The procedures for entering, naming, and invoking these macros is identical to those for the macros discussed previously. For information on how to do this, see the sections "Entering Macros," "Naming Macros," and "Executing Macros" earlier in this chapter.

Syntax of Advanced Macro Commands

The macro commands require proper syntax to operate. SCO Professional macros recognize a specific syntax: if you use an incorrect syntax, SCO Professional does not understand what you mean.

The syntax to advanced macro commands is similar to the syntax of the special key functions described earlier in this chapter. Both of these functions are enclosed in braces.

The syntax of advanced macro commands is:

{*KEYWORD argument1,argument2,argument3*, and so on}

Keywords are displayed in uppercase letters and the arguments are displayed in italics. You must separate the keyword from the first argument with a space. The default separator for subsequent arguments is the comma (,) character. You can also use the semicolon (;) character as an argument separator. You can configure the default argument separator by selecting /Worksheet Global Default Other International Punctuation. See Chapter 5, "Changing the Worksheet Format," for more information. You can enclose parameters in double quotation marks (") if they contain a separator.

8

■ **NOTE:** If you use a space to separate arguments in an advanced macro command, SCO Professional returns an error.

Command language macros can use four different argument types: string, location, value, or condition. A string argument is a sequence of up to 240 characters enclosed in double quotation marks ("). If you do not enclose strings in quotation marks, SCO Professional can confuse them for range names.

The location argument can be a cell address, a range address, or a range name. The value argument can be either a single number or a formula that evaluates to a numerical value. The condition argument is an expression that tests a condition.

In certain command language macros, you can specify an argument type by following the argument with a *:type*, where *type* is either string or value. If you use the *:type* argument, you must use the colon (:) character to separate the argument from the type. If a string argument or range name contains a colon character, you must use double quotation marks to enclose it.

You can write keywords and arguments in both upper- and lowercase letters. This guide distinguishes between them by using uppercase characters for keywords and lowercase italic characters for arguments.

Many advanced macro commands change the contents of one or more cells in the worksheet. The instructions that modify the worksheet put it in a special CALC mode. The worksheet does not show new values until the macro encounters ⟨Return⟩ or a cursor movement key. When the macro encounters a (˜) or cursor movement command, SCO Professional updates the worksheet.

Types of Advanced Macro Commands

The advanced macro commands fall into five functional categories: program flow, data manipulation, keyboard interaction, file manipulation, and screen control.

The program flow commands determine and control the execution of macros. Use program flow commands to change the flow of macro execution, set up conditions, execute subroutines a specified number of times, stop looping subroutines, and capture system errors.

Using the data manipulation commands you can manipulate worksheet data from within the command language macro. You can use data manipulation commands to clear areas on the screen, copy information to specific cells, and recalculate specific sections of the worksheet.

The keyboard interaction commands allow the macro to interact with information entered by the user from the keyboard. Using keyboard interaction commands, you can pause the macro for input from the keyboard, disable and enable the ⟨Break⟩ key, display a prompt and wait for input, check the type-ahead buffer for single keystrokes, create custom SCO Professional menus and use them, and pause the macro for a specified length of time.

The file manipulation commands allow you to use files from within a macro. Use file manipulation commands to open and close specified files, check and change the position of the file pointer in an open file, report on the size of an open file, and read information from and write information to an open file.

The screen control commands allow you to modify the display of the screen. You can instruct a macro to beep, change the mode indicator, and disable and enable the control panel update as well as screen redraw functions.

8

The following table lists the advanced macro commands in alphabetical order and indicates the category to which each belongs:

Advanced Macro Commands

Macro	Category
{?}	Keyboard interaction
{BEEP}	Screen control
{BLANK}	Data manipulation
{BRANCH}	Program flow
{BREAKOFF}	Keyboard interaction
{BREAKON}	Keyboard interaction
{CLOSE}	File manipulation
{CONTENTS}	Data manipulation
{DEFINE}	Program flow
{DISPATCH}	Program flow
{FILESIZE}	File manipulation
{FOR}	Program flow
{FORBREAK}	Program flow
{GET}	Keyboard interaction
{GETLABEL}	Keyboard interaction
{GETNUMBER}	Keyboard interaction
{GETPOS}	File manipulation
{IF}	Program flow
{INDICATE}	Screen control
{LET}	Data manipulation
{LOOK}	Keyboard interaction
{MENUBRANCH}	Keyboard interaction
{MENUCALL}	Keyboard interaction
{ONERROR}	Program flow
{OPEN}	File manipulation

(Continued on next page.)

Advanced Macro Commands (*Continued*)

Macro	Category
{PANELON}	Screen control
{PANELOFF}	Screen control
{PUT}	Data manipulation
{QUIT}	Program flow
{READ}	File manipulation
{READLN}	File manipulation
{RECALC}	Data manipulation
{RECALCCOL}	Data manipulation
{RESTART}	Program flow
{RETURN}	Program flow
{SETPOS}	File manipulation
{SUBROUTINE}	Program flow
{WAIT}	Keyboard interaction
{WINDOWSOFF}	Screen control
{WINDOWSON}	Screen control
{WRITE}	File manipulation
{WRITELN}	File manipulation

The following sections describe these advanced macro commands in detail.

Controlling Program Flow

The advanced macro commands that allow you to control the flow of a macro are called PROGRAM FLOW COMMANDS. With the program flow commands, you can determine the structure, number of executions, and conditions of subroutines within your macro.

8

Program Flow Commands

Command	Function
{BRANCH}	Executes macro instructions in a specific location
{DEFINE}	Specifies the location and type of information to pass to a subroutine call
{DISPATCH}	Redirects macro execution to a specified location
{FOR}	Performs a loop a number of times at a specific location
{FORBREAK}	Terminates the execution of a {FOR} loop
{IF}	If a condition evaluates to true, executes the command following {IF}
{ONERROR}	Allows macro to continue execution if a system error occurs
{QUIT}	Terminates macro execution
{RESTART}	Terminates execution of the current subroutine and clears the subroutine stack
{RETURN}	Terminates the execution of the current subroutine and returns macro execution to calling routine
{*subroutine*}	Calls a subroutine

{BRANCH}

The {BRANCH} command allows you to redirect the flow of the macro. {BRANCH} transfers macro execution at the current address to the new location.

The syntax of {BRANCH} is:

   {**BRANCH** *location*}

The *location* argument is the new location (cell address or range name) where you want macro execution to continue. If *location* is a range name,

SCO Professional immediately reads the new keystrokes beginning with the upper left cell of that range.

The {BRANCH} command differs from the {GoTo} command in that {BRANCH} changes the flow of macro execution but does not move the cell pointer. {GoTo} moves the cell pointer but does not affect the execution flow.

The following example shows how you can use the {BRANCH} command:

```
B3: '{IF B1<500}{BRANCH LOW}                              READY

        A              B              C              D
1                     499
2
3\A
4              High¨
5
6LOW           Low¨
7
8
```
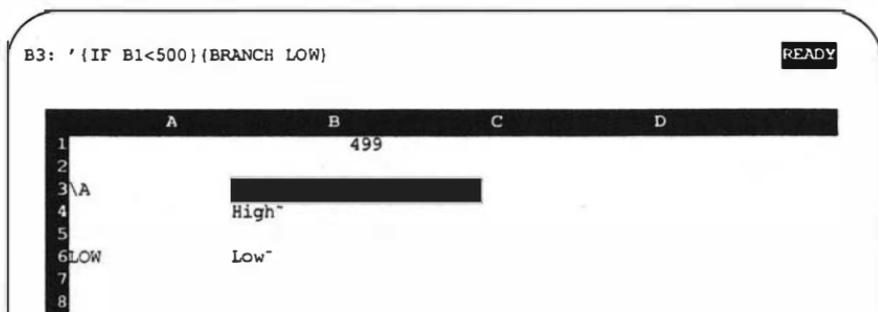
If the value in cell B1 is less than 500, the \A macro branches to LOW and stores the word *Low* in the current cell. If it is greater than 500, the macro skips the {BRANCH} command and stores *High* in the current cell.

■ NOTE: The {BRANCH} command is not a subroutine call. If you use {BRANCH} to alter macro execution flow, and you want to return to the original macro routine, you must use another {BRANCH} command.

8

{DEFINE}

The {DEFINE} command allows you to determine the location and type of information that you want to pass to a subroutine. The {DEFINE} command must be the first command issued by the subroutine.

The syntax of {DEFINE} is:

> {**DEFINE** *location1:type1,location2:type2...*}

The *location* arguments are the cells where SCO Professional stores values that you want to pass to the subroutine. These arguments can be either cell addresses or range names. If you specify a range name that refers to more than one cell, SCO Professional stores the information in the upper left cell of that range.

The *type* argument determines whether the information is to be evaluated or stored as a simple string. If you do not specify a *type*, or you specify the type as a :string, SCO Professional stores the information as a left-justified label. If you specify *type* as :value, the information is evaluated and stored in *location* as a value. If you declare a label as a value, SCO Professional returns an error message.

Use a {DEFINE} statement to determine the location and the type of arguments to pass to the subroutine. To specify A1..A4 as locations for SCO Professional to store four arguments as values, use the following {DEFINE} statement:

> {**DEFINE A1:value,A2:value,A3:value,A4:value**}

The {DEFINE} command specifies that the four cells, A1..A4, are to contain values. If any of the arguments that the subroutine passes to these cells is a formula, SCO Professional evaluates the formula before placing it in the appropriate cell. If any of the arguments is a label, SCO Professional returns an error message. The subroutine call must have four arguments to pass to the four locations.

The following example shows how you can use the {DEFINE} command to specify that the contents of cell AA1 is a label.

```
B1: '{GETLABEL "Sort the database? (Y/N) ",A20}                          READY

          A         B         C         D         E         F         G         H
1 \A         {GETLABEL "Sort the database? (Y/N) ",A20}
2            {IF @UPPER(A20)="Y"}{SORTDB B20)
3
4
5 SORTDB    {DEFINE AA1:label}
6
7
```

The \A macro tests a condition and, if true, calls the subroutine SORTDB. The parameter (the range to be sorted) is passed to SORTDB in the cell B20, and then placed in the cell AA1 before running the subroutine SORTDB.

{DISPATCH}

The {DISPATCH} command allows you to redirect the flow of the program to a specified location.

The syntax of {DISPATCH} is:

   {**DISPATCH** *location*}

The *location* argument is a cell address or range name. The contents of the address should be a cell address or range name. The macro executes the

keystrokes at the cell address (or the first cell of the range name) desig-
nated by the location. If *location* is blank, or contains a numeric value,
SCO Professional terminates macro execution and returns the control to the
user.

The {DISPATCH} command differs from {BRANCH} in that {BRANCH}
executes the commands in *location* only, while {DISPATCH} interprets the
contents of *location* as a {BRANCH} to determine the flow of the macro.
If you specify *location* as a range of more than one cell, {DISPATCH} uses
the cell in the upper left-hand corner of the range.

The following example shows how you can use the {DISPATCH} com-
mand:

    {DISPATCH A20}

If the contents of cell A20 are either a cell address or a range name, the
macro branches to the new area specified in A20 and continues processing.
If no location is specified, or the cell specified in location contains a
numeric value, macro execution terminates.

{FOR}

The {FOR} command performs a loop at a specific location for a specific
number of times. It is similar to what most programming languages call a
For-Next.

The syntax of {FOR} is:

    {FOR *counter,start,stop,step,starting_location*}

The *counter* argument is a cell address in the worksheet. The {FOR} com-
mand uses this cell to count the number of iterations to perform the loop.
When the number of iterations in *counter* exceeds the value specified with
the *stop* argument, the {FOR} loop ends.

The *start* argument gives *counter* its initial value. The *stop* argument indi-
cates the end of the {FOR} loop. The *step* argument determines how much
the *counter* increases with each loop. The *starting_location* argument is a
cell address or range name that specifies the location of the subroutine that
you want to execute.

■ **NOTE:** If you use the {QUIT} command to stop a {FOR} loop, {FOR} terminates after the first pass. Use {RETURN} or {FORBREAK} to terminate a {FOR} loop.

The following example shows how you can use a {FOR} loop.

```
B1: '{FOR F20,1,20,1,E}                                          READY

        A        B          C        D        E        F        G        H
 1 \F        {FOR F20,1,20,1,E}
 2
 3 E         {IF @cellpointer("contents")=0}{FORBREAK}
 4           /RE¬{RIGHT}
 5
```

The \F macro checks the contents of the current cell. If the contents of the current cell are not zero, \F erases them, and moves one cell to the right. The macro continues for the next 20 columns in the row unless one of the cells contains a zero. If this happens, the {FORBREAK} command terminates the {FOR} loop.

{FORBREAK}

Use the {FORBREAK} command to interrupt the execution of a {FOR} loop before it reaches the stop value. Processing continues at the first character after the {FOR} command.

The syntax of {FORBREAK} is:

{FORBREAK}

The {FORBREAK} command takes no arguments.

8

■ **NOTE:** Do not use {FORBREAK} in subroutines called by any command other than {FOR}. If you use {FOR-BREAK} in other subroutines or in the main macro, SCO Professional returns an error message.

For an example of {FORBREAK}, see the example for the {FOR} command.

{IF}

The {IF} command tests a condition. If the condition evaluates to true, {IF} executes the macro command immediately following on the same line. If the condition evaluates to false, {IF} ignores the macro command and continues in the next cell down.

The syntax of {IF} is:

> {**IF** *condition*}*macro commands*

The *condition* argument can be a formula, function, or name of a cell that contains a formula. If *condition* is a numeric value, it is considered true unless it evaluates to zero. SCO Professional considers blank cells, NA, ERR, and string values as zero.

The following example shows how you can use the {IF} command to test a condition.

> **{IF A16>26}{BRANCH TEST}**
> **{BRANCH CONTINUE}**

In this example, the {IF} command tests to see whether the contents of cell A16 are greater than 26. If the condition evaluates to true, SCO Professional executes the next instruction and redirects the flow of macro execution to a range named TEST. If the condition evaluates to false, SCO Professional executes the command in the next cell, redirecting the flow of macro execution to a range named CONTINUE.

{ONERROR}

The {ONERROR} command allows the macro to continue execution even if a system error occurs. The {ONERROR} command allows you to capture the error message in a specific message location, and then branches to a new location and continues macro execution. (Syntax errors in the parameter list of a macro command halt the macro but do not take the {ONERROR} branch.)

The syntax of {ONERROR} is:

{**ONERROR** *location,message_location*}~

The *location* argument is the specific cell address where you want macro execution to continue after {ONERROR} encounters a system error. The optional *message_location* argument is the cell address where you wish to capture the error message generated by the error condition.

The following example shows how you can use the {ONERROR} command to capture a system error message.

```
B1: '{ONERROR NOFILE,A7}                                    READY

        A        B         C        D        E        F        G        H
1 \A        {ONERROR NOFILE,A7}
2           /fr{?}~
3
4 NOFILE    {GETLABEL "No such filename, try again ",A20}
5           {BRANCH B1}
6
7
```

The \A macro prompts for a file to retrieve. If the filename does not exist, \A captures the error message in cell A7 and continues executing at the range named NOFILE. NOFILE prompts you to try again, and branches back to the \A macro.

{QUIT}

The {QUIT} command terminates macro execution.

The syntax of {QUIT} is:

   {QUIT}

The {QUIT} command takes no arguments.

You can use {QUIT} to document the end of a macro, stop a loop, and to terminate macro execution.

The following example shows how you can use {QUIT} to terminate a macro with a condition:

   \Q   {IF A5<12}{QUIT}

The macro \Q tests the condition to determine whether the contents of A5 are less than 12. If A5 is less than 12, the {QUIT} command terminates macro execution.

{RESTART}

The {RESTART} command clears the subroutine stack. The macro then halts when it encounters a non-label or non-string-valued cell.

The syntax of {RESTART} is:

   {RESTART}

The {RESTART} command takes no arguments.

Subroutines can call up to 31 new subroutines. Each time a macro calls a subroutine, SCO Professional keeps track of the subroutine layers (stack). When a subroutine ends, SCO Professional returns to the calling routine.

A stack is created with the subroutine commands {*subroutine*} and {MENUCALL}. The {RESTART} command clears the subroutine stack so that macro execution does not return to the calling routines. SCO Professional continues to execute any instructions that follow a {RESTART} command.

When you use {RESTART}, macro execution terminates at the first non-blank, or the first {RETURN} command. Because {RESTART} clears the stack, {RETURN} does not know where to return, and the macro terminates.

The following example shows how you can use the {RESTART} command to terminate the current subroutine and clear the subroutine stack.

>   {IF counter>0} {RESTART}
>   ...
>   ...
>   ...
>   {RETURN}

In this subroutine, if counter is less than 0, the subroutine continues to execute until it reaches {RETURN}. If counter is greater than 0, the macro executes the {RESTART} command.

{RETURN}

The {RETURN} command terminates the current subroutine and returns the macro execution to the original calling routine.

The syntax of {RETURN} is:

>   {RETURN}

The {RETURN} command takes no arguments.

Use the {RETURN} command with the subroutine commands {*subroutine*} and {MENUCALL} to cancel the instructions of the current subroutine. The {RETURN} command differs from {RESTART} in that {RETURN} does not clear the subroutine stack. The {RETURN} command differs from {QUIT} in that {QUIT} terminates macro execution while {RETURN}

8

terminates the subroutine but continues executing instructions in the calling routine.

If you end a subroutine with a blank cell or a cell containing a numeric value, you do not need to use {RETURN}. The {RETURN} command accomplishes the same thing as the /XR command.

The following example shows how you can use {RETURN} to terminate a subroutine and return macro execution to the calling routine.

```
B1: '{GETLABEL "Sort the data, or quit? (S/Q) ",A18}                    READY

          A          B          C          D          E          F          G          H
1 \S         {GETLABEL "Sort the data, or quit? (S/Q) ",A18}
2            {IF A18="S"}{SORTDB}
3            {IF A18="Q"}{QUIT}
4
5 SORTDB     {GETLABEL "Sort now? Will take a while? (Y/N) ",B18}
6            {IF B18="N"}{RETURN}
7            {SORT}
```

The \S macro calls the subroutine SORTDB. SORTDB asks whether the user wants to sort the data now. If the user enters N at the prompt, the {RETURN} command returns from the subroutine SORTDB to the calling routine \S; otherwise, the subroutine SORT is called.

{*subroutine*}

The {*subroutine*} command allows you to call another macro to run as a subroutine of the original macro.

The syntax of {*subroutine*} is:

> {*subroutine argument1,argument2...*}

The {*subroutine*} is a range name assigned to a single cell. The *arguments* are optional values or strings that you want to pass to the subroutine. The arguments are used for input only (and not output). If you specify an *argument*, you must use a {DEFINE} statement to specify a corresponding entry.

To call a {*subroutine*}, simply enter the range name of the specific macro in brackets. You can use this command to call the {*subroutine*} as many times as you need to during macro execution.

You can use {*subroutine*} to call other subroutines. When you call a subroutine from within a subroutine, this layering is called a SUBROUTINE STACK. SCO Professional allows you to "stack" up to 31 consecutive subroutines. You can end a subroutine with a {RETURN} command, an /XR command, or a non-label or non-string-valued formula.

■ **NOTE:** When calling a subroutine, do not use one of the key names, such as {Calc} and {Edit}, to name it. If you use one of these key names, SCO Professional executes the subroutine, not the key name function.

The following example shows how you can use {*subroutine*} to call a subroutine.

> \A   {IF A16>26}{TEST}
> {CONTINUE}

The \A macro tests to see whether the contents of cell A16 are greater than the value 26. If the condition evaluates to true, SCO Professional executes the next instruction and executes the subroutine TEST. If the condition evaluates to false, SCO Professional executes the subroutine CONTINUE.

Manipulating Worksheet Data

8

The advanced macro commands that allow you to manipulate information stored in worksheet cells are called DATA MANIPULATION commands. Using these data manipulation commands, you can store character strings or values in worksheet cells, recalculate specific sections of the worksheet, and erase contents of cells or ranges.

Data Manipulation Commands

Command	Function
{BLANK}	Erases the contents of a cell or range of cells in a location
{CONTENTS}	Stores the contents of a cell as a formatted label in a location
{LET}	Stores a number or string in a specific location
{PUT}	Places a value in a location within a range
{RECALC}	Recalculates the formulas in a specified range of rows
{RECALCCOL}	Recalculates the formulas in a specified range of columns

{BLANK}

The {BLANK} command allows you to erase the contents of a cell or a range of cells in a specified location.

The syntax of {BLANK} is:

   {BLANK *location*}⁓

The *location* argument is a cell address, a range of cell addresses, or a range name. The {BLANK} command accomplishes the same effect as using the /Range Erase command. However, the {BLANK} command is faster because it does not force redrawing of the screen. The /RE command allows you to pause the macro for user-input while {BLANK} does not.

The {BLANK} command does not affect protection settings or numeric or width format.

The following example shows how you can use the {BLANK} command:

```
B2: '{BLANK C1..H1}                                              READY

    1
    2 \B      {BLANK C1..H1}
    3         {GoTo}C1~
    4         {LET C1,BLANK:LABEL}~
    5
```
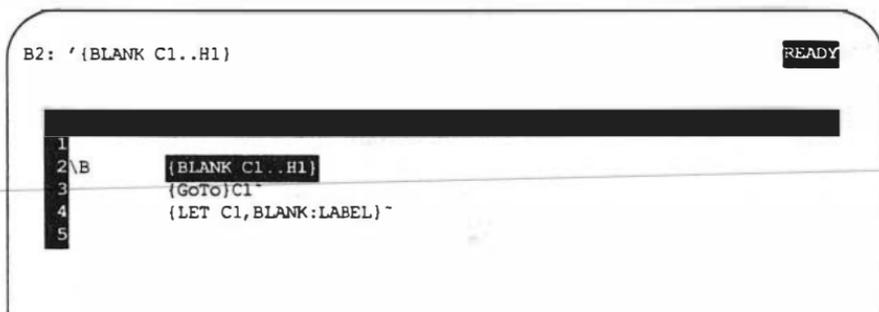
The \B macro uses the {BLANK} command to clear the range C1..H1. When the range is clear, the macro moves the cell pointer to cell C1 and puts the word "BLANK" as a label in the upper left cell of the range C1..H1.

{CONTENTS}

The {CONTENTS} command allows you to store a label or numeric value as a label in a specific format.

The syntax of {CONTENTS} is:

> {**CONTENTS** *destination,source,width,format*}

The *destination* argument is the cell address or range name of the location where you want to store the label. The *source* argument is the cell address or range name of the location of the numeric value that you want to store as a label.

The *width* and *format* arguments are optional. If you specify a *format*, you must use the *width* argument; however, you can specify a *width* without specifying a format. Use *width* to specify the width of the label entry. If you do not specify *width*, {CONTENTS} uses the width of the *source* value.

The *format* argument is a code number that corresponds to the settings used by the /Range Format command. Use the *format* argument to specify the exact format of the string placed in *destination*. The following table describes the format that each of the code numbers represents:

Format Code Numbers

Code	Format
0-15	Fixed format with 0 to 15 decimal places
16-32	Scientific format with 0 to 15 decimal places
33-47	Currency format with 0 to 15 decimal places
48-63	Percent (%) format with 0 to 15 decimal places
64-79	Comma (,) format with 0 to 15 decimal places
112	Horizontal bar graph (+/-) format
113	General format
114	Date (D1) format (DD-MMM-YY)
115	Date (D2) format (DD-MMM)
116	Date (D3) format (MMM-YY)
117	Text format (display formulas as entered)
118	Hidden format (cell's contents do not appear on the screen)
119	Date (D6) format (HH:MM:SS AM/PM)
120	Date (D7) format (HH:MM AM/PM)
121	Date (D4) format (long international date display)
122	Date (D5) format (short international date display)
123	Date (D8) format (long international time display)
124	Date (D9) format (short international time display)
127	Worksheet default numeric display format

The following example shows how you can use the {CONTENTS} command:

```
C17: [W1] '{CONTENTS G16,G15,12,117}                                    READY

           A       B      C        D        E        F        G       H
    13
    14
    15    TOTAL REVENUES  $442,145 $273,068 $685,184 $197,038 $1,597,435
    16
    17\C            {CONTENTS G16,G15,12,117}
    18
    19
```
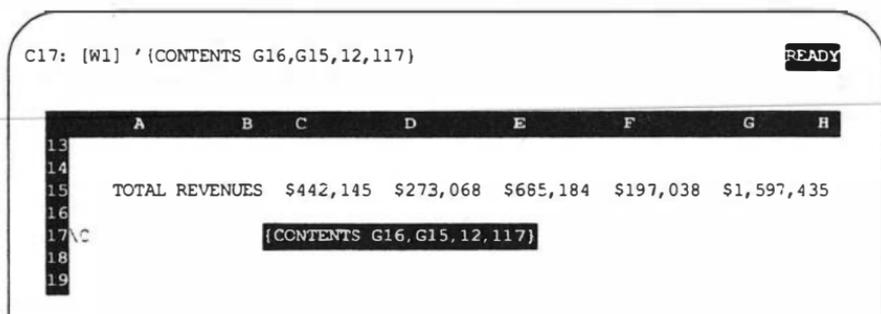
The \C macro uses the {CONTENTS} command to copy the formula from cell G15 and places it in cell G16 as a label with a width of 12 characters.

{LET}

The {LET} command allows you to put a number or a string entry in a specific location on the worksheet.

The syntax for {LET} is:

> {LET *location,entry :type*}

The *location* argument is a cell address or range name of the location where you want to put the value or label entry. If you specify a range name for the *location*, {LET} places the entry in the upper left cell of the range.

The *entry* argument can be a numeric value or a formula that results in a value, or a string or string formula. If *entry* is a numeric value, {LET} stores the number entry in *location*. If *entry* is a string value, {LET} stores the string as a label in *location*. If you do not specify the type using the *type* argument, SCO Professional attempts to distinguish and evaluate string and numeric values. If SCO Professional cannot evaluate *entry* as either a string or numeric value, {LET} places the *entry* characters in *location* as a label.

You can use the optional *:type* argument to distinguish a label from a range name. Use either *string* or *value* to specify the *:type*. If you specify *entry* as *string*, {LET} places the *entry* in *location* as a label. If you specify *entry* as *value*, {LET} evaluates *entry* as a value, cell address, or range name.

The following example shows how you can use the {LET} command in a macro:

     \L   {GoTo}C1⁻
                 {LET C1, 10+20}

The \L macro moves the cell pointer to cell C1 and uses the {LET} command to place the value 30 in cell C1.

{PUT}

The {PUT} command allows you to place a value in a location within a range.

The syntax of {PUT} is:

    {**PUT** *location,column,row,entry :type*}

The *location* argument can be a range name or specific cell addresses. Enter a single cell address only if the values for both *column* and *row* are equal to zero. If they are not, SCO Professional returns an error message.

The *column* argument is the column number, and the *row* argument is the row number within the range. The first column and first row of the range specified in *location* are numbered zero. The *entry* argument is the number or string that you want to store in *location*.

When you do not specify the type using the *type* argument, {PUT} determines if *entry* is a number, formula, cell address, or range name. If {PUT} cannot evaluate *entry*, it places the *entry* characters in *location* as a label.

You can use the optional *:type* argument to distinguish a label from a range name. Use either *string*, *value*, or *label* to specify the *:type*. If you specify *entry* as a *string*, {PUT} places the *entry* in *location* as a string. If you

specify *entry* as a *value*, {PUT} evaluates *entry* as a value, cell address, or range name.

The {PUT} command differs from {LET} in that {PUT} allows you to specify a range of column and row offset numbers in which to put the value, while {LET} places the entry in a location with a specific cell address.

The following table gives examples of several {PUT} commands and their results:

{PUT} Commands

Command	Result
{PUT A1..H5,0,0,4*16:value}	Places the number 64 in cell A1 as a value.
{PUT A2..L8,2,3,HELLO:label}	Places the word "HELLO" in cell C4 as a left-justified label.
{PUT A1..H5,1,3,ERROR:label}	Returns an error because the offset is out of bounds.

{RECALC}

The {RECALC} command recalculates the formulas in a specified range, one row at a time, from the top of the range down.

The syntax for {RECALC} is:

{**RECALC** *location,condition,iterations*}

8

The *location* argument is the range of the worksheet that you want to recalculate.

The *condition* and *iterations* arguments are optional. Use the *condition* argument to specify what must be true for the {RECALC} command to stop recalculating the formulas in the *location* range. SCO Professional recalculates the range as long as *condition* is false.

Use *condition* with the *iterations* argument to specify the maximum number of times that you want SCO Professional to recalculate the formulas in the range (as long as *condition* is false). The *iterations* argument is decremented once each time the range is calculated. Recalculation continues until *condition* is true, or until *iterations* becomes zero, whichever comes first.

When the worksheet is in automatic recalculation mode, each time you make an entry, SCO Professional recalculates the formulas on the worksheet. If a worksheet is very large, automatic recalculation slows down the functions for the entire worksheet. You can turn off the automatic recalculation by selecting /Worksheet Global Recalculation Manual. When your worksheet is in manual recalculation mode, you must press the ⟨Calculate⟩ key to update the worksheet.

With recalculation set to manual, you must include the {Calc} command in your macro to force a recalculation. However, {Calc} instructs SCO Professional to recalculate the entire worksheet. Use {RECALC} or {RECALCCOL} to limit recalculation to specific sections of your worksheet.

The following examples show how you can use {RECALC} to recalculate a range of rows:

    \R   {RECALC COMMISSION}

    \S   {RECALC A10,A10=.5,15}

The \R macro recalculates a range named COMMISSION. The \S command recalculates the formula in cell A10 until it is equal to .5, or until it has been recalculated 15 times.

{RECALCCOL}

The {RECALCCOL} command is the same as the {RECALC} command except that it recalculates the formulas in a specified range, one column at a time, from the left to the right of the range.

■ **NOTE:** The {RECALCCOL} command is needed if the formula is above and to the right of a value that has changed. If the formula is above and to the left of the changed value, the {Calc} command is the only way to calculate the correct value.

Using Keyboard Interaction Macros

The KEYBOARD INTERACTION commands are commands that allow the user to interact with the macro through the keyboard. Using these commands, you can pause the macro for the user to enter a single character or a string from the keyboard; disable and enable the ⟨Break⟩ key; display a prompt and wait for input of a string or value; create custom menus and use them; check the type-ahead buffer for a single keystroke; or pause the macro for a length of time.

Keyboard Interaction Commands

Command	Function
{?}	Pauses macro and waits for input from the keyboard
{BREAKOFF}	Turns off the user's ability to interrupt the macro execution
{BREAKON}	Restores the user's ability to interrupt macro execution

(Continued on next page.)

8

Keyboard Interaction Commands (*Continued*)

Command	Function
{GET}	Pauses macro execution and stores a single keystroke in a specified location
{GETLABEL}	Pauses macro execution, displays a prompt, and stores the entered keystrokes as a label in specified location
{GETNUMBER}	Pauses macro execution, displays a prompt, and stores the entered keystrokes as a number in specified location
{LOOK}	Checks for keyboard input during macro execution and places a single keystroke in specified location
{MENUBRANCH}	Branches to a custom SCO Professional menu, selects a menu item, and executes the corresponding macro
{MENUCALL}	Selects a custom menu item and executes the corresponding macro as a subroutine call
{WAIT}	Pauses macro execution for a specified length of time

{?}

The {?} command suspends macro execution until the user presses the ⟨Return⟩ key.

When SCO Professional encounters a {?} command during macro execution, it pauses and waits for input from the keyboard. The user can enter anything during the pause. When the user presses ⟨Return"⟩, macro execution resumes with the keystroke immediately following the {?} command.

The syntax of {?} is:

        {?}

The {?} command takes no arguments.

For more information about the {?} command, see "Using Simple Interactive Macros," earlier in this chapter.

{BREAKOFF}

The {BREAKOFF} command turns off the ability of the user to interrupt macro execution.

■ **NOTE:** Do not include a {BREAKOFF} command in a macro until it has been thoroughly tested. If the break function is disabled during macro execution and the macro executes an infinite loop, you must use the Abort key or kill the **procalc** process to stop the macro.

The syntax of {BREAKOFF} is:

{**BREAKOFF**}

The {BREAKOFF} command does not take any arguments.

Without the {BREAKOFF} command, a user can interrupt the macro at any point during macro execution by pressing ⟨Break⟩. If you include the {BREAKOFF} command in your macro, the macro cannot be stopped using ⟨Break⟩. Use the {BREAKON} command to turn macro interrupt ability back on. {BREAKOFF} remains in effect until a {BREAKON} command cancels it or until the macro ends.

8

{BREAKON}

The {BREAKON} command restores the user's ability to interrupt macro execution. The {BREAKON} command is only necessary if you have used the {BREAKOFF} command to disable macro interruption. By default, users can interrupt the macro at any point during macro execution by pressing ⟨Break⟩.

The syntax of {BREAKON} is:

{BREAKON}

The {BREAKON} command does not take any arguments.

{GET}

The {GET} command stops macro execution, pauses for the user to enter a single keystroke, stores the keystroke in the specified *location* and continues macro execution. The keystroke can be any single alphabetic character, numeric digit, function key, or a special key such as ⟨Edit⟩. Using the {GET} command, you do not need to press ⟨Return⟩ to resume macro execution.

The syntax of {GET} is:

{GET *location*}

The *location* argument is the cell address where you want to store the single keystroke. The {GET} command stores the keystroke as a left-aligned label. If the user enters a movement, function, or special key, the name of the key is entered in *location*.

The following example shows how you can use the {GET} command.

```
A9: 'Sort the database? (Y/N)                              READY

        A        B           C        D        E        F        G        H
1 \G         {GoTo}A9~
2            {GET D9}~
3            {IF @UPPER{GET D9}="Y"}{BRANCH SORTDB}
4            {QUIT}
5
6
7
8
```

The \G macro goes to the cell that contains the prompt (A9). If the user answers Y to the prompt, \G branches to the range SORTDB and performs the sort.

{GETLABEL}

The {GETLABEL} command stops the macro execution, displays a *prompt*, and pauses for the user to enter a response. When the user presses ⟨Return⟩, {GETLABEL} stores the response in the specified *location*, and continues macro execution.

The syntax of {GETLABEL} is:

{**GETLABEL** *prompt,location*}

The *prompt* argument is a string of up to 80 characters. You must enclose the prompt string in double quotation marks if it contains any argument separator characters such as a comma (,) or semicolon (;). For clarity, include a space between the last letter of the prompt and the closing quotation mark. This separates the *prompt* from the user's response. The {GETLABEL} command displays this string in the control panel. As the user enters a response (of up to 80 characters), {GETLABEL} displays it after the *prompt* in the control panel.

■ **NOTE:** The control panel is capable of displaying up to 72 characters. If the *prompt* is longer than 72 characters, it scrolls off the screen.

When the user presses ⟨Return⟩, {GETLABEL} stores the user's response in *location.*

8

The *location* argument is the cell address where you want to store the user's response. The {GETLABEL} command stores the response as a left-aligned label. {GETLABEL} overrides a current {PANELOFF} condition.

The following example shows how you can use the {GETLABEL} command.

```
B1: '{GETLABEL "Enter the range to delete: ",B3}                    READY

           A         B         C         D         E         F         G         H
 1 \G        {GETLABEL "Enter the range to delete: ",B3}
 2           /RND
 3
 4
 5
 6
 7
 8
```
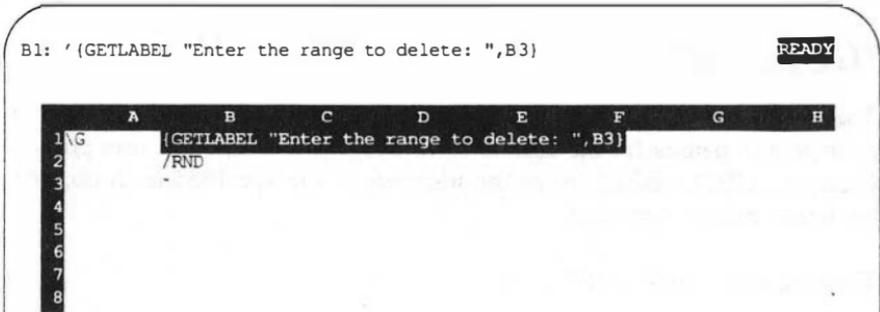
The macro called \G prompts the user to enter a range to delete. When the user presses ⟨Return⟩, the macro performs a /RND on the range entered in cell B3.

The {GETLABEL} command is similar to the /XL command but with some exceptions.

The {GETLABEL} command differs from the {GETNUMBER} command in that {GETNUMBER} stores the user's *numeric* response as a *value* in the specified *location.*

{GETNUMBER}

The {GETNUMBER} command stops the macro execution, displays a *prompt*, and pauses for the user to enter a response. When the user presses ⟨Return⟩, {GETNUMBER} stores the response as a value in the specified *location*, and continues macro execution.

The syntax of {GETNUMBER} is:

    {GETNUMBER *prompt,location*}

The *prompt* argument is a string of up to 80 characters. You must enclose the prompt string in double quotation marks if it contains any argument separator characters such as comma (,) or semicolon (;). For clarity,

include a space between the last letter of the prompt and the closing quotation mark. This separates the *prompt* from the user's response. The {GET-NUMBER} command displays this string in the control panel. As the user enters a response (of up to 80 characters), {GETNUMBER} displays it after the *prompt* in the control panel.

■ **NOTE:** The control panel is capable of displaying up-to-72 characters. If the *prompt* is longer than 72 characters, it scrolls off the screen.

When the user presses ⟨Return⟩, {GETNUMBER} stores the user's response in *location*. The user's response can be a numeric value, a formula, or a range name that references a numeric value. If the response is a range, the {GETNUMBER} command stores the response as a numeric value. The *location* argument is the cell address where you want to store the user's response.

The {GETNUMBER} command overrides the current {PANELOFF} condition.

The following example shows how you can use the {GETNUMBER} command.

```
B4: 33                                                          READY

           A         B          C        D      E      F      G      H
  1 \N:        {GETNUMBER "Enter the commission: ",AMOUNT}
  2            {GoTo}AMOUNT~
  3
  4 AMOUNT          33
  5
  6
```

8
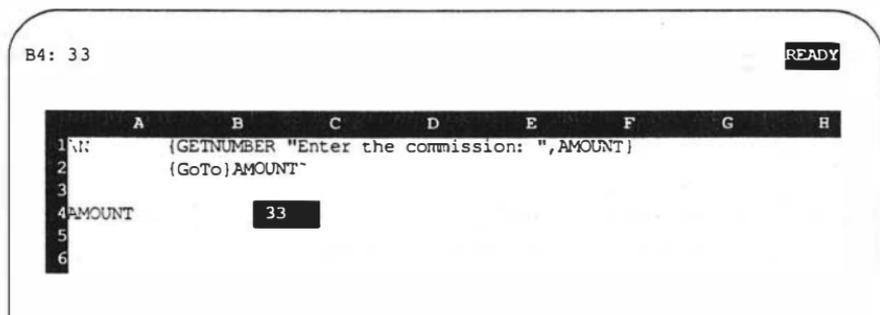
The \N macro prompts you to enter a number for commission, stores the amount in the range called AMOUNT, and then goes to the upper right cell where the number is stored.

The {GETNUMBER} command is similar to the /XN command but with some exceptions.

The {GETNUMBER} command differs from the {GETLABEL} command in that {GETLABEL} stores the user's response as a *label* in the specified *location*.

{LOOK}

While a macro is executing its own keystrokes, it ignores any input from the keyboard. SCO Professional stores any input typed in from the keyboard during macro execution in a buffer called the TYPE-AHEAD buffer. This buffer holds approximately 10 keystrokes. When the buffer is full, the type-ahead buffer does not accept any more keystrokes and SCO Professional beeps.

You can use the keystrokes stored in the type-ahead buffer by inserting the {LOOK} command in your macro. The {LOOK} command checks the type-ahead buffer to see if the user has entered a character from the keyboard since macro execution began. If the buffer contains one or more keystrokes, {LOOK} puts the first keystroke it finds in a specified location. The character is left on the input for a subsequent read by {GET}, {GETLABEL}, etc.

The syntax of {LOOK} is:

{**LOOK** *location*}

The *location* argument is the cell address where you want {LOOK} to put the first keystroke it finds in the type-ahead buffer.

The following example shows a mailmerge macro that prints the form letter in *prange*:

```
B2: 'Press H to halt printing                                    READY

      A                    B                  C        D        E
1
2        Press H to halt printing
3
4 \P      {FOR counter,1,@rows(database),1,print}
5
6 Print   {Calc}/PPRprange~AGQ
7         {LOOK stop}
8         {IF stop="H"}{QUIT}
9         {RETURN}
10
11 counter      2
12 stop   H
13
14 ╪ 14-Feb-91  08:00 AM
```

Use the label in cell B2 to inform the user that pressing H terminates printing. The \P macro executes the {FOR} command. The {FOR} loop executes the subroutine Print the number of times that there are records in the range database. The {LOOK} command in the *prange* subroutine stores information in the type-ahead buffer in *stop*. The {IF} command checks *stop* to see if it contains an H. If *stop* contains an H, the macro executes the {QUIT} command.

8

If there are no keystrokes in the type-ahead buffer, {LOOK} does not place anything in *location*. The {LOOK} command is similar to the {GET} command except that {LOOK} does not stop macro execution to wait for keyboard input.

{MENUBRANCH}

The {MENUBRANCH} command allows you to branch to a *location* and select an item from a custom menu contained in that *location*. SCO Professional then executes the macro selected from this menu.

The syntax of {MENUBRANCH} is:

{**MENUBRANCH** *location*}

The *location* argument is a cell address or range name of the upper left cell of the area where you store the menu in your worksheet. This area should be between two and eight columns wide and three or more rows deep.

While {MENUBRANCH} and {MENUCALL} commands are similar in that they both display menus, these commands differ significantly in the way each completes routines. The {MENUBRANCH} command branches to a new location and executes the new instructions. When {MENU-BRANCH} encounters a {RETURN}, the macro terminates. The {MENU-CALL} command treats the new instructions as a subroutine call and redirects the flow of macro execution to a specified location. When the routine is complete, execution returns to the calling macro.

Both the {MENUBRANCH} and {MENUCALL} commands override the current {PANELOFF} condition.

Setting Up Custom Menus

Because both the {MENUCALL} and {MENUBRANCH} commands use the same menus but treat the macros contained in them differently, the procedure for setting up custom menus is the same for both commands.

When constructing a custom menu for use with the {MENUCALL} and {MENUBRANCH} commands, use the following information:

- Use the first row of the menu area range (*location*) for the menu selections.

- Enter one menu item in each cell of the top row. Do not place blank cells between menu items. Place a blank cell to the right of the last menu item.

- You can enter up to eight menu items in each menu.

- You can use up to 79 characters (including spaces between menu choices) in the top row of the menu.

- You should begin each menu item with a different character so that you can use the first letter when selecting a menu item.

- Include a menu item (such as Exit or Quit) so you can exit the menu.

- Use the second row of the menu area range for brief descriptions of each of the menu selections.

- Enter one description in each cell of the second row. If you do not want to display a description, do not place a blank cell between menu descriptions. Instead, place a label cell with blank spaces in the row.

- Place each description in the cell below the menu item it describes.

- Use the third row of the menu area range for the macro that you want to execute when you choose the menu item.

- Enter one macro in each column under the appropriate menu item and description.

The syntax of {MENUCALL} is:

{**MENUCALL** *location*}

The *location* argument is a cell address or range name of the upper left cell of the area where you want to store the menu in your worksheet. This area must be between two and eight columns wide and three or more rows deep.

For information on how to set up custom menus for use with the {MENUCALL} command, see the section "Setting Up Custom Menus" earlier in this chapter.

For a discussion of the differences between the {MENUBRANCH} and {MENUCALL} commands, see the {MENUBRANCH} section.

For an example of how to use {MENUCALL}, see the example for the {MENUBRANCH} command.

{WAIT}

The {WAIT} command suspends macro execution until a specified time or until the user presses ⟨Ctrl⟩Break simultaneously (unless a {BREAKOFF} command has been executed). When the computer clock reaches the time indicated in the {WAIT} command, the macro resumes execution.

The syntax of {WAIT} is:

{**WAIT** *time*}

The *time* argument is a decimal value for a time serial number. You can use the @DATE and @TIME functions to calculate the time serial number.

8

8

The following table gives examples of several {WAIT} commands and their results:

{WAIT} Commands

Command	Result
{WAIT @NOW+@TIME(0,0,10)}	Suspends macro execution for 10 seconds
{WAIT @TODAY+@TIME(14,30,0}	Pauses the macro until 2:30 P.M. today

When you use the {WAIT} command, the mode indicator changes to WAIT for the duration of the time the macro execution is suspended. SCO Professional does not update the worksheet clock for the duration of the {WAIT}. If you use ⟨Ctrl⟩Break to interrupt the {WAIT}, the mode indicator changes to ERROR. Press ⟨Return⟩, to return to READY mode.

Manipulating ASCII Files

The advanced macro commands that allow you to work with ASCII files are called FILE MANIPULATION commands. Using these commands, you can open an ASCII file, determine the size of the open file, determine the position of the file pointer in that file, change the file pointer position, print the current screen contents to a file, read characters and lines from an open file, write characters and lines to an open file, and close an open file.

If one of the file manipulation commands fails, macro execution continues in the same cell. If the command succeeds, execution proceeds to the next cell down. This allows you to detect file operation errors and correct them.

Using Custom Menus in Macros

Once you call a custom menu using the {MENUBRANCH} or {MENU-CALL} commands, you can use the menus in the same way that you use SCO Professional menus. To select a menu item, either move the highlight to the desired item and press ⟨Return⟩, or press the first letter of the menu item. To exit a custom menu, select an appropriate menu item (Exit or Quit), or press ⟨Escape⟩.

The following example shows how you can use a custom menu with the {MENUBRANCH} command.


```
B1: [W23] '{MENUBRANCH MENU1}                                    READY

       A        B                C              D          E
1 \M       {MENUBRANCH MENU1}
2          {BRANCH \M}
3
4 MENU1    Save             Print              Quit
5          Save the Worksheet  Print Report    Quit menu
6          /FS^R            /PPRreportGQ       {QUIT}
7
8
```
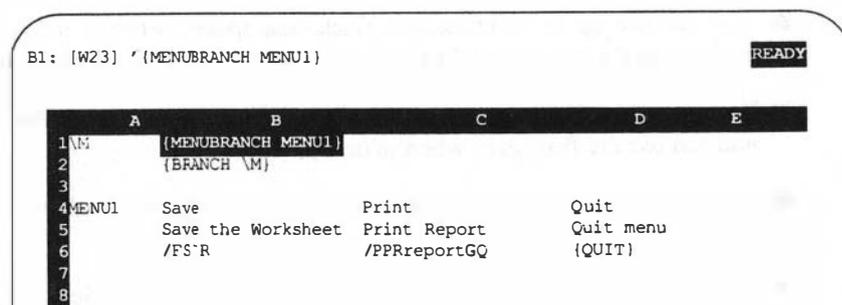
The \M macro branches to the menu called MENU1. The user can then select a menu item from the menu. After the menu is run, the \M macro terminates.

An example substituting the {MENUBRANCH} command with {MENU-CALL} works the same way, except that after MENU1 is run, the macro returns to \M and continues to execute.

{MENUCALL}

The {MENUCALL} command allows you to select a menu item and then executes the macro selected from this menu as a subroutine.

You must place each file manipulation command alone in a cell.

File Manipulation Commands

Command	Function
{CLOSE}	Closes a previously opened file
{FILESIZE}	Calculates the number of bytes in an open file and stores that number in a specified location
{GETPOS}	Determines the position of the file pointer in an open file and stores that position in a specified location
{OPEN}	Opens a file for reading or modifying
{PRINT}	Prints the text contents of the current screen to a file or printer.
{READ}	Reads characters from an open file and stores them as a label in a specified location
{READLN}	Reads a line of characters from an open file and stores them as a label in a specified location
{SETPOS}	Positions the file pointer in a specified location in an open file
{WRITE}	Allows you to enter characters in an open file
{WRITELN}	Allows you to enter a line of characters in an open file

8

{CLOSE}

The {CLOSE} command closes a file that you opened previously using the {OPEN} command.

{OPEN}

The {OPEN} command allows you to open a file for reading or modifying.

The syntax of {OPEN} is:

> {**OPEN** *filename,access*}

The *filename* argument is a string indicating the name, filename extension, and pathname (if the file is not in your current directory) of the file that you wish to open. The string can also be a range name that refers to the single cell containing the filename string, or an expression resulting in a string.

■ **NOTE:** The *filename* argument cannot exceed 64 characters.

The *access* argument is a single character code that indicates how you wish to access the file. The following table describes these access codes:

{OPEN} Access Codes

Code	Description
A (append)	Opens an existing file and positions the file pointer at the end of the file
R (read only)	Opens and allows you to read an existing file with a specified filename. Allows access to the specified file using the {READ} and {READLN} commands.
W (write only)	Opens a new file (or recreates an existing file) and allows you to access it using the {READ}, {READLN}, {WRITE}, and {WRITELN} commands. If a file with the specified filename exists, SCO Professional replaces it with the new file.
M (read and write)	Opens and allows you to modify an existing file with a specified filename. Allows access to the specified file using the {READ}, {READLN}, {WRITE}, and {WRITELN} commands.

The syntax of {CLOSE} is:

> {**CLOSE**}

The {CLOSE} command takes no arguments.

If no file is open, SCO Professional ignores the {CLOSE} command and continues executing the current macro. You must use {CLOSE} to close an open file before opening a new one.

{FILESIZE}

The {FILESIZE} command calculates the number of bytes contained in a file that was opened with the {OPEN} command, and it stores the number in a specified *location*.

The syntax of {FILESIZE} is:

> {**FILESIZE** *location*}

The *location* argument is the cell address or range name where you want {FILESIZE} to store the number that represents the size of the open file.

The following example shows how you can determine the size of a file and place that number in a cell.

> {**OPEN TEST,r**}
> {**FILESIZE C2**}
> {**CLOSE**}

The {FILESIZE} command determines the size of the file *TEST* and places that number in cell C2 of the current worksheet.

Before using {FILESIZE} to calculate the number of bytes in a file, you must first use the {OPEN} command to open that file. If no file is open, SCO Professional ignores the {FILESIZE} command and continues executing the current macro.

If the macro cannot find the filename that you specify using the {OPEN} command, SCO Professional executes any commands that follow in the same cell. You can place a subroutine name following in the same cell to execute in case the {OPEN} command fails. If the filename is found, SCO Professional executes the first command in the cell and ignores the commands that follow.

■ **NOTE:** Make sure that the XENIX or UNIX system file permissions are appropriate for the access method that you use.

The following example shows how you can use the {OPEN} command to access a file:

\O   {OPEN testing,m} { ERROR }

The \O macro opens and allows you to read and modify the file named *testing*. If the {OPEN} command fails for any reason, such as incorrect permissions, the macro \O calls the subroutine ERROR.

You must use the {CLOSE} command to close an opened file before opening a new one.

{PRINT}

The {PRINT} command allows you to print the contents of the current screen to a file. The environment variable PRINTSCR must be set in order for you to use this macro effectively.

The syntax for {PRINT} is:

{PRINT}

The Print command takes no arguments.

If the PRINTSCR environment variable is not set, Professional stops the execution of the macro at the {PRINT} command and requests a filename. You can enter a filename and the macro completes execution.

The output of the {PRINT} command is all of the text of the current screen. This is the same output generated by pressing the PrintScreen key, which is also dependent upon the PRINTSCR environment variable. For more information on setting the PRINTSCR environment variable, see Chapter 2, "Creating a Custom Environment," in the *Configuration Guide*.

{READ}

The {READ} command allows you to read characters from an open file and stores them as a left-justified label in the specified *location*.

The syntax for {READ} is:

> {**READ** *bytes, location*}

The *bytes* argument is the number of characters that you want to read from the open file, starting at the current position of the file pointer. You must express *bytes* as either a numeric value or an expression that evaluates to a numeric value. If *bytes* is a number larger than the number of characters following the file pointer in the open file, {READ} reads the remaining characters and stores them in *location*.

The *location* argument is the cell address or range name where you want to store the specified string of characters from the open file. If *location* is a range name, SCO Professional places the number of characters specified with *bytes* in the upper left corner cell of the range.

The following example shows how you can use the {READ} command to read characters from an open file:

```
\R              {OPEN test.txt}
                {READ 6,A10}
                {CLOSE}
```

If the open file *test.txt* contains the text *This is only a test,* the \R macro places the label *This i* in cell A10 of the current worksheet.

■ **NOTE:** The *bytes* argument must be a number between 0 and 240. If *bytes* is a negative number, {READ} interprets *bytes* as 240.

If no file is currently open, SCO Professional ignores the {READ} command and continues executing the current macro.

After reading the specified number of characters from the open file, the file pointer moves to the first character following the characters that were read.

{READLN}

The {READLN} command copies a line of characters from the currently open file and stores them as a label in a specified *location*.

The syntax for {READLN} is:

{**READLN** *location*}

The *location* argument is the cell address or range name where you want to store the specified line of characters from the open file. If you specify *location* to be a range name, SCO Professional places the line of characters in the upper left corner cell of the range.

If no file is currently open, SCO Professional ignores the {READLN} command and continues executing the current macro.

The {READLN} command reads a line of characters beginning with the current position of the file pointer and ending with a carriage return. The carriage return is not copied with the text.

8

The following example shows how you can use the {READLN} command:

```
B7: '{OPEN file,R}                                              READY

          A          B          C       D       E       F       G
    1 file       example.prn
    2 row
    3 size
    4 filepointer
    5 buffer
    6
    7 \D         {OPEN file,R}
    8            {FILESIZE size}
    9 LOOP       {GETPOS filepointer}
   10            {IF filepointer>=size}{BRANCH DONE}
   11            {READLN buffer}
   12            {PUT text,0,row,buffer}
   13            {LET row,row+1}
   14            {BRANCH LOOP}
   15
   16 DONE       {CLOSE}
   17
   18
   19
   14-Feb-91  08:00 AM
```

The \D macro reads lines of text from a file and stores them in a range of
the worksheet. The \D macro opens the file called *example.prn* and deter-
mines the size of the file. The macro then starts a loop. First, the macro
determines the position of the file pointer. If the file pointer is at the end of
the file, the macro branches to the subroutine DONE and closes
example.prn. If the file pointer is not at the end of the file, {READLN}
reads a line into the space reserved at range *buffer*. Then the macro copies
this line from *buffer* to the range *text* at row *row*, column 0. Then the
{LET} command increments *row* for the next line of text and the macro
branches back to LOOP.

The {READLN} command updates the file pointer automatically. The
macro executes until the file pointer reaches the end of *example.prn*, then
the macro branches to DONE and closes the file.

After reading the line of characters from the open file, the file pointer
moves to the first character following the line that was read.

{SETPOS}

The {SETPOS} command positions the file pointer in a specified *location* in an open file.

The syntax of {SETPOS} is:

{**SETPOS** *position*}

The *position* argument is a numeric value, or an expression that results in a numeric value, that indicates the character on which you want to position the file pointer.

■ **NOTE:** SCO Professional considers the position of the first character in a file as position zero.

Before using {SETPOS} to position the file pointer in a file, you must first use the {OPEN} command to open that file. If no file is open, SCO Professional ignores the {SETPOS} command and continues executing the current macro.

The following example shows how to use the {SETPOS} command to change the position of the file pointer.

```
\S              {OPEN test.txt}
                {SETPOS 11}
                {CLOSE}
```

If the open file *test.txt* contains the text *This is only a test*, the \S macro positions the file pointer on the character *y* in the word *only*.

■ **NOTE:** It is possible to place the file pointer in a *position* beyond the end of the current file. Use the {FILESIZE} command to determine the number of the last character in the open file before positioning the file pointer. If you specify an argument larger than the filesize, any following {READ} instructions do not work; any following {WRITE} instructions enlarge the file to place the data at the position that you specify.

{WRITE}

The {WRITE} command allows you to enter characters in an open file.

The syntax for {WRITE} is:

> {**WRITE** *string*}

The *string* argument is a string of characters that you want to write to the open file, starting at the current position of the file pointer. The *string* argument cannot be either a numeric value or an expression that evaluates to a numeric value. The *string* argument can be a literal string, a string-valued expression, or a single-cell range name.

If no file is currently open, SCO Professional ignores the {WRITE} command and continues executing the current macro.

After writing the string of characters to the open file, the file pointer moves to the first character following the characters that were written.

The following example shows how {WRITE} places each string in a specified file.

```
B3: '{OPEN linetest,w}                                          READY

1
2
3\O     {OPEN linetest,w}
4       {WRITE "This "}
5       {WRITE "is "}
6       {WRITE "one "}
7       {WRITELN "line.   "}
8       {CLOSE}
9
```

This example writes the following line to the file *linetest*:

```
This is one line.
```

Note that there is a space after each {WRITE} string to separate the words when they appear in the file.

{WRITELN}

The {WRITELN} command allows you to write a line of characters to the currently open file.

The syntax for {WRITELN} is:

{**WRITELN** *string*}

The *string* argument is a line of characters that you want to write to the open file, starting at the current position of the file pointer. The *string* argument cannot be either a numeric value or an expression that evaluates to a numeric value. The *string* argument can be a literal string, a string-valued expression, or a single-cell range name.

If no file is currently open, SCO Professional ignores the {WRITELN} command and continues executing the current macro.

After writing the line of characters to the open file, the file pointer is positioned immediately following those characters in the open file.

Controlling the Worksheet Screen

Use the SCREEN CONTROL COMMANDS to control the worksheet display during macro execution. The screen control commands allow you to change the mode indicator, suppress redrawing of the screen, and sound the computer's bell.

8

Screen Control Commands

Command	Function
{BEEP}	Sounds the computer's bell
{INDICATE}	Changes the mode indicator at the top right corner of the screen
{PANELOFF}	Turns off the control panel redraw function during macro execution
{PANELON} .	Restores control panel redraw function
{WINDOWSOFF}	Freezes entire screen display (except control panel) during macro execution
{WINDOWSON}	Restores screen display redraw during macro execution

{BEEP}

The {BEEP} command sounds the computer's bell. For example, you can use this macro command to prompt the user to enter information from the keyboard, alert the user to an error, indicate the end of a specified time period, and to signal the completion of a macro.

The syntax of {BEEP} is:

{**BEEP** *number*}

The optional *number* argument is a value between zero and three that determines the number of times to ring the bell. The interval between beeps is very short, so, in effect, the argument determines the duration of the bell. The default value for *number* is one. The tone of the bell does not change because not all terminals have that capability.

The following macro shows how you can use the {BEEP} command:

```
B1: '{GoTo}H1~                                                      READY

        A       B         C       D       E       F       G       H
  1 \N    {GoTo}H1~
  2       {GETLABEL "What kind of car do you drive? ",H1}
  3       {BEEP}
  4
  5
```
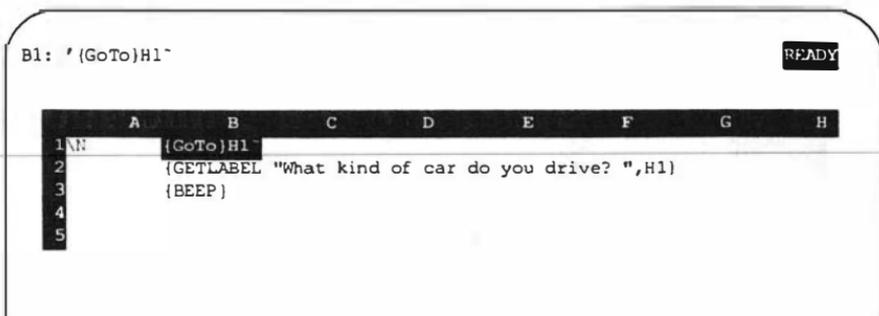
The screen control macro named \N moves the cell pointer to cell H1, displays the prompt "What kind of car do you drive?" in the control panel, and waits for input from the keyboard. SCO Professional displays the user's response to the prompt in the control panel, and then moves it to cell H1 when the user presses ⟨Return⟩. Then SCO Professional beeps to indicate that the macro execution is complete.

{INDICATE}

The {INDICATE} command allows you to change the mode indicator in the top right corner of the screen. Use this macro command to indicate the type of command that the macro is currently executing.

The syntax of {INDICATE} is:

{**INDICATE** *string*}

The *string* argument is a string of up to five characters with which you wish to replace the default SCO Professional mode indicator. To remove the custom mode indicator, and to return the indicator to READY, use {INDICATE} with no *string* argument.

8

The following macro shows how you can use the {INDICATE} command:

```
A1: '\I                                                              CAR

        A       B          C        D        E        F        G        H
  1\I       {INDICATE CAR}
  2         {GETLABEL "What kind of car do you drive? ",H1}
  3         {INDICATE MILES}
  4         {GETLABEL "How many miles per gallon? " H2}
  5
```

The screen control macro named \I changes the mode indicator to CAR, displays the prompt "What kind of car do you drive?" in the control panel, and waits for input from the keyboard. SCO Professional displays the user's response to the prompt in the control panel, and then places it in cell H1 when the user presses ⟨Return⟩. Then SCO Professional changes the mode indicator to MILES, asks the user, "How many miles per gallon?," and places the response in cell H2.

■ **NOTE:** The mode indicator on the screen remains MILES until you execute the {INDICATE} command with no *string* argument. Then the mode indicator changes to READY.

{PANELOFF}

The {PANELOFF} command allows you to turn off SCO Professional's ability to redraw the control panel during macro execution. (The control panel is the three uppermost lines of the screen.) Use this macro command to prevent the display and flicker of macro instructions in the control panel during macro execution.

The syntax of {PANELOFF} is:

{PANELOFF}

The {PANELOFF} command does not take any arguments. To turn the control panel redraw function back on during execution of a macro, use the {PANELON} macro command. SCO Professional turns the control panel redraw function back on automatically when macro execution is complete.

{PANELON}

The {PANELON} command restores the default control panel redraw function during macro execution.

The syntax of {PANELON} is:

{PANELON}

The {PANELON} command does not take any arguments. To turn the control panel redraw function off during the execution of a macro, use the {PANELOFF} macro command. If the {PANELOFF} command has not been executed, and you use [PANELON], SCO Professional ignores the {PANELON} command.

{WINDOWSOFF}

The {WINDOWSOFF} command allows you to freeze SCO Professional's entire screen display, with the exception of the control panel. Use this macro command to prevent cell pointer movement which causes the display to flicker when changes occur on the screen during macro execution. Because SCO Professional does not have to redraw the screen with every change, the {WINDOWSOFF} command speeds up macro execution.

8

The syntax of {WINDOWSOFF} is:

{WINDOWSOFF}

The {WINDOWSOFF} command does not take any arguments. To turn the screen redraw function back on during execution of a macro, use the {WINDOWSON} macro command. SCO Professional turns the screen redraw function back on automatically when macro execution is complete.

{WINDOWSON}

The {WINDOWSON} command restores the default screen display redraw during macro execution. Use this macro command to display the changes and cursor movement during macro execution. Because SCO Professional must redraw the screen with every change, the macro execution time with the {WINDOWSON} command is slower than with the {WINDOWSOFF} command.

The syntax of {WINDOWSON} is:

   {WINDOWSON}

The {WINDOWSON} command does not take any arguments. If you use the {WINDOWSON} macro command when the screen redraw function is on, SCO Professional ignores the {WINDOWSON} command.

Using /X Commands

SCO Professional has a set of equivalent macro commands for some of the {} macro commands. See the Special Key Functions table in the section "Entering Macros" earlier in this chapter. We suggest that you ignore the /X syntax in favor of the {} syntax because the {} syntax provides a richer, more complete command language. The following chart lists /X commands and their functions.

/X Commands

Command	Function	{} Equivalent
/XI(*Condition*)⁻	Uses an if-then condition	{IF}
/XG(*Location*)⁻	Goes to a location and continues executing the macro	{BRANCH}
/XC(*Location*)⁻	Goes to a location and calls a subroutine	{subroutine}
/XR	Returns from subroutine (used with /XC)	{RETURN}
/XQ	Quits macro execution	{QUIT}
/XM(*Location*)⁻	Displays and processes a user-defined menu	{MENUBRANCH}
/XL(*Message*)⁻(*Location*)⁻	See /XN	{GETLABEL}
/XN(*Message*)⁻(*Location*)⁻	Displays a message, accepts a label entry (/XL) or number entry (/XN) from the keyboard, and places this entry in a cell	{GETNUMBER}

Six of the eight /X commands require a condition, location, message, or combination of these, each of which is followed by the tilde (⁻) character. The other two /X commands are used by themselves.

8

/XI(condition)⁻

The /XI command is an "if-then-else" conditional command. The condition is considered true if it has a non-zero value. If its value is zero, it is considered false. When the condition holds true, SCO Professional continues reading macro keystrokes in the same cell. If the condition is false, SCO Professional moves to the next cell of the macro definition sequence (down the column).

/XG(location)⁻

The /XG command is the macro version of the GoTo command. Use /XG to direct the macro execution to a new location. You can invoke this command in any cell of the worksheet. If /XG is not in the cell specified as the location, SCO Professional moves to the specified cell. After finding the specified location (which may be a cell address, a range or a range name) with this command, SCO Professional continues reading keystrokes from that location. If you specify a range or a range name instead of a cell, SCO Professional begins in the upper left corner of the range.

/XC(location)⁻

The /XC command is the Call Subroutine command. This command is similar to the /XG command discussed previously in that it continues reading the keystrokes of the macro at the location you specify. Like the /XG command, the location may be a cell address, a range, or a range name.

The /XC command differs from the /XG command in that /XC repeats, or "nests," the sequence of keystrokes between itself and the /XR command. You must use the /XC and /XR commands together. You can use the /XI command to control the progress and number of repetitions of the /XC command.

The following example shows how you can use the /XC command to call a subroutine:

```
A1: [W9] ' \A                                                          READY

           A            B            C            D              E
    1 \A       /XCB9~        Call routine at B9
    2          /XMC5~        Execute menu at C5
    3
    4
    5                        Save          Print          Retrieve
    6                        Save worksheet Print worksheet Retrieve worksheet
    7                        /XGSave~      /XGPrint~      /XGRetrieve~
    8
    9          {Goto}A34~                  Top left message screen
   10          {Goto}A44~                  Highlight message
   11          /XR                         Return to main routine
   12
   13
   14 Save     /fs{?}~       Save file with specified filename
   15 Print    /ppagq        Align paper, print sheet, quit
   16 Retrieve /fr{?}~       Retrieve specified worksheet
   17
   18
   19
   14-Feb-91  08:00 AM
```

/XR

The /XR command is the ⟨Return⟩ from Subroutine command. Always use the /XR command in conjunction with and after the /XC command. If you do not include an /XC command with an /XR command, SCO Professional sounds a tone to indicate an error when the macro is executed.

The /XR command rereads the sequence of keystrokes starting after the /XC command. This repetition, or nesting series, can be done up to 16 times per macro.

8

/XQ

The /XQ command is the Quit command. This command causes SCO Professional to erase the CMD mode indicator from the upper right corner of the screen, and returns you to READY mode.

/XM(location)¯

Use the /XM command to make a choice from a preconstructed menu. You construct the menu before you construct the macro sequence.

The location required in the macro sequence is the location of the menu in the worksheet. The location can be a cell address, a range, or a range name. The specified location is considered the top left cell of the menu range or the entire range (depending on whether you specified a single cell or a range). A menu range can be up to eight columns wide and must be at least two rows deep.

Use the first row to enter up to eight different menu choices, using any text you want. We suggest that you keep the text as short as possible to avoid overflowing other worksheet cells. Place each menu choice in its own column (or cell). Do not place any empty cells between the menu items. When reading keyboard command input, SCO Professional reads the choices from left to right and stops at the first empty cell or the eighth choice (whichever comes first). Therefore, the cell to the right of the last menu item should be empty.

Remember that you can choose a menu item by typing the first letter of the word. It is unwise to use menu choices that begin with the same first letter. If more than one menu choice begins with the same letter, SCO Professional uses the first choice it encounters. Upper- and lowercase letters are considered alike.

The second row of the menu range is reserved for an abbreviated phrase describing each of the menu choices in the row above. You can list the actual steps needed to take the action described by the menu choice. The screen displays up to 40 characters of these phrases.

Below the second line (the explanatory phrase for each command) is a macro that executes the action that you have assigned to the command. Create these macros just as you would any other macro. For more informa-

tion on how to create macros, see the section "Creating Simple Macros," earlier in this chapter.

After you use the /XM command to make a menu selection, SCO Professional executes the corresponding macro. If the macro cell (directly below the menu item description) is empty, SCO Professional considers the macro sequence completed. If it is a multi-cell macro, the additional cells defining the macro must immediately follow the cell in which the macro begins.

```
A1: [W9] '                                                          READY

        A        B              C            D            E
 1            Goto prompt screen           {Goto}A34~{Goto}A44
 2            Execute menu at C5           /XMC5~
 3
 4
 5                       Save          Print        Retrieve
 6                       Save worksheet Print worksheet Retrieve worksheet
 7                       /XGD9~        /XGD11~      /XGD13~
 8
 9
10 Save     Save file with              /fs{?}~
11          specified filename
12 Print    Align paper, print          /ppagq
13          sheet, quit
14 Retrieve Retrieve specified          /fr{?}~
15          worksheet
16
17
18
19
14-Feb-91  08:00 AM
```

When you invoke a macro containing the /XM command, SCO Professional pauses at the /XM command and moves to the location you specified. The menu appears at the top of the screen. The second line of the status area is used for the explanatory phrase describing each menu choice.

When you choose one of the menu items, SCO Professional executes the corresponding macro. The menu macro does not return to the original macro automatically unless you include the appropriate commands.

8

- **NOTE:** If you press ⟨Escape⟩ to move back one step (as you would with the regular SCO Professional menus), SCO Professional ignores the ⟨Escape⟩ and continues reading the keystrokes of the rest of the macro sequence.

/XL(message)¯(location)¯

Use the /XL command to enter labels in specified locations. When you use the /XL command, SCO Professional first moves to the specified location. The location may be a cell address, a range, or a range name. If you specify a range or a range name, SCO Professional uses only the top left cell of the range as its location.

The message included in the macro sequence can be up to 39 characters long. After you move to the specified location, SCO Professional displays the message on line 2 of the control panel. You can type up to 240 charac-ters in response to this message. When you finish typing, enter the text by pressing ⟨Return⟩. SCO Professional formats all the text that you enter in the worksheet using this command as left-aligned labels.

```
A1:                                                        READY
        A           B                   C              D          E
  1          /XLEnter Customer Name:    ¯E10¯
  2          /XLEnter Address:     ¯C10¯
  3          /XLEnter State:     ¯D10¯
  4          /XLEnter Zip Code:     ¯E10¯
  5
  6
  7
  8          Name            Address              State   Zip
  9
```
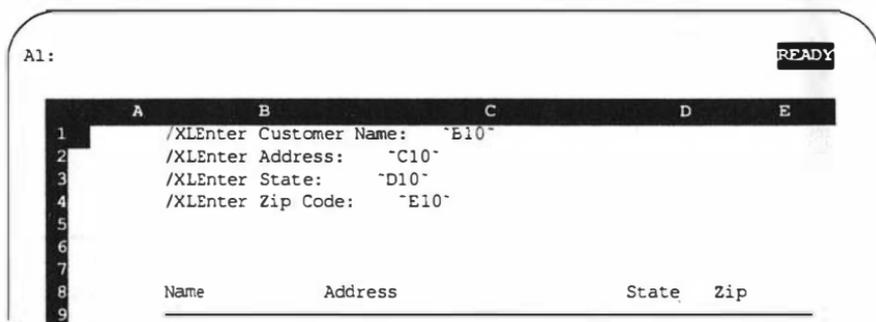
/XN(message)˜(location)˜

The /XN command is very similar to the /XL command except that /XN creates a value, while /XL creates a label. In fact, if you type an entry that cannot be interpreted as a numeric value, SCO Professional beeps and returns an error message. If this happens, you must press ⟨Return⟩ or ⟨Escape⟩ before you can continue. The entry may consist of numbers or formulas. The @ functions and range names in formulas are acceptable.

When you use the /XN command in a macro sequence, SCO Professional moves to the specified location, displays a message of up to 39 characters in the status area, and waits for you to enter any number or formula you wish. When you press ⟨Return⟩, SCO Professional calculates the numeric value of the entry and enters the value at the specified location. The program does not recalculate the entire worksheet. If you want to recalculate the worksheet, you must include a {Calc} command to force recalculation.

8

≡ Chapter 9

Creating Graphs

9

Creating Graphs

Graph commands create visual presentations of your worksheet's data. SCO Professional graphs are effective in highlighting certain relationships among data and, at the same time, easy to create.

There are five different types of graphs you can create, along with several options available with each graph (such as adding titles or overlaying a grid). You can even switch from one type of graph to another using the same data and options.

Contents of This Chapter

This chapter is organized into the following sections:

- **"Creating and Viewing Graphs"** briefly introduces the Graph menu and minimal commands for creating and viewing graphs.

- **"Choosing a Graph Type"** explains the differences among the five major graph types and shows how to select them.

- **"Specifying X Axis Labels or Data"** explains how to select a range of labels (non-XY graphs) or data (XY graphs only) for the X axis.

- **"Specifying A-F Ranges"** shows how to select up to six ranges of data for your graph.

- **"Resetting Graph Values"** describes how to erase particular graph settings.

- **"Viewing Your Graph"** explains how to examine your current graph.

- **"Using Graph Options"** details the many ways in which you can enhance the appearance of your graph through legends, titles, grid lines and so on.

9

- ■ "Saving Your Graph" tells how to save each graph you create.

- ■ "Naming Graph Settings" explains how you can save a particular group of graph settings for future use.

- ■ "Printing Your Graph" shows you how to print your graph from within the Graph menu.

- ■ "Using the Clipboard" tells you how to transfer graphs to and from the SCO Professional Clipboard.

Creating and Viewing Graphs

When you create a graph, there are only two decisions you are required to make. The first is what type of graph you want drawn (by using the /Graph Type command) and the second is which range of the worksheet you want represented (most often specified using the /Graph A command). All other decisions and embellishments are optional.

The first step in creating a graph is to select /Graph. This calls up the /Graph menu:

```
A1:                                                                    MENU
Type X A B C D E F Reset View Save Options Name Print Graph-Transfer Quit
Selects graph type
        A       B       C       D       E       F       G       H
  1
  2
  3
  4
  5
  6
  7
```
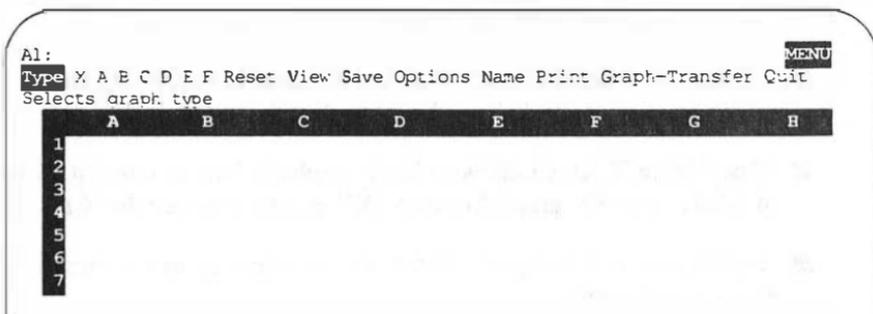
On the following pages, we will discuss these graph commands in their menu order. Their submenus are discussed in the order of probable use.

When you are ready to view a graph, you may use the /Graph View command or, if you are in the READY mode, you may use the ⟨Graph⟩ key. The graph temporarily replaces the worksheet on the screen. See Chapter 1, "Getting Started," for more information on special keys.

After viewing a graph, press any key to return to your worksheet. When you are ready to view it again, you may use the /Graph View command or, in the READY mode, use the ⟨Graph⟩ key to redraw it.

Choosing a Graph Type

There are five types of graphs offered by SCO Professional: bar, stacked-bar, line, pie (or rectilinear pie), and XY. The first three types can represent different attributes for up to six sets, or ranges, of related data. The pie chart represents different data values for a single set of data. The XY graph represents a value for each pair of related elements in the range. Instead of being one-dimensional like the other graphs, it is two-dimensional. An XY graph can represent up to six different sets of data in one graph. Pie charts cannot show positive and negative values simultaneously.

9

Bar Graphs

A BAR GRAPH is the easiest to use when representing different sets of data. Bar graphs display one or more sets of data in a horizontal orientation. Each set is represented by a bar whose height is indicative of the set's value. The following bar graph shows the revenue percentage per product of a fictitious company, XYZ Corporation:
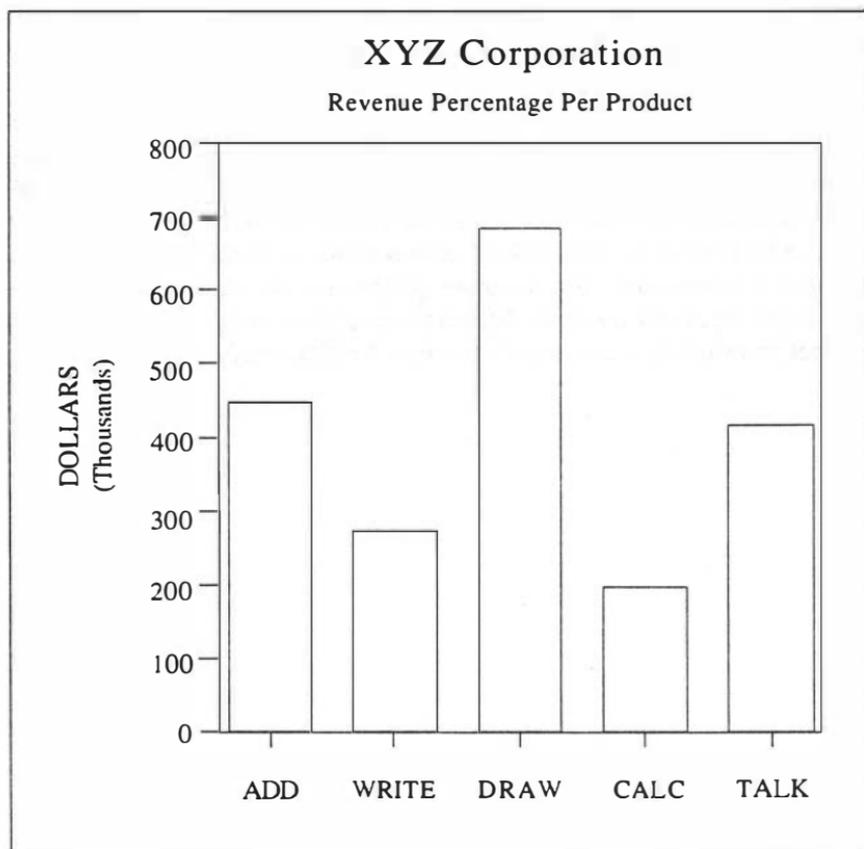
Bar Graph

Stacked-Bar Graphs

A STACKED-BAR GRAPH is another type of bar graph. It, too, uses rising vertical bars to represent data. However, only one set of data extends across the horizontal axis. The other sets are stacked on the first. Its best use is for comparing consecutive values of data from several sets, such as where each product's revenue came from.
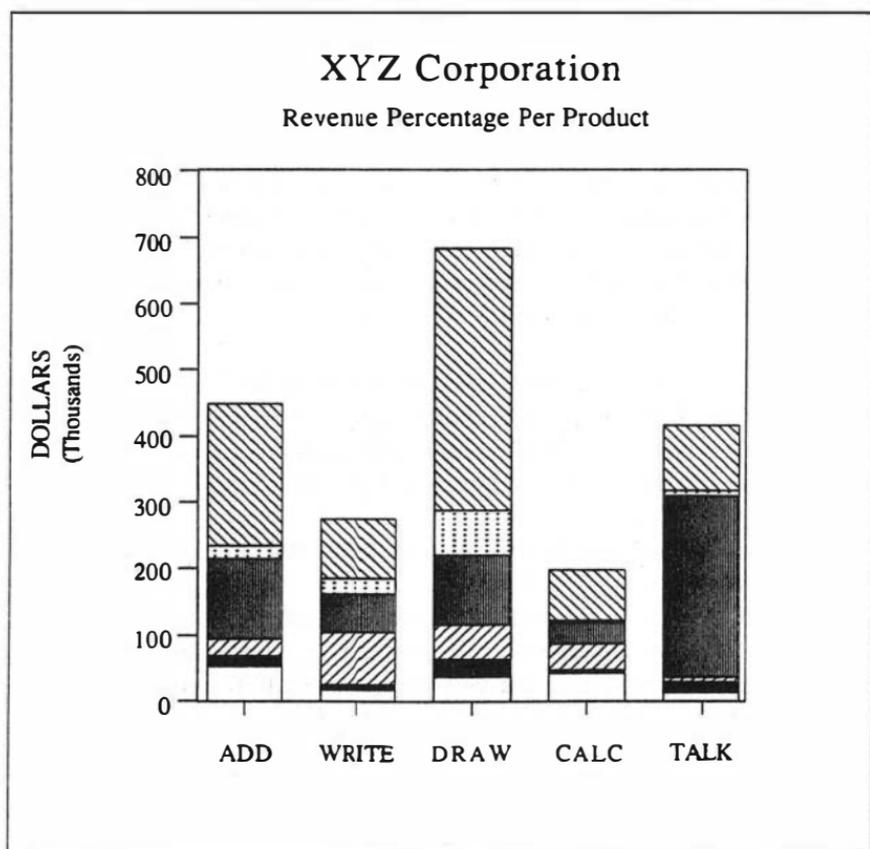
Stacked-Bar Graph

Line Graphs

A LINE GRAPH uses a scale to show amounts or values in a vertical orientation. Multiple sets of data are lined up horizontally on the graph. The values are indicated by lines, labels, or symbols at the height (adjusted to scale) that represents their amount or value. Like the bar graph, the line graph is mainly used to compare one or more series of numbers.

Despite their name, line graphs do not necessarily use lines to depict sets of data. There are four commands you may use singularly or (when possible) in combination to show the values in a line graph. To choose the format of your line graph, use the /Graph Options Format or the /Graph Options Data-Labels command.

The first choice you have when using either the /Graph Options Format Graph Symbols command or /Graph Options Format A-F Symbols command is to use symbols to represent different sets of data. Each set of data uses a different symbol and each piece of data is represented by its sets symbol. The symbol is placed above its value on the horizontal axis (base) at the height that indicates its place on the scale.

In place of symbols, you may use user-definable data labels (using the /Graph Options Data-Labels A-F command) to identify the values on your graph. The data labels are specified by selecting a range in your worksheet and each point on the graph is represented by its own label.

A third choice (available in conjunction with either the /Graph Options Format Graph Lines command or /Graph Options Format A-F Lines command) is to use a line to indicate the position of each data item on the scale. Imagine using an invisible dot to pinpoint the data's position on the scale. Then draw a line connecting the dots from the left to the right side of the graph. One line is used for each range of data. This is the LINES option.

A fourth choice (the default command) is to use a combination of line and symbol. A line is drawn across the graph to represent the position of each piece of data in a range. Then the position of each piece is further identified by the symbol representing its range. This choice is available using either the /Graph Options Format Graph Both command or the /Graph Options Format A-F Both command.
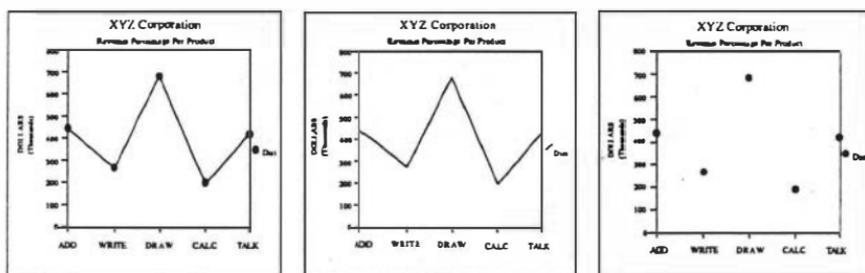
Line Graph Options

Pie Charts

A PIE CHART is round and divides one set of data into slices. The size of these slices depends on the amount or value of each piece of data with respect to that of the entire range. SCO Professional considers the entire chart to be 100% of the range. It automatically calculates (to one decimal place) a percentage for each slice. Totaled, the individual slices equal 100%, or as close to 100% as is possible. Pie charts best demonstrate how one piece of data relates to the entire set.

9

SCO Professional uses RECTILINEAR PIE CHARTS on terminals that are unable to draw pie charts. They contain the same information as pie charts, but they are displayed as rectangles divided into rectangular segments. Pie charts only use Range A for defining parameters. The pie chart shown below graphs the same information as our bar and line graphs, but in a different orientation.
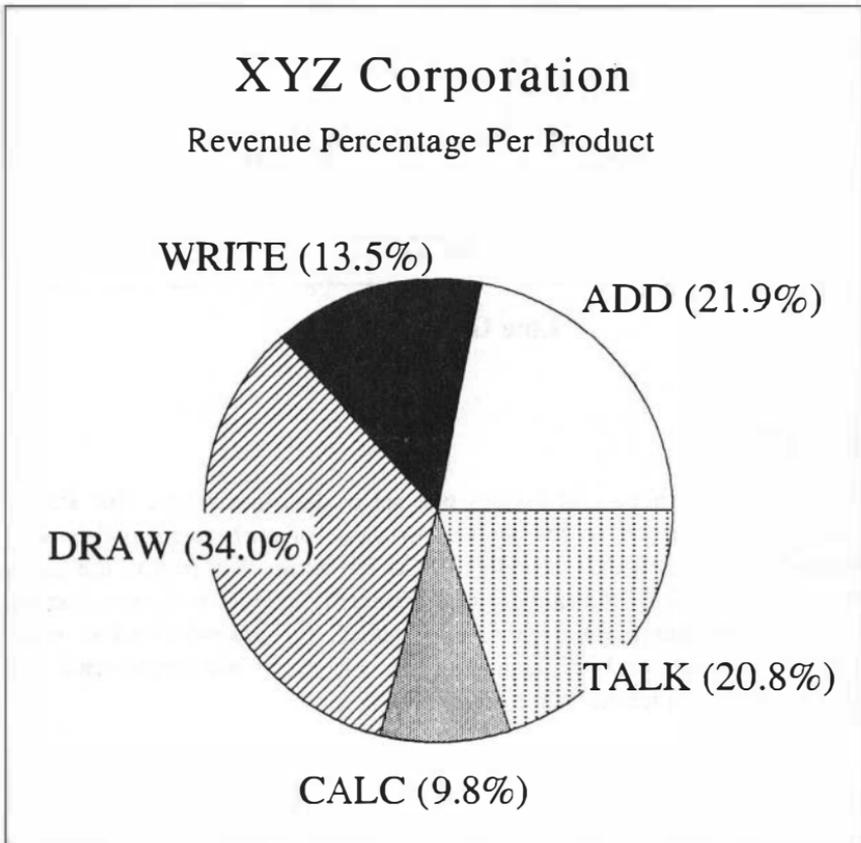
Pie Chart

XY Graphs

Each of the graphs discussed so far allows you to graph multiple sets of data as ranked by one scale of values. In these graphs, the Y axis represents the value scale and the X axis represents labels for each data set. In XY graphs, on the other hand, both the X and Y axes represent scales of values, and the resulting graph is called a SCATTERPLOT, a graph which shows the correlation between two variables. For example, XY graphs can show the correlation between gender and salaries, or between age and cancer rates. In our example, an XY graph is created to test the correlation between increased promotional activity and sales growth in a hypothetical corporation.

In any XY graph, you first choose a data range for the horizontal axis (the X axis) by selecting /Graph **X** and entering the desired range. Next, select a range you want to compare to the X-axis scale by choosing **A** from the Graph menu and entering the range coordinates. For each successive range you want to compare to the X range, select **B** through **F** from the Graph menu and enter each range's coordinates. Up to six sets of comparisons to the X range (A through F) are possible.

In our example, we are simply interested in the correlation between promotional expenses, which is our X axis, and monthly sales, which is our A range. If you were to create this XY graph, you would use the following procedure:

1. Enter a range of promotional expenses as your X range. These values affect the scaling of the X axis.

2. Enter a corresponding range of monthly sales as your A range. For example, if you entered a range of promotional expenses from January to May, enter a range of sales covering the same months. These values affect the scaling of the Y axis.

3. We suggest that you remove graph lines, alter scale settings, and add descriptors such as legends and titles as needed to enhance the appearance and readability of your graph. The commands necessary to accomplish this are described later in this chapter.

9

When you view your completed graph, each data point is shown. In our example, one data point represents each month, each signifying promotional costs versus sales for the month:
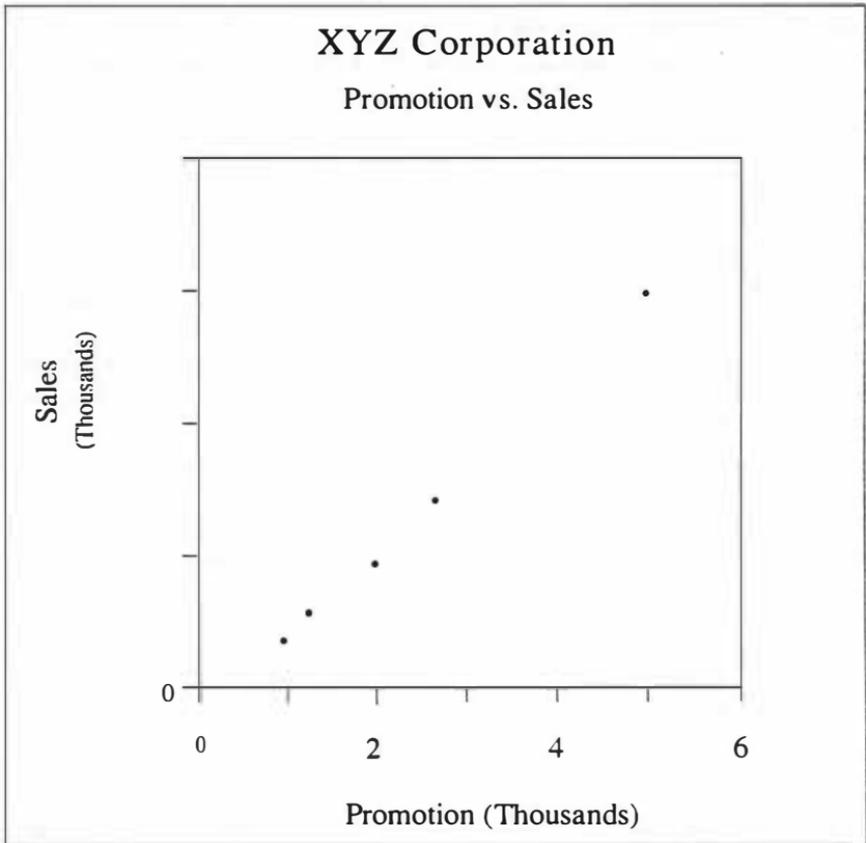
XY Graph

As you can see, in this case there is a positive correlation between promotional spending and sales.

Choosing a Graph Type

To choose a type of graph, first select /Graph Type, then choose: **Bar**, **Stacked-bar**, **Line**, **Pie**, or **XY**. Alternatively, you can highlight the desired command and press ⟨Return⟩. It is a good idea to choose the type of graph, select all the commands you want to use with it, and then view it after you have made your choices. SCO Professional does not display your graph for you until you use the /Graph View command, or the ⟨Graph⟩ key while in READY mode.

Changing Graph Types

To change from one graph type to another while still representing the same data, reselect /Graph Type and enter the type you want. Then, reselect View from the Graph menu to see the result.

Specifying X-Axis Labels or Data

The /Graph X command specifies an X (horizontal) axis. With bar, stacked-bar, and line graphs, this command can be used to place optional labels equidistant along the horizontal border. With pie charts, the labels are placed to the right of the chart.

The X command has a different function when displaying XY graphs. With XY graphs, SCO Professional plots the defined data values associated with the Y (vertical) axis to take into account the new X-axis values. Each piece of data is now plotted to reflect the relationship of the X- and Y-range values. The X-data range remains associated with the X axis, while the Y-axis values reflect each of the additional defined data ranges (A-F) in turn.

Select /Graph X. You are prompted for a range from the worksheet. You may find you need to create a range that suits your needs beforehand. SCO Professional automatically does the rest of the work once you select View. Notice that X labels are not limited to label entries but can also be numbers or formulas.

9

Specifying A-F Ranges

These six letters—A, B, C, D, E, and F— select the different sets of data needed for the graph by using cell ranges from a worksheet. Since at least one cell range must be indicated, selecting A is mandatory. Select /Graph A. Now specify the cell range containing the first set of data from your worksheet and enter it in response to the prompt. For all graphs except pies, you may substitute any other range command choice (B - F) for A.

It is possible that the data you want to use for your graph ranges cannot be found in one convenient range. At times, you may even want to contrast distant parts of your worksheet in a graph. When this happens, copy the cells you want to use into an unused portion of the worksheet so that you can use the range command to specify them.

After you have selected a primary range with the /Graph A command, you may decide you wish to compare similar sets of data to it. Select letters B - F the same way you did A, and specify a range for each set of data desired. The additional sets of data you choose are integrated with that of A. The first values of each range are grouped together, then the second values of each range are grouped together, and so on.

SCO Professional distinguishes between these different sets of data by using different patterns or symbols to represent them. The two types of bar graph (bar and stacked-bar) use different crosshatching patterns. SCO Professional can also use color to distinguish the different data ranges.

Resetting Graph Values

The Reset command allows you to clear graph type and range settings for an entire graph or for individual range settings within a graph. Usually, this command is used after you have saved a graph and wish to use the same data to create a new graph.

Select /Graph Reset. Then indicate what you want reset. Selecting Graph clears all graph settings from the computer's memory. X erases labels from non-XY graphs and the X range from XY graphs. A-F erase individual range settings. However, if it was a data range that was reset, SCO Professional remembers the legend and format selected for it. If you select

another data range to replace the one that was reset, the legends and format will automatically be reused.

Viewing Your Graph

The View command is used to see your graph after you have selected all necessary ranges and options for it. Select /Graph View. Graph settings are remembered with the worksheet in use, even if you are no longer viewing the graph. The graph temporarily replaces the worksheet on your screen, unless an optional output device has been specified in your *graph.pro* file. When you view your graph, it does not look exactly the same as when you print it, unless your graphics terminal is compatible with SCO Professional. However, /Graph View does give you a general idea of how your graph looks when printed.

Once you have viewed a graph, you may decide that you want to return to the worksheet to change some values or add some options. Press any key to return to your worksheet. You may redraw your graph later by using /Graph View or the ⟨Graph⟩ key while in READY mode, or you may use any of the Graph commands to make adjustments.

Viewing Graphs in the X Environment

In the X environment you can modify a spreadsheet in one window and see the effects of your changes simultaneously on a graph in another window. This "hot graph" feature allows you to test projections on a worksheet and see the effects on a graph immediately.

■ **IMPORTANT:** You must have SCO Open Desktop or some version of MIT's X Window System software such as SCO Xsight to use the hot graph feature.

If your SCO Professional worksheet is displayed in a **scoterm** or an **xterm** window in the X environment, you can view a graph of your worksheet in a separate, dynamically updating window. When you choose the /Graph View command in the X environment, a new window opens and displays the graph you have configured for the current worksheet. The window displaying your worksheet remains in view and active.

The hot graph display updates as you modify the current worksheet. For example, you can create "what if" projections on the worksheet and see graphic results of the changes immediately.

If you open a second hot graph window by choosing the /Graph View command again, only the newly opened graph window changes as you modify the worksheet. You can leave the first graph display in view and use the hot graph display to compare various "what if" projections to it.

Depending on the complexity of the graph and the hardware you are using, system performance may be affected by the hot graph feature. If you want to disable the feature to improve performance, exit from SCO Professional and start the program with the command **procalc -H.** The **-H** flag turns off the dynamic updating of graph displays.

If you are using SCO Professional in a **scoterm** window and the default font is not 6x13, you must invoke scoterm with the command **scoterm -fn 6x13** in order to see graphs in their correct form. The same font limitation applies to **xterm** windows as well.

Using Graph Options

The Options command introduces a set of enhancements that allow you to add legends and decide the format for your graphs, among other features. They are used for aesthetic purposes and to offer additional information about the graph.

Select /Graph Options. You may choose as many options as you want before returning to the /Graph menu or the READY mode. Quit takes you back to the /Graph menu. The ⟨Escape⟩ key can be used to back you up one command step at a time. The ⟨Break⟩ key returns you to READY mode.

Legend

The Options Legend command controls labels that act as keys to your graph elements. The legends are assigned to each of the attributes used in your graph. Legends with pie charts are ignored.

Choose /Graph Options Legend. Then select the datar ange by typing the letter of the range: **A, B, C, D, E,** or **F**. The most recent legend for that range is displayed in response to the command. If you want to accept it, press ⟨Return⟩; otherwise, type the desired legend, then press ⟨Return⟩.

A legend can be up to 19 characters long. For the clarity of the display, we suggest you keep legends as short as possible. Sometimes you may find that, when you specify legends, the screen displays more characters than the printer can print.

In addition to typing legends, you could also use a cell's contents as a legend. To do this, specify the /Graph Options Legend command, then type a backslash (\), a cell address or a range name, and bR .

9

The example shown below adds legends to our original stacked-bar graph. These legends explain the meanings of the various shaded areas.
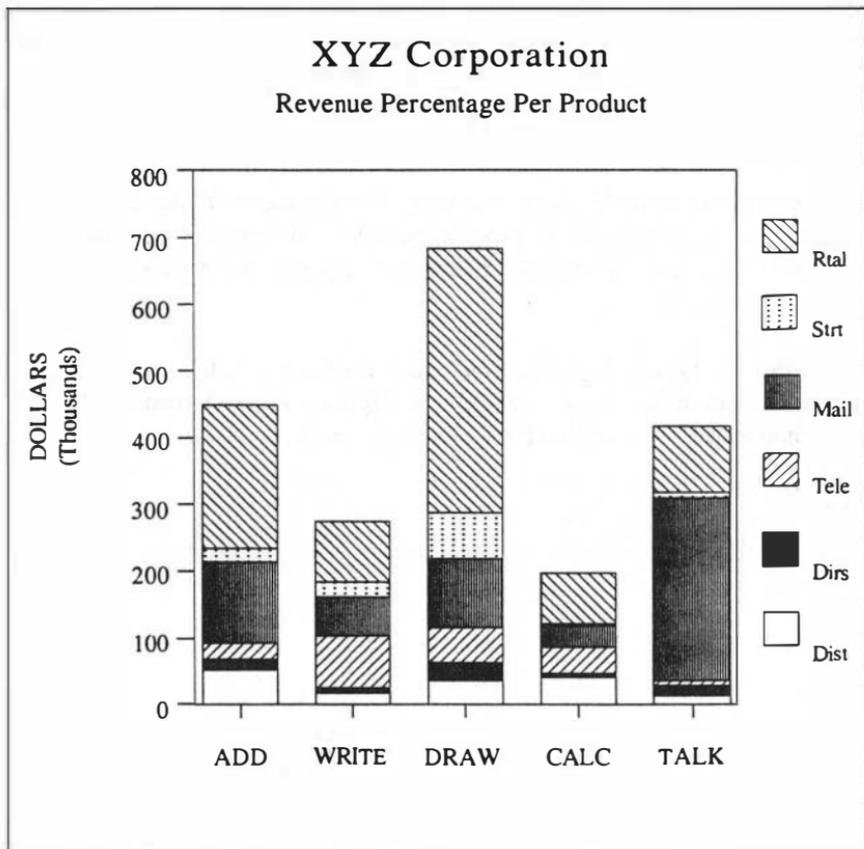
Using Legends with a Stacked-Bar Graph

If you choose a range name, SCO Professional uses the contents of the top left cell of the range as the legend. If you use a cell's contents as a legend, SCO Professional considers the reference to be absolute. If the cell's contents are changed or transferred to another area, SCO Professional continues to use whatever contents are still at the same cell address.

The next time you view your graph, the legends are displayed at the side of the screen. If you reset the corresponding data range, SCO Professional no longer displays the legend but remembers it for future use. When you specify another range to take the place of the first one, the legend reappears.

SCO Professional stays in the Options menu until you use Quit to return to the /Graph menu. If you wish to specify a legend for another range, select /Graph Options Legend again, and specify your new range and legend.

Format

The Options Format command determines the way data points are shown or connected in XY and line graphs. The options include using a line to connect all the points from one range, using symbols to show all the data points (each range using a different symbol), using neither lines nor symbols, or using both a connecting line and symbols for the points.

Select /Graph Options Format. To set an overall format, select Graph. To select a particular range from the graph, choose the range by its letter (A through F). Now select the type of format you wish to use: Lines, Symbols, Neither, or Both. If you select Neither, you must use the /Graph Options Data-Labels command to designate identifiers for your data.

The next time you view your graph, the chosen formats are displayed. SCO Professional stays in the Format menu after you have chosen a format option. You may format additional ranges at this point. To return to the Options menu, select Quit.

Data-Labels

The Options Data-Labels command specifies a range whose contents are used to label the data points of a given range (A—F) in all graphs except pie charts.

Select /Graph Options Data-Labels. Choose the letter of the data range that you wish to label (A through F). You are prompted for the range of cells that contains the information you want to use as labels. (If you previously selected a range, it is displayed.) Any formula or number in the range you select is converted to a label according to its current value. A range or global command affecting the format of a cell in the range specified

9

determines the format of its display in the graph. If you previously selected a range, it is displayed. As the last step, select the alignment of the labels in relation to the data points by typing the first letter of your choice. Choose Centered, **Left**, **Above**, **Right**, or **Below**. For bar graphs, always choose **Above** for bars with positive values and **Below** for bars with negative values.

The next time you view the graph, your data-labels are displayed in the appropriate positions. SCO Professional stays in the Data-Labels menu until you issue a Quit command. If you use a command from the /Graph Reset menu to erase a data range at some later time, you also erase the data-labels associated with that range.

Titles

The Options Titles command creates main titles, subtitles, or individual axis titles (X or Y).

Select /Graph Options Titles. Now choose to enter a First line in the graph title, a Second line in the graph title, a title for the **X**-horizontal axis, or a title for the **Y**-vertical axis. The last title specified for each option is displayed. To accept it, press ⟨Return⟩. To change it, press ⟨Escape⟩ and enter the title of your choice in its place. SCO Professional has automatically placed you in the EDIT mode to make writing and revising easier. You may use up to 39 characters in a title. However, we suggest that titles, like legends, be kept as short as possible. While some lengthy titles appear acceptable when displayed on the monitor, they may contain more characters than the printer can print. The first line of a graph title prints in a larger font size than the second line does.

Instead of typing a title, you may use the contents of a cell as a title. To do so, start your Title entry with a backslash (\) and either type the address of the cell or a range name. Press ⟨Return⟩. If you type a range name, the contents of its top left cell is used as the title. Should the cell contents be changed before you use the /Graph Save command, any contents at the location you specified are used as the current title. Numbers and formulas assume their current values and can also be used as titles.

Both graph titles (First and Second) are centered at the top of the graph. Graph titles are independent of the filenames that you choose for the Save and Name commands. X-axis titles appear below the horizontal axis and Y-axis titles appear parallel to, and to the left of, the vertical axis.

SCO Professional stays in the Options menu until you issue a Quit command to go back to the Graph menu.

Grid

The Options Grid command adds horizontal, vertical, or both horizontal and vertical grid lines to a graph. It is also removes grid lines from all graphs (except pie charts, which do not have grid lines). In the example below, grid lines have been added to our bar graph example.

9
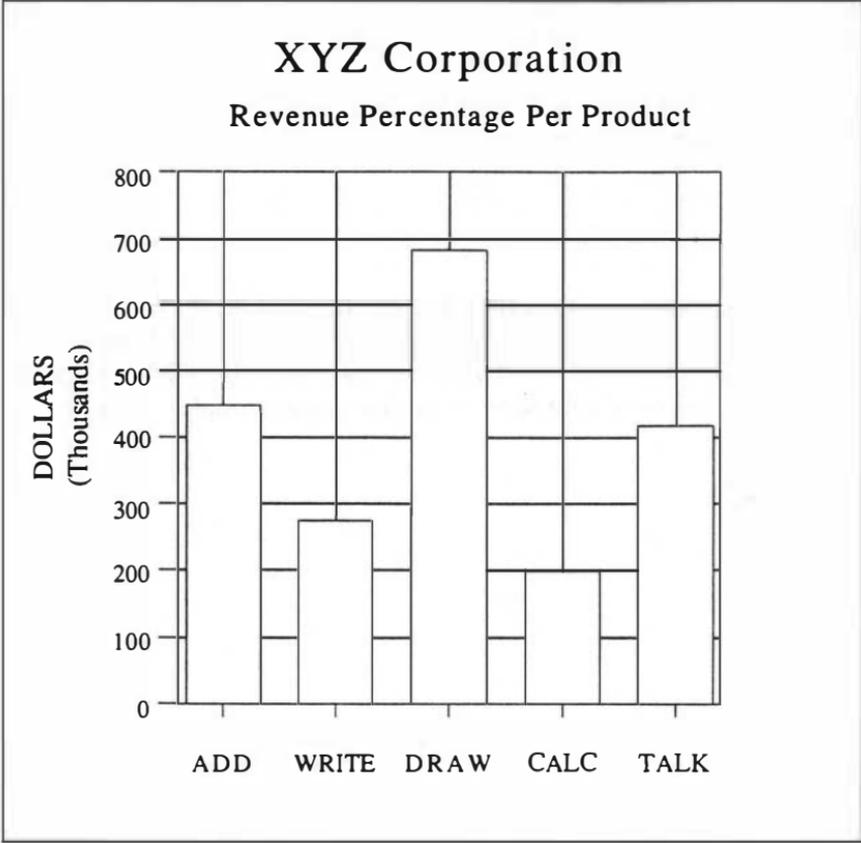
Graph Options Grid

Choose /Graph Options Grid. Your choices are Horizontal lines, Vertical lines, or Both vertical and horizontal lines. To remove all grid lines, choose Clear.

If grid lines are added, they appear at each scale mark in the direction you specified when you view your graph. Scale marks are "ticks" (lines) equally spaced along the axes.

Scale

The Options Scale command allows you to move between automatic and manual scale settings in all graphs (except pie charts, which do not use scaling). It also allows you to specify a "skip" factor for the X-axis labels, suppress or print scale indicators, and use international date and time formats for your scales.

Usually, you want to use automatic scaling. At times, you may wish to take advantage of manual scaling to get a close-up view of a particular portion of an XY graph. For example, you may have created an intricate engineering model and wish to see exactly where two points intersect. If the automatic scaling does not provide sufficient detail, you can use manual scaling to change the scale to focus on a specific portion of the graph.

Scaling is initially set to Automatic in SCO Professional. Once you have chosen the data for your graph, Professional decides what increments to use for scaling. For example, if each piece of data you chose for a bar graph varies by about 10 points, the increment for the scale numbers is 10. The scale numbers (increments) used depend primarily on the highest and lowest ranges. When the values of the graph data are displayed, the length of each bar is determined by the scaling.

If you select Manual scaling, you must specify the upper and lower limits of the scale. Choose /Graph Options Scale Y-scale (or X-scale) Lower, and type a number for the lower-scale limit. Enter your choice and press ⟨Return⟩. Then choose Upper and type and enter the upper scale limit. To ensure that the scale includes zero in bar and stacked-bar graphs, SCO Professional ignores a positive lower limit or a negative upper limit.

9

If you select Manual scaling, you cannot change the scale increments your-self. The increments are established by SCO Professional based on the set-tings you specify as the upper and lower limits.

To use the command, select /Graph Options Scale Y-scale (or X-scale). Then select Y-axis, X-axis, or Skip. The X-axis scale setting is only used with XY graphs.

If you chose Y-axis or X-axis, you now have to specify Automatic or Manual scaling. Scaling is initially set to Automatic. If Manual is chosen, specify upper- and lower-scale limits by choosing Lower first and typing a number for the lower scale limit. Enter your choice by pressing bR . Then choose Upper. Type in and enter an upper-scale limit. To ensure that the scale includes zero in Bar and Stacked-bar commands, SCO Professional ignores a positive lower-scale limit or a negative upper-scale limit.

For both Manual and Automatic scaling, SCO Professional uses integer numbers as upper and lower limits. Although you set the limits with Manu-al scaling, SCO Professional can only use the whole numbers closest to the limits you set. Tick marks are drawn next to each scale number, evenly spaced along the axis. If a range of data point values is too varied (for example, a range that has some values differing by 5 or 10 points but lowest and highest values differing by one or two million), the highest values may not be able to fit on the graph and are excluded. Otherwise, SCO Profes-sional tries to include all the data values in the graph.

If you select Skip, you need to type a number for the skip factor and enter it. Then, starting from one, every nth entry (depending on the number you chose) is taken from the X range and used as a label along the X (horizon-tal) axis. For example, if five is the skip factor, the first, sixth, eleventh (and so on) entries from the range are used as graph values.

If you select Indicator from the X-scale or Y-scale menu, you can either suppress or allow the printing of the scale indicator (such as *thousands*). The default setting is Yes, allowing the printing of the scale indicator. Choose No to suppress the scale indicator.

If you select Format from the X-scale or Y-scale menu, you are asked to select the format of your scale data. The choices are the same as those presented in an earlier chapter. These include international date and time

formats, scientific notation, and currency formats. See Chapter 5, "Changing the Worksheet Format," for more information on these formatting choices.

When you have used the Options Scale command, SCO Professional continues to return you to the Scale menu until you choose Quit or press ⟨Escape⟩. This takes you back to the /Graph Options menu.

Graph Options Scale Format

The /Graph Options Scale Format command allows you to control the format in which scale numbers on a graph are displayed. Pie charts ignore this setting. The initial setting used to display your graphs is the general format. This is a fairly standard format choice, but with SCO Professional you have many additional choices: Fixed, Scientific, Currency, Comma, Percent, Date, and Text. The corresponding displays are the same as those described in Chapter 5, "Changing the Worksheet Format."

Choose /Graph Options Scale Format. Notice that before you can use this command, you must set the necessary options in /Graph Options Scale. (For example, you have to choose X-axis or Y-axis.) Select your desired format and, in response to the prompts, type and enter the additional information (such as, number of decimal places for the Fixed option). After you have entered this information, SCO Professional returns you to the Options menu. The next time you view your graph, the scale numbers are displayed using the format you have chosen.

Color and Black and White

The Color and B&W commands decide whether your data bars, lines, or symbols are displayed in color or in black and white.

Choose /Graph Options Color or B&W If you have chosen B&W , all data bars are displayed in contrasting patterns. When you choose Color, SCO Professional displays symbols, data bars, and lines from different ranges in various colors if this is possible on your terminal. Titles, legends, scale numbers, axes, and grid lines are always displayed in a uniform color. Remember, SCO Professional can only access the existing capabilities of your terminal. See the *SCO Professional Configuration Guide* for information on how to create a #GRAPHICS section, which enables the color capabilities of your terminal.

9

Saving Your Graph
to a Separate File

The Save command stores a current graph in a graph picture file. The command adds the extension *.gph* to the filename to distinguish it from other types of files. The file can then be printed or used in other programs.

To use the command, select /Graph Save. Specify a filename either by typing one and pressing ⟨Return⟩ or by choosing one from the menu of existing *.gph* files. If you choose an existing file name, SCO Professional asks if you wish to erase the current graph before it accepts the new one. Once erased, the file cannot be recalled. The same restrictions that apply to worksheet filenames apply to graph filenames.

Once the filename has been chosen and entered, a representation of the graph's image is stored in the named file.

Naming Graph Settings

SCO Professional has a set of commands grouped in a menu under the /Graph Name command. These commands (Create, Use, Delete and Reset) identify and manage graphs and their settings as part of a worksheet. Named graph settings are different from graph files (created with the /Graph Save command). The /Graph Save command generates a separate file to be sent to a printer or graphics device. The settings specified using the /Graph Name command are saved under a specified name along with your worksheet in a worksheet file.

■ NOTE: Unless you save the worksheet by using /File Save, any changes made with the following commands cannot be recorded.

Create

The /Graph Name Create command stores all the settings for each graph separately. Because of this command, you can create more than one graph from a worksheet by saving each graph under a separate name. Graph settings and range locations can be saved with this command. Then, by using the Name Use command, you can reopen the group of graph settings.

Select /Graph Name Create. Enter a graph name up to 15 characters long. If you use an existing name, SCO Professional erases the old graph settings and replaces them with the new ones. Once this has happened, the only way to return tq the old graph settings is to retrieve the file without first saving it. We suggest you exercise caution when using an existing graph name. SCO Professional returns to the /Graph menu after you issue Name Create. The graph settings are saved in the worksheet file identified by the name you chose.

The graph settings you save with the Name Create command are saved along with all other worksheet settings when you use the /File Save command. The /File Retrieve command retrieves the worksheet and all its named graphs. The /File Combine command does not retrieve graph settings. Since the graph settings are saved as part of the worksheet, the /Worksheet Erase command clears the worksheet and its settings from memory, including graph settings and their names. The /Graph Name Delete and the /Graph Name Reset commands are used to delete all named graph settings without deleting the worksheet. /Graph Name Reset cancels all named graphs.

Use

The /Graph Name Use command restores named graph settings in the worksheet so that you can view or modify them. Select /Graph Name Use. Now type the graph name. SCO Professional uses the named graph settings to redraw the graph on the monitor.

Because SCO Professional saves the locations of cells in the specified ranges rather than the contents of the cells, you may change the graph's contents by changing the information in your worksheet. Use the /Graph Name Use command, and SCO Professional evokes the stored graph settings and uses them with any new information contained in the worksheet.

9

Delete

The /Graph Name Delete command deletes named graph settings individually. To use it, select /Graph Name Delete. The Specify command does not wait for confirmation before it erases the graph name and settings. Make sure you are deleting the right group of graph settings before pressing ⟨Return⟩. After you have used this command, you are returned to the /Graph menu.

Reset

The /Graph Name Reset command erases all named graph settings in a worksheet. Before you use this command, double check the graphs and make sure you are not using them anymore. Once the graphs are erased, they cannot be recalled unless the worksheet file is not saved.

Select /Graph Name Reset. All named graphs are erased. As with the Name Delete command, you are not prompted for confirmation. After you have selected this command, SCO Professional returns you to the /Graph menu.

Printing Your Graph

To print your graph, select /Graph Print. The following menu and screen are shown:

```
A1:                                              default        Print
Colors Fonts Location Page-Feed Select Go Quit
Set the colors of the graph


Colors                      Font Types              Graph Location
---------                   ----------              --------------
Main Title:     1           Main Title:     1                  Full page
Sub-Title:      1           Sub-Title:      1
Grid:           1           Text:           1       Page length:  11.000
Range A:        1                                   Page width:    8.500
Range B:        2           Font Sizes              Graph length: 11.000
Range C:        3           ----------              Graph width:   8.500
Range D:        4           Main Title: 1638        Top Margin:    0.000
Range E:        5           Sub-Title:  1092        Left Margin:   0.000
Range F:        6           Text:        546        Page Feed: Manual




14-Feb-91  08:00 AM       sample.wki
```

The Colors and Fonts commands allow you to change the color and font settings for titles, grid lines, and A-F ranges. From either the Colors or the Fonts menu you can select an item to change. You are prompted to enter a number from 0-65535 that represents a color or font on your printer or graphics device. After entering the correct value, press ⟨Return⟩. See Appendix B, "SCO Professional Graphics Drivers," of the *SCO Professional Configuration Guide* or ask your system administrator for the correct color or font values. You can also use the Fonts settings to improve your graph's appearance, as explained in the "Making Fine Adjustments for Graph Printing" section in this chapter.

9

The Location command allows you to choose from a menu of sizes and page locations for your graph. From the location menu, you can make your graph print full-page, half-page (top, bottom, left or right), or in any quadrant of the page (top left, top right, bottom left, bottom right). As you

move along the Location menu from left to right, you can select these options by choosing the appropriate selection from 0 to 8. You can also choose Manual if you want to make fine adjustments to a pre-located graph's appearance. See the "Making Fine Adjustments for Graph Printing" section in this chapter.

The Page-Feed command allows you to set page advance to manual or automatic. On the automatic setting, the printer advances one page each time a graph is drawn. On the manual setting, the printer does not advance until instructed to do so. The manual setting is default.

The Select command allows you to choose, with your arrow keys, the printer or graphics device on which you want to print. You are presented with a menu of printers and graphics devices, which have been defined by your system administrator as being available for graph printing. To select the appropriate printer or graphics device, either type its name or move to it with the arrow keys, pressing ⟨Return⟩ when its name is highlighted. For more information on how to configure a printer or graphics device, see the *SCO Professional Configuration Guide*.

The Go command sends your graph, along with any settings you have chosen from the /Graph Print menu, to the printer or graphics device you previously chose with the Select command. You must select a printer or graphics device before choosing Go.

The Quit command exits the Print menu, and returns you to the /Graph menu. If you have not chosen Go, the graph is not printed, and the settings you have made in the Colors, Fonts, Location, Page-Feed, and Select menus are lost.

Making Fine Adjustments for Graph Printing

If you find a printed graph unsatisfactory after specifying a location for it with the numbered commands in the /Graph Print Location menu, you can make several minor adjustments. You can improve a pre-located graph's appearance by adjusting both its location and its font sizes. The Manual command in the /Graph Print Location menu and the Size command in the /Graph Print Fonts menu allow you to do this. These same menu options appear in the GraphPrint option of the Professional Manager.

To make fine adjustments to the location of a printed graph on the page, select Manual from the /Graph Print Location menu, and then use the Graph-size and Margins options in the Manual menu.

Reset the position of the graph by changing the top and left margins in the Margins menu. Set the length and width (the vertical and horizontal measurements of the graph) in the Graph-size menu.

These settings are all expressed in inches. They appear on the screen when you are in the /Graph Print menu or in any of its submenus. If a setting you specify requires updating other settings, these changes appear automatically on the same screen. If you enter a graph size or margin measurement that is too large, an error message tells you the limits of the setting.

To define the most appropriate font sizes for your printed graph titles and text, choose Size in the /Graph Print Fonts menu, and then choose the Main-Title, Sub-Title, or Text command and enter the font size you want at the prompt. Note that the default sizes are even multiples of 546. To create proportional fonts, enter sizes that are evenly graduated. The font size numbers you specify are shown on the screen associated with the /Graph Print menu.

9

The following example adjustment of a graph printout tells how to change both the location and the font sizes of a graph.

1. While the worksheet file for your graph is active and you are in SCO Professional's main menu, select the Graph Print Location command.

2. Select 1 from the Location menu. This sets the parameters for printing the graph on the upper half of the page, as shown in the following sample screen:

```
                                                    lp          Print
Colors Fonts Location Page-Feed Select Go Quit
Select the portion of the device on which to print the graph


Colors                  Font Types              Graph Location
------                  ----------              --------------
Main Title:   1         Main Title:   1                Upper half
Sub-Title:    1         Sub-Title:    1
Grid:         1         Text:         1         Page length:  11.000
Range A:      1                                 Page width:    8.500
Range B:      2         Font Sizes              Graph length:  5.500
Range C:      3         ----------              Graph width:   4.250
Range D:      4         Main Title: 1638        Top Margin:    0.000
Range E:      5         Sub-Title:  1092        Left Margin:   2.125
Range F:      6         Text:        546        Page Feed: Manual
```

Note the settings in the Graph Location column that reflect the location of the graph on the top half of the page.

3. Print out the graph. If the results are unsatisfactory, for example, the fonts are now too large to fit next to the graph, and the graph is too small to show significant details, then make the following adjustments.

4. In the /Graph Print Location menu, select the Manual Margins Left command. Change the left margin setting from 2.125 to .125 inches to make as much room as possible for the graph. Press ⟨Return⟩.

5. From the Manual menu select the Graph-size Width command and change the graph width from 4.25 to 8 inches to widen the graph. Press ⟨Return⟩.

6. Choose Quit from the Manual menu. The Print menu appears. From the Print menu select the Fonts Size Main-Title command, and change the size from 1638 to 546. Press ⟨Return⟩.

7. Select the Fonts Size Sub-Title command from the Print menu. Change the size from 1092 to 546. Press ⟨Return⟩.

    The Print parameters appear as follows:

```
                                              lp          Print
Colors Fonts Location Page-Feed Select Go Quit
Set the font type and size


Colors               Font Types            Graph Location
──────               ──────────            ──────────────
Main Title:   1      Main Title:   1             Manual
Sub-Title:    1      Sub-Title:    1
Grid:         1      Text:         1       Page length:   11.000
Range A:      1                            Page width:     8.500
Range B:      2      Font Sizes            Graph length:   5.500
Range C:      3      ──────────            Graph width:    8.000
Range D:      4      Main Title:   546     Top Margin:     0.000
Range E:      5      Sub-Title:    546     Left Margin:    0.125
Range F:      6      Text:         546     Page Feed: Manual
```

9

8.   From the print menu choose **Go** to print the graph.

There is a limit as to how small a font you can specify. If text still overlaps
or runs off the edge of the graph when you reduce the font to the smallest
size, then edit the text.

Using the Clipboard

SCO Professional uses a clipboard that is integrated with other SCO prod-
ucts. The /Graph-Transfer command allows you to send graphs to, or
remove graphs from, that clipboard. To use this command, select /Graph
Graph-Transfer. You are given two choices, to Copy graphs to the Clip-
board or Retrieve graphs from the Clipboard.

If you are copying to the Clipboard, you are prompted to enter the name of
the graph that you wish to send. If you are retrieving a graph from the
Clipboard, you are presented with a list of available graphs to choose from.
After completing your action, you are returned to the /Graph menu.

≡ Chapter 10

Printing Worksheets

Contents of This Chapter   10-1

≡ 10

Printing Worksheets

SCO Professional print commands allow you to create a printed version of either your entire worksheet or parts of it. This printed version is known as a HARD COPY. Print commands also allow you to save your worksheet to a file in a format suitable for merging with another document. This electronic version of a printout is known as SOFT COPY. Print commands are not used to print graphs. Information on printing graphs is found in Chapter 9, "Creating Graphs."

Contents of This Chapter

This chapter is organized into the following sections:

- "Printing to a Printer or to a File " explains the difference between sending your worksheet directly (after formatting) to a printer or sending it to a file for later printing, merging with other documents, or editing.

- "The Main Print Menu" introduces you to the Print menu and the commands required for printing.

- "The Printing Procedure" describes the general procedure for printing a worksheet.

- "Specifying a Non-Default Printer" tells how to pick a new printer.

- "Choosing the Print Range" shows you how to pick the area of your worksheet that you want to print.

- "Choosing Print Options" describes the many formatting options you can choose to enhance the appearance of your printed worksheet including margins, borders, headers, and footers.

- "Clearing Print Option Settings" describes how you can reset some or all of the print options you have chosen to their default values.

- "Aligning Paper in the Printer" tells you how to realign the printer, if necessary.

- "Sending Prepared Copy to the Printer or File" explains what to do once you are ready to print or save your worksheet to a print file.

- "Advancing Paper in the Printer" and "Starting a New Page" show you how to insert lines or pages between ranges you have selected for printing.

- "Exiting the Print Menu" describes how to leave the various print menus.

Printing to a Printer or to a File

The /Print Printer and /Print File commands determine where the output of your print session is sent. If you select /Print Printer, your work is sent to a designated printer once you have selected all of the appropriate Print commands described later in this chapter. If you select /Print File, your work is saved to a print file after formatting.

Creating a Hard Copy

Selecting /Print Printer moves you to the main Print menu, where you can choose the commands needed to produce a formatted, hard copy of one or more worksheet ranges. When you leave the Print menu, this copy is sent to the designated printer for printing. SCO Professional saves your current print settings if you save the worksheet.

Any printers you want SCO Professional to access must be defined by using the **pconfig** configuration utility as described in Chapter 3, "Setting Up Your Printers and Graphics Devices," of the *SCO Professional Configuration Guide*. In addition, a default printer may be assigned by using either the **pconfig** utility or the /Worksheet Global Default Printer Name-select command as described in Chapter 2, "Worksheet Basics," of this guide.

Creating a Print File

If you select /Print File, you must then choose a name for your print file before moving to the main Print menu. SCO Professional lists all existing print files in your current directory. Select one for re-use, or create a new file by entering a new name. SCO Professional automatically adds the *.prn* extension. Naming files is fully described in Chapter 2, "Worksheet Basics." After you format one or more print ranges, SCO Professional saves your work to the print file that you just named.

When you are ready to print, edit, or export a print file, you must use a standard ASCII text (or word processing) program. When you are ready to print the *.prn* file, issue your usual operating system print command from an operating system prompt.

A popular use of the /Print File command is to create files that can be edited by using a word processor. The command allows you to save a text version of your entire spreadsheet or a portion of it. You can then transfer it into a text processor to generate letters or reports.

The Main Print Menu

After choosing /Print Printer or choosing a print filename with the /Print File command, you are shown the main Print menu. This menu consists of the Range, Line, Page, Options, Clear, Align, Go, Select, and Quit commands. Range, Go, and Quit are the only mandatory commands for printing. All other commands are optional.

In the main Print menu, you can select which range or ranges of your worksheet to print or save to a file by using the Range command. To print or save the whole worksheet, specify a range that contains the entire worksheet; then format the range by using the procedure found later in this chapter. To print or save a series of smaller ranges, specify and format each range of the series separately.

The printed version of the range(s) you select is affected by other print commands. You can specify format options such as margins, headers, or footers. In addition, you can print your worksheet showing either the currently displayed values or the underlying cell formulas. After formatting each range, send it to the printer or the print file by using the Go command. If you are printing a series of ranges, you can separate the ranges by a blank line or a page by using the Line and Page commands described later in this chapter.

The Printing Procedure

The general procedure for printing is described here. If you are using more than one range, the procedure is repeated for each range. Throughout the rest of this chapter, each group of commands is discussed in the order presented in the following steps. If you are printing to a printer, make sure that the printer is turned on before using this procedure.

1. Select /Print Printer or /Print File. Specify a filename if you chose File.

2. If you want to send print text with a print driver other than the system default, choose a different driver with the Select command.

3. Specify a print range.

4. Specify any of the following print options for the range you are currently formatting: page format (Margins and Page-length), extra text (Header or Footer), range borders (Borders), printing format (Formatted and Unformatted), and cell contents (As-displayed or Cell-formulas). There is an additional option for printer control (Setup). This option allows you to use a series of special characters to control such aspects of printer use as changing the typeface or type size.

5. At any point before using the Go command (step 7) you may select Clear to erase range and options settings, either individually or as a group.

6. If you are printing to a printer, select **A**lign to align the paper in the printer.

7. To prepare the formatted range for the printer or the print file (depending on which you specified previously), select **G**o. The range is printed or saved to a file when you select Quit.

8. If there are more ranges to be printed, decide if you want to separate them from each other. If you choose the Line command, the ranges are separated by one line for each time the command is selected. If you choose the Page command, each range is separated by one page.

    Repeat steps 2,3,4,5,6,7, and 8 for each range you want to print. You may want to specify a different driver for your worksheet's titles, insert some space by using the line command, or print some portions of your worksheet in landscape mode. When all of your ranges have been prepared, proceed to step 9.

9. If you are done and have no more ranges to prepare, select Quit. The selected text is then sent to the printer or saved in the specified file. You must select Quit each time you wish to print.

Specifying a Non-Default Printer

If you chose /Print Printer, you may want to print to a printer other than the system default. The /Print Printer Select command allows you to substitute the default print driver with one of the others available to you. When you quit the main Print menu, output is sent to the current printer that you selected, or, if no printer is selected, to the system's default printer.

To change the current printer, choose Select from the main Print menu. A screen similar to the following appears:

```
A1:                                                              PRINT
Enter printer name:

HP2563              HP2563B 350 lpm line printer

HP2563       HP2563B       HP2564       HP2564B      alps alps-land
desk jet     direct        epson        epson.side hplaser
hplaser.side imagen        laser        laser-land laserjet
laserjet-land look         okidata      okidata-land paint jet
primage      qume          qume.side    qume.wide wldirect
```
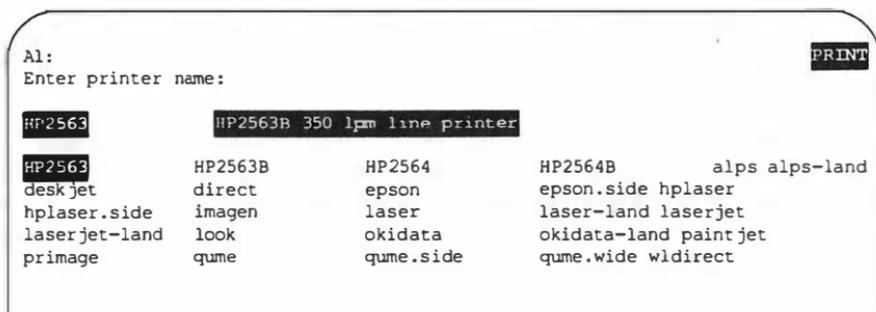
Select the desired print driver and press ⟨Return⟩.

Users can select printers with bitmap capabilities or landscape modes to print ranges in a sideways fashion. Information on how to configure these printers is found in the *SCO Professional Configuration Guide*.

If you select a printer that does not support landscape mode, your printout is lengthwise with columns across the top margin. If you select a landscape mode printer, your printout is sideways, allowing for a greater number of columns but a smaller number or rows.

The printer selected with the /Print Printer Select command is the default printer as long as you remain in the Print menu.

Choosing the Print Range

The Range command is selected from either the /Print Printer menu or the /Print File menu before you select Go. If you are reprinting the most recently specified range, there is no need to select this command. Otherwise, the command must be used.

To use it, select /Print Printer Range or /Print File Range. Specify the range with either your arrow keys or by typing the cell addresses that define the range or the range name. Press ⟨Return⟩ to enter it. Your defined range is now ready for formatting or printing.

Labels overlapping the specified print range are truncated at the right margin of the range.

Choosing Print Options

As you saw in the printing procedure, step 4 is choosing one, several, or none of the options available from the /Print Printer Options or /Print File Options menus. These options are introduced in the order in which they were presented in the printing procedure.

When you save your worksheet, all selected print options are saved with it; so the next time you retrieve the worksheet, you can print it using the same options. However, the options are returned to their default values if you erase the worksheet. You may reset them for any new worksheet that you create.

As an example of the uses of Print Options, here is a sample worksheet showing a retail store's budget for 1991:

```
E24: @SUM(E9..E20)                                                    PCINT
Enter print range: B7..E24

          A         B          C          D          E          F
   6                Lease    Computer   Supplies   Utilities    Payroll
   7
   8
   9     1-91    $2,500.00    $500.00    $500.00   $1,200.00   $4,000.00
  10     2-91    $2,500.00    $500.00    $502.50   $1,206.00   $4,000.00
  11     3-91    $2,500.00    $500.00    $505.01   $1,212.03   $4,000.00
  12     4-91    $2,500.00    $500.00    $507.54   $1,218.09   $4,000.00
  13     5-91    $2,500.00    $500.00    $510.08   $1,224.18   $4,000.00
  14     6-91    $2,500.00    $500.00    $512.63   $1,230.30   $6,000.00
  15     7-91    $2,500.00    $500.00    $515.19   $1,236.45   $6,000.00
  16     8-91    $2,500.00    $500.00    $517.76   $1,242.64   $6,000.00
  17     9-91    $2,500.00    $500.00    $520.35   $1,248.85   $4,000.00
  18    10-91    $2,500.00    $500.00    $522.96   $1,255.09   $4,000.00
  19    11-91    $2,500.00    $500.00    $525.57   $1,261.37   $8,000.00
  20    12-91    $2,500.00    $500.00    $528.20   $1,267.67   $8,000.00
  21
  22    ----------------------------------------------------------------
  23
  24            $30,000.00  $6,000.00  $6,167.78  $14,802.67  $62,000.00
14-Feb-91   08:00 AM
```

A range of this budget, B7..E24, is then formatted using options from the Print Options menu. The options used, which are described in detail later in this section, are margins, borders, page-length, a header, and a footer.

Sample Print Options Settings

Option	Setting
Left Margin	4 spaces from left side of page
Right Margin	62 spaces from left side of page
Top Margin	1 line from top of page
Bottom Margin	1 line from bottom of page
Border Rows	B6..E6
Border Columns	A9..A24
Page-Length	30 lines
Header	@ I Yearly Store Budget I #
Footer	I Santa Cruz, California

SCO Professional's print dimensions are always given in vertical lines and horizontal spaces. To illustrate our example, we are using a page 66 spaces wide by 30 lines long. Here is the printed output using our selected options:

```
29-Aug-91              Yearly Store Budget                   1


              Lease     Computer     Supplies    Utilities

  1-91     $2,500.00    $500.00      $500.00     $1,200.00
  2-91     $2,500.00    $500.00      $502.50     $1,206.00
  3-91     $2,500.00    $500.00      $505.01     $1,212.03
  4-91     $2,500.00    $500.00      $507.54     $1,218.09
  5-91     $2,500.00    $500.00      $510.08     $1,224.18
  6-91     $2,500.00    $500.00      $512.63     $1,230.30
  7-91     $2,500.00    $500.00      $515.19     $1,236.45
  8-91     $2,500.00    $500.00      $517.76     $1,242.64
  9-91     $2,500.00    $500.00      $520.35     $1,248.85
 10-91     $2,500.00    $500.00      $522.96     $1,255.09
 11-91     $2,500.00    $500.00      $525.57     $1,261.37
 12-91     $2,500.00    $500.00      $528.20     $1,267.67


----------------------------------------------------------

          $30,000.00   $6,000.00   $6,167.78   $14,802.67



                    Santa Cruz, California
```

Notice that there is extra space around the header and the footer. SCO Professional automatically reserves three lines for a header and footer on each page. In this way, the actual number of lines available to print a worksheet range on each page equals the Page-Length minus the Top Margin, the Bottom Margin, Border rows, and three lines each for the Header and Footer (whether they are used or not.) In our example, the available page size is Page-Length (30 lines) minus the Top and Bottom Margins (1 line each), the Border Row (1 line), and a Header and Footer (3 lines each), for an available area of 21 lines.

The rest of this section explains how to alter each of these worksheet settings.

Margins

The Options Margins command allows you to set left, right, top, and bottom margins for your printout. SCO Professional has its own default settings for margins, which may be set with the /Worksheet Global Default Printer command. Refer to Chapter 2, "Worksheet Basics."

This command is particularly useful when using wide paper, which can print long lines. The default settings are used whenever you do not supply your own margin settings with the Options Margins command.

The default margin settings for SCO Professional assume a standard 8-1/2" by 11" sheet of paper with 66 lines per page:

Margin	Location
Left	4 spaces from left edge of paper
Right	76 spaces from left edge of paper
Top	2 lines from top of paper
Bottom	2 lines from bottom of paper

These margins are used if not changed with the /Worksheet Global Default Printer or Options Margins commands.

To change margins, select the /Print Printer Options Margins or /Print File Options Margins. Choose which margin you want to set: Left, Right, Top, or Bottom. Specify the lines for top and bottom margins or the spaces for left and right margins by typing the number and pressing ⟨Return⟩. When setting the right margin, remember the number of spaces is counted from the left edge towards the right, not from right to left.

1

SCO Professional automatically reserves three lines at the top and bottom of every page for a header and a footer. One line is reserved for the header or footer itself. The two additional reserved lines separate headers and footers from the rest of the text. Therefore, if you are using continuous-feed paper and have set the top and bottom margins to zero, each page of text actually begins three lines below one perforation and stops three lines above the next perforation. A worksheet can be printed without page breaks, headers, or footers by using the Unformatted command. The top and bottom margins that you set cause blank lines to be printed before the header and after the footer.

SCO Professional prints the selected ranges using either the margins you select or the default margin settings. If the print range you selected is wider than the left and right margins permit, SCO Professional prints the material within the margins, top to bottom first (as many pages as required). Then it begins at the top, printing the columns beyond the right margin, also from top to bottom. If any labels are too long, SCO Professional cuts them off at the right margin.

Page-Length

The Options Page-Length command sets the number of lines per printed page. The term "page length" refers to the total number of lines from the first to the last line of the sheet of paper.

SCO Professional uses an initial default value of 66 lines, based on an 11-inch-long sheet of paper using a standard type size of 6 lines per inch. Using the Options Page-length command, you can change the page length to any number of lines ranging from 1 to 100. If you do not select this option or the /Worksheet Global Default Printer Page-Length command, SCO Professional automatically uses its own default value.

To select the command, choose /Print Printer Options Page-Length or /Print File Options Page-Length. The current page length is displayed. To accept it, press ⟨Return⟩. To change it, enter the number for the new page length and press ⟨Return⟩.

Headers or Footers

The Options Header and the Options Footer commands allow you to add a line of text at the top (header) or bottom (footer) of your copy. SCO Professional automatically adjusts the copy so that an additional two lines of blank space separate the header or footer line from the body of the copy. The headers and footers can begin at the left margin, be justified to the right margin, or be centered on the page. The header prints after the top margin and the footer prints before the bottom margin.

To select the commands, choose Header or Footer from the /Print Printer Options or the Print File Options menus. When you are prompted to enter either a header or footer line, you may type any desired text up to 240 characters long and press ⟨Return⟩. We suggest that the line length not exceed the margins you have set. SCO Professional automatically places you in the EDIT mode while you write and revise your entry.

Each header or footer line may be divided into up to three sections, one left-justified, one centered, and one right-justified. To create separate sections, divide the sections with a vertical bar or pipe " | ". Each time you use a pipe, SCO Professional considers it the beginning of a new header or footer section and positions the following text one section to the right of the previous one. If you begin a line with a pipe, it centers the text. If you begin a line with two pipes, the text is flush right. A line which does not begin with a pipe begins at the left margin.

If you reselect the Options Header or Options Footer commands after you return to the Options or the Print menu, you can edit or erase the header or footer when it is displayed in the Edit line.

Information often included in a header or footer are the date and page numbers. Both of these can be inserted anywhere in the header or footer, and they are automatically calculated by SCO Professional. When you type a crosshatch, #, SCO Professional replaces it with sequential page numbers in hard or soft copy. When you type @, SCO Professional replaces it with the

current date. The example below includes the current date flush left, the
centered text "Yearly Totals", and the current page flush right:

```
A16: [W30] '    TOTAL REVENUES                                            EDIT
Enter Header line: @ | Yearly Totals | #

               A          B    C         D         E
                                      XYZ Corporation
 1
 2
 3       Revenues-Production Cost & Operation Cost by Product
 4           Year-to-Date For Months Ended December 31, 1991
 5
 6
 7 REVENUES                    |     ADD    WRITE     DRAW
 8
 9   Distributors              |   50,432    6,865   35,920
10   Dealers                   |   22,641    4,512   32,741
11   Telemarketing             |   19,760   92,736   53,876
12   Mail Order                |  129,443   65,003  102,906
13   Strategics                |   19,995   15,987   59,876
14   Retail                    |  199,874   87,965  399,865
15                             |
16      TOTAL REVENUES         |  442,145  273,068  685,184
17 ========================== | ============================
18 OPERATION COST              |
19                             |
14-Feb-91   08:00 AM
```

SCO Professional generally does not print a footer on the last page of your
printout, just in case you want to add more ranges to it. To print a footer on
the last page, you must select /**Print Printer Page** or /**Print File Page** after
Go and before leaving the /**Print** menu.

Borders

The Options Borders command prints specified row(s) and column(s) along
the left or top of each text area of a printout. Columns or sections of
columns chosen from the worksheet are placed at the left side of the text,
beside the corresponding rows, to provide the left border. Rows or sections
of rows are placed above corresponding columns to provide the top border.
This command is mostly used for including column or row headings on
each page of your copy.

To select the command, choose /Print Printer Options Borders. Choose the type of border that you want: Rows or Columns. You are prompted for the border range (if you have used this command before, your previous border range is displayed). To use a series of rows as a border range, move the cell indicator to the first row of your border series, press ., then move the cell indicator to the last row and press ⟨Return⟩.

■ **IMPORTANT:** When you specify the border range, be careful not to include any columns or rows from the range selected to be printed. If the border range overlaps the range specified for printing, the output duplicates text from the areas the two ranges have in common.

When you print, the border rows that correspond with the column addresses of the print range provide a top border. For example, if columns A - F indicate the width of the print range and the border range is specified as row 1, the top border includes cells A1 to F1.

The following screen shows border rows being selected for printing.

```
E4: [W10]                                                              POINT
Enter border rows: A1..E4

                 A           B    C           D           E
  1                                           XYZ Corporation
  2                                     ---------------------
  3              Revenues-Production Cost & Operation Cost by Product
  4                   Year-to-Date For Months Ended December 31, 1991
  5
  6
  7  REVENUES                    |      ADD     WRITE       DRAW
  8 ----------------------------|----------------------------------
  9    Distributors             |    50,432    6,865     35,920
 10    Dealers                  |    22,641    4,512     32,741
 11    Telemarketing            |    19,760   92,736     53,876
 12    Mail Order               |   129,443   65,003    102,906
 13    Strategics               |    19,995   15,987     59,876
 14    Retail                   |   199,874   87,965    399,865
 15                             |----------------------------------
 16      TOTAL REVENUES         |   442,145  273,068    685,164
 17 ============================|==================================
 18  OPERATION COST             |
 19 ----------------------------|----------------------------------
14-Feb-91  08:00 AM
```

If you return to the Options Borders command to examine your borders, do
not use ⟨Return⟩ to quit the command. The ⟨Return⟩ key can break up a
border if it is pressed while your cell indicator is on a single cell of the
border. Use ⟨Escape⟩ instead to take you back to the Options menu.

Other Print Options

The Options Other menu contains two pairs of commands that affect the
appearance of your spreadsheet. They are Formatted or Unformatted, and
As-Displayed or Cell-Formulas.

Formatted or Unformatted

The Formatted and Unformatted commands in the Options Other menu
control the appearance of your print copy by removing or adding certain
format options and modifying the border option. The default value is For-
matted. Unformatted is often used to prepare a file for export to another
program.

To select one of the commands, choose either **Formatted** or **Unformatted** from the /Print Printer Options Other or /Print File Options Other menu. If you choose Unformatted, the copy is printed without pagebreaks, headers, or footers. Borders are printed on the first page only. If you choose Formatted, the most recently specified (or default) pagebreaks, headers, footers, and borders are used.

As-displayed or Cell-formulas

The Options Other As-displayed or Options Other Cell-formulas commands determine the appearance and contents of your printed copy. To choose either command, select As-displayed or Cell-formulas from the /Print Printer Options Other or /Print File Options Other menu.

To illustrate the difference between the As-displayed and Cell-formulas options, examine the effects of each command on the range A16..D16 from the example below:

```
D16: [W10] @SUM(D9..D14)                                          POINT
Enter print range: A16..D16


 9   Distributors            |     50,432     6,865    35,920
10   Dealers                 |     22,641     4,512    32,741
11   Telemarketing           |     19,760    92,736    53,876
12   Mail Order              |    129,443    65,003   102,906
13   Strategics              |     19,995    15,987    59,876
14   Retail                  |    199,874    87,965   399,865
15                           |
16      TOTAL REVENUES       |    442,145   273,068   685,184
```

If you use the As-displayed option, the default setting, each worksheet cell is printed as you see it on the worksheet screen, formatted as you have specified and with all formula calculations completed.

```
      TOTAL  REVENUES                |      442,145     273,068
```

If you use the Cell-formulas option, each cell is printed consecutively in a table format:

```
A16:  [W10]  '       TOTAL REVENUES
B16:  [W1]   '|
C16:  [W9]   @SUM(C9..C14)
D16:  [W9]   @SUM(D9..D14)
```

The cells are organized one row at a time starting at the top, from left to right of the print range. Blank cells are ignored. Each line contains the information that appears in the first line of the Status Area when the cell pointer is in that cell in the worksheet: cell address, format, protection status (if protected), and what was typed into the cell, such as formulas and labels (including the label-prefix character). The Cell-formulas option is useful in troubleshooting formulas and making formatting decisions.

Setup

The Setup command allows you to send special instructions about type style and type size, for example, to the printer when you use Go to print a range. These instructions, a string of ASCII decimal characters entered from the keyboard, tell the printer what special print attributes it should use.. They are actually printer control codes and are determined by the requirements of your printer and by what available features you want to use. As such, they vary in both length and content. In addition, since the printer governs the features themselves, the characters used, and even the features available, may change from printer to printer.

If you do not use this command, SCO Professional uses any previously saved global default setup. The global default setup initially set by SCO Professional is empty, until it is changed using the /Worksheet Global Default Printer Setup command.

To choose this command, select /Print Printer Options Setup. The current string of printer control codes, if any, is shown. SCO Professional automatically changes to the EDIT mode. To use the current string, press ⟨Return⟩. To cancel it for this work session, press ⟨Escape⟩, then ⟨Return⟩. You may edit it by using the arrow, ⟨Delete⟩, and ⟨Backspace⟩ keys as well as inserting other characters.

The string of printer control codes can contain up to 39 characters. Non-printing characters, such as ⟨Escape⟩ and ⟨Ctrl⟩O, cannot be entered by typing the character. They must be entered by typing a backslash, \, followed by a three-digit number. This is the decimal number of the character's ASCII code (see Appendix C, "Introducing ASCII," for a listing of ASCII codes). For example, the character ⟨Ctrl⟩O is number 15 in ASCII code. It would be entered as \015. Printing characters, such as H, s, 9, and (can be typed literally or entered as their ASCII code.

As mentioned earlier, the characters used in the string are those that will control the features of your printer. There is no standardization of printer control codes. To find which printer control codes work with your printer, look in your printer manual. Then, if necessary, translate them to the \ plus ASCII code format to enter them. Press ⟨Return⟩ to enter the string of characters.

When you use Go to print copy or to store it in a print file, SCO Professional inserts the printer control codes selected for this work session. If none are specified, it uses the default setup.

Many printer-controlled commands are also controlled by SCO Professional through the Print menu. When possible, use the Print menu commands instead of printer control codes. They are easier to use and keep track of. For example, although you may set margins using printer control codes, it is better to set them using the Options Margins command.

Embedding Setup Strings in the Worksheet

You can also embed setup strings within your worksheet. For example, if you want a particular section of output to be overstruck, or to be printed in a different type size or font, you can insert a setup string before that section to turn the desired settings on, and one at the end of the section to turn the desired settings off. Embedding setup strings in this manner allows you to instruct your printer to print in special ways several times during a print session.

You create an embedded setup string in your worksheet by adding a double pipe symbol (‖) to the beginning of a setup string. For example, if the literal string to print 16 characters per inch is ⟨Escape⟩ (s16H, the embedded setup string is:

‖027(s16H

As stated previously, each three-digit number in the string is the decimal number of a character's ASCII code.

To turn a printer capability on, embed a setup string on a row by itself at the top left corner of your selected print range. To turn a printer capability off, embed a setup string on a row by itself at the lower left corner of your selected print range. SCO Professional ignores all data to the right of the setup string label.

In the following example, the printer control code in cell A1 causes the printer to print 16.66 characters per inch. The code embedded in cell A3 causes the printer to print a more standard 10 characters per inch. The text in cell A2 prints out with a "squeezed" appearance.

```
A1:  | |\027(s16.66H                                              READY

            A         B         C         D         E         F         G
  1   | \027(s16.66H
  2   This printout looks squeezed
  3   | \027(s10H
  4
  5
  6
  7
  8
```

Note that, within the cells, the printer control codes appear to have only one pipe symbol (l) each, but the edit line accurately shows the double pipe symbol.

Clearing Print Option Settings

The Clear command can reset to the default values some or all of the print options you have described for your worksheet. It can erase the print range, format, and borders, or it can return margins, the page length, and the printer control code setup to the /Worksheet Global Default settings. The As-displayed format option is used when everything is cleared.

To use this command, select /Print Printer Clear or /Print File Clear. Next, choose which settings you want to clear: All, Range, Borders or Format.

If you choose All, the print range, header/footer, and border selection are erased. Margins, page length, and printer control code setup return to default settings, and the As-displayed format option is selected. No confirmation is necessary.

If you choose Range, SCO Professional erases the most recent print range selected. If you choose Borders, any borders set are erased. If you choose Format, the page length, margins, and printer control code setup items are reset to the defaults.

Aligning Paper in the Printer

The Align command is used to let SCO Professional know that you have reloaded or realigned the paper in the printer manually and that the printer is now at the top of a new page. The printer keeps track of line numbers and, using manual controls, may cause the printer's line count to be incorrect. Specifically, the first page printed may be missing its header and the page breaks might be misaligned with the paper. The Align command tells the printer to set the line number back to one, to start numbering pages from the beginning again, and print the headers and top margin information as appropriate.

When the printer finishes printing a range that ends in the middle of the page, it starts printing a new range at that position unless Align is used before sending the new range or unless the previous range included a Page command.

Before you use this command, position the paper correctly in the printer. The printer should be at the very top of the page because the margins are included automatically from that point. However, you may decide to move the paper a few lines down if the printing is unformatted (and, therefore, does not include margins). If your system uses spooled printing, do not adjust the paper manually—other users also access the printer—but use the Page command, and have SCO Professional advance printing to the start of a new page.

To use the command, select Align from the /Print Printer menu or the /Print File menu. This lets SCO Professional know that the paper is aligned at the top of the page. From this point, margins, page breaks, and so on, can be implemented at the start of the page according to your specifications when you select Go.

Sending Prepared Copy to the Printer or File

The Go command is used after you have selected a print range and any options that you wish to use. It prepares your copy for the printer or a print file, depending on whether you chose /PrintPr inter or /Print File to begin with.

When you are ready to send your copy to a printer or to a file, and have selected all desired ranges, select /Quit from the main Print menu. Your prepared copy is sent to the printer or placed in a print file for storage. If you have not specified a range, SCO Professional sounds a tone. Press ⟨Escape⟩ or ⟨Return⟩ to clear the error and to return to your position. Correct the problem and reissue the Go command if you still want to print.

You can cancel the printing of your prepared copy, if you have not left the Print menu, by pressing the ⟨Break⟩ key.

Advancing Paper in the Printer

The Line command advances the paper in your printer one line. To use the command, select Line from the /Print Printer or /Print File menu after you send the previous range to a printer or file by selecting Go. An extra blank line is created between the last print range and the one coming up. Each time you press Line or ⟨Return⟩, an additional blank line is created.

If you reach the bottom of the page specified by the margin and page-length settings, SCO Professional advances you to the next page. If you used the Footer option, the footer is printed in the correct position before the page is advanced.

1

Starting a New Page

The Page command advances the text to the top of the next page (after one print range, before the next print range). Unless you use the Align command, SCO Professional assumes the next print range begins right below the ending line of the last print range. For instance, if you ended your last printing in the middle of a page, SCO Professional starts the next printout in the middle of the page. Therefore, the first page of the second printing does not include header or top margin information.

To use the command, select /Print Printer Page or /Print File Page. After ending a print range, SCO Professional fills the rest of the page with blank lines. Any footer chosen is printed at the bottom of the page. The next text is placed at the top of the next page.

Another way to advance the printer one page is to use the /Worksheet Page-Break command while creating your document. While in READY mode, move the cursor to the cell in your spreadsheet where you want the page break to occur. Make sure this cell will be in the actual print range. Type /Worksheet Page-Break. SCO Professional opens a new row above the cursor and enters a special label into that row. This label tells the printer to advance one page each time it is encountered. Succeeding text is placed at the top of the next page. Do not enter anything in the special page-break row where it crosses the range to be printed.

Exiting the Print Menu

From the /Print Printer or /Print File menus, the Quit command moves you back to the READY mode. Once select Quit and leave the /Print menu, the copy requested is printed as you specified.

≣ Chapter 11

Working with Databases

Contents of This Chapter   11-1

≡ 11

Working with Databases

Data commands are powerful tools used to manage SCO Professional's databases. They maintain records in the order that you indicate, as well as assist in financial planning and numeric analyses. Once you have created your database, you can sort part or all of it, make queries to find significant information, and perform statistical analyses. Other special database commands let you create tables for analyzing different possibilities, help you find the frequency distribution of portions of your database, and allow you to perform regression analysis and matrix arithmetic.

SCO Professional databases are easy to use partly because they incorporate commands and features from other aspects of the program. For example, you can use /Worksheet Insert to insert rows and columns for extra records and fields; /Range Format and /Range Label to determine format and alignment of your data; /Copy and /Move to rearrange cells. In addition, you can use the EDIT mode. Formulas and functions are also used in database construction and management.

Contents of This Chapter

The chapter is divided into the following sections:

- ■ "Creating Databases" tells you what a database is and how it is set up.

- ■ "Sorting Records" describes the procedure that lets you change the order of records in a database.

- ■ "Querying Records" shows you how to find specific records in the database using certain criteria.

- ■ "Constructing Tables" explains the procedure for showing how changes in one or two cells of a database can affect the values of dependent cells in the same database.

- "Numbering Records" describes how to number records, or other ranges, in a sequence of specified increments or decrements.

- "Checking Frequency Distribution" shows you how to count the number of entries that exist within each equally incremented segment of a range of values in a worksheet.

- "Performing Matrix Arithmetic" tells how to invert or multiply a matrix of numerical data and place the results in a specified range.

- "Performing Regression Analysis" explains the procedure for making predictions about one set of values based on another set of values.

- "Parsing Files" shows you how to separate data from imported files into individual worksheet cells.

- "Generating Statistics with Database @Functions" describes the @ functions that perform numerical analyses.

Creating Databases

A DATABASE is a group of related data. Each row of data is considered a RECORD. All similar data is organized into groupings, each of which is called a FIELD, which represents the same facet of each data record.

For example, say that you work in a company that employs 10 people. You need to create a database that keeps track of their names, salaries. and social-security numbers. The best way to do this is to make a record for each employee. Start by setting up fields first, for Names, Social Security numbers, and Salaries. Then, enter records for each of the 10 employees. Each record would then be organized in the same order.

The following screen shows this sample database, organized onto an SCO Professional worksheet:

	A	B	C	D	E	F
1	Name :	SS_number	Salary:	Order:		
2	Anderson, Larry	472-67-88	$46,000	1		
3	Brewster, Janice	332-56-54	$24,000	2		
4	Dodds, Mike	882-90-88	$28,500	3		
5	Emerson, Paul	445-99-90	$52,000	4		
6	Ferguson, Beth	554-54-53	$48,000	5		
7	Lambert, Mary	998-89-89	$46,500	6		
8	Newman, Debra	839-89-33	$42,000	7		
9	Rothman, Sandra	334-44-22	$54,000	8		
10	Saliera, Samuel	443-45-88	$62,900	9		

A database uses the same column and row organization used by the worksheet itself. Formulas, labels, and values are also entered and used in a database just as they are in the worksheet. The biggest difference between a database and other worksheets is that the columns are used to organize the fields, and the rows organize the records, of the database.

Each column represents a field, and each row (excluding the top row, which is used only to identify the field names) represents a single record. No two fields in a database can have the same field name. All field names must be labels, so if you enter a number to be used as a field name, make sure you precede it with a label prefix.

Spaces should be avoided when typing field names. Even if they are not apparent, SCO Professional remembers that they are there. You may get undesirable results if you use the /Data Parse or /File Import Parse commands with databases that contain spaces in field names.

The subsequent rows of the database (the second, third, and so on) contain records. Each record represents a new set of related information. Records consist of one or more fields. Each field of a record is placed in a column headed by an identifying field name. As we said earlier, each piece of data that you enter in your database is considered part of both a field and a record. Fields describe similarities between pieces of information (all addresses of all employees), and records organize related pieces of information (all data, including the address, about one employee).

Sorting Records

The /Data Sort command allows you to sort database records in ascending or descending order. For example, you can use it to alphabetize a set of records by last name. This command only changes the order of records (that is, it rearranges the rows). The order of fields in the database is not affected.

When you select the /Data Sort command, you call up a menu of subsidiary commands:

```
A1:                                                           SORT
Data-Range Primary-key Secondary-key Reset Go Quit Selects input range for
sorting
```

Sorting a database requires that you use commands on the /Data Sort menu to perform the following steps. First, select the /Data Sort Data-Range command to specify the range to be sorted. Second, choose the Primary-key command to set the field to be sorted. As an option, select the Secondary-key command to set a second field, which further sorts any duplicate fields that arise in the primary field. Finally, select Go to sort your database.

Before discussing each of these steps, it is necessary to explain two aspects of the /Data Sort command. Once you have used this command, there is usually no way to restore the previous order of the records. To avoid problems, create an extra field for numbering the records in sequence before you issue the /Data Sort command. In this way, you can always resort your database using this extra field as the primary key. You can either number each record manually if there are just a few records in the database, or you can use the /Data Fill command, discussed in the section "Numbering Records" later in this chapter, to enter a series of incremented numbers. Remember to include this extra field in the Data-range.

The /Data Sort command changes the position of records, which can affect
entries that contain formulas with cell references. To avoid this problem,
make all references to cells outside of the range to be sorted absolute.
Within the range to be sorted, references to cells in the same record can be
relative. Do not refer to cells in different records. For more information,
see the section "Addressing Cells" in Chapter 3, "Using Formulas and
Functions."

Varying the Sort Order

The /Worksheet Global Default Other Sort command allows you to control
the way records are sorted when you invoke the /Data Sort command. By
default, numerical labels are sorted before alphabetical labels; SCO Profes-
sional is also case sensitive, which means that labels beginning with capital
letters are sorted before labels beginning with lowercase letters.

When you select the /Worksheet Global Default Other Sort command, you
are provided with four options:

1. With the default option, SCO Professional sorts numeric labels and
    string formulas that begin with one or more digits before sorting alpha-
    betic labels.

2. With the second option, SCO Professional sorts alphabetic labels
    before numeric labels.

3. With the third option, SCO Professional does not sort string formulas
    with numeric labels. This option sorts numeric labels first, then alpha-
    betic labels, and finally, string formulas are at the bottom of the sort
    order.

4. With the fourth option, SCO Professional also does not sort string for-
    mulas with labels. This option sorts alphabetic characters first, then
    numeric labels, and finally string formulas.

The following table shows an example of the differences between these four options:

1	2	3	4
'123Pro	Hooray	'123Pro	Hooray
'16candles	+"for"	'16candles	zebras
Hooray	zebras	Hooray	'123Pro
+"for"	'123Pro	zebras	'16candles
zebras	'16candles	1.5	1.5
1.5	1.5	1+1	1+1
1+1	1+1	+"for"	+"for"

Note that value cells (numbers and numeric formulas) are always sorted after label cells.

To vary the sorting order, select the /Worksheet Global Default Other Sort command; then, choose the setting that you prefer. Once a setting is selected, that setting lasts throughout the current worksheet session. If you want a particular setting to become permanent, you can save that setting by using the /Worksheet Global Default Update command. See Chapter 2, "Worksheet Basics," for more information on using the Update command.

To change the case sensitivity, you have to invoke SCO Professional with the command **pro** or **procalc** followed by the **-1** option. Refer to Appendix B, "Command Line Flags," for more information.

Data-Range

The range, or portion of the records that you want to sort, must be specified first. You can sort the entire database or just one section of it. When you specify the range, do not include field names located in the top row, or they are sorted too. If you want the records left intact, you must specify all columns of your database in the sort range.

First, select the /Data Sort Data-Range command. Enter the range, which can be either a cell coordinate or a named range. Once you have entered a range, SCO Professional remembers it. The next time you use this command, SCO Professional automatically displays this range. If you use the /Data Sort command several times, the most recently used range is dis-

played. To accept this, simply press ⟨Return⟩. Otherwise, press the ⟨Escape⟩ key and respecify the range.

Primary-key

The /Data Sort Primary-key is the second mandatory command. It allows you to specify the Primary-key field and the order (descending, highest to lowest, or ascending, lowest to highest) in which the Primary-key field is sorted. The Primary-key field and the order in which it is sorted determine the order of the records.

Select the /Data Sort Primary-key command. You can either enter the cell coordinates or named range, or use your arrow keys to move the cell indicator anywhere in the column of the field that you want as the Primary-key field, and then press ⟨Return⟩.

Now decide on the order of the Primary-key field. You can choose ascending (A) or descending (D). Ascending puts records in order from the lowest to highest number or letter. Descending puts them in reverse order. The order is decided according to the following (ascending) order of precedence:

1. Blank cells.

2. Label cells. The alignment prefixes are ignored, but the rest of the characters are used to put the labels into ASCII order. (ASCII is a standard computer code that assigns a number to each character available on the keyboard. For a complete list of the ASCII codes, please see Appendix C, "Introducing ASCII.") This results in ordering punctuation marks first, uppercase letters next, and lowercase letters last.

3. All other cells. They are placed in the order of their number or formula value.

SCO Professional remembers your most recent choices, so you do not have to respecify the Primary-key field unless you want to change your choices. Press ⟨Return⟩ to accept the choices. Do not use the ⟨Escape⟩ key.

The following screen shows the database sorted by using the Salary column as Primary-key:

```
              A              B            C          D         E        F
 1 Name:               ES_number    Salary:   Order:
 2 Brewster, Janice    332-56-54    $24,000        2
 3 Rothman, Sandra     334-44-22    $24,000        8
 4 Lambert, Mary       998-89-89    $24,000        6
 5 Ferguson, Beth      554-54-53    $28,000        5
 6 Dodds, Mike         882-90-88    $28,000        3
 7 Saliera, Samuel     443-45-88    $32,000        9
 8 Newman, Debra       839-89-33    $32,000        7
 9 Emerson, Paul       445-99-90    $32,000        4
10 Anderson, Larry     472-67-88    $36,000        1
```

Note that, in this example, the numbers in the Order field have changed from the order in which they were displayed for the example used in the previous section, "Creating Databases." Having a column of numbers to indicate the order of records is especially useful if you decide to resort the records later. See the section "Numbering Records" later in this chapter for an easy way of casting a column of sequential numbers.

Secondary-key

If the Primary-key field has two or more records that are identical, then their sorted order is unpredictable because they are considered equal. The /Data Sort Secondary-key command sorts the order of records with identical Primary-key data.

For instance, you may want to sort the sample database by salary first, and then with names alphabetically ordered within. To do this, choose the Salary field as the Primary-key and the Name field as the Secondary-key.

11

The following screen shows the database sorted first by salary (as Primary-key) and second by name (as Secondary-key):

	A	B	C	D	E	F
1	Name:	SS_number	Salary:	Order:		
2	Brewster, Janice	332-56-54	$24,000	2		
3	Lambert, Mary	998-89-89	$24,000	6		
4	Rothman, Sandra	334-44-22	$24,000	8		
5	Dodds, Mike	882-90-88	$28,000	3		
6	Ferguson, Beth	554-54-53	$28,000	5		
7	Emerson, Paul	445-99-90	$32,000	4		
8	Newman, Debra	839-89-33	$32,000	7		
9	Saliera, Samuel	443-45-88	$32,000	9		
10	Anderson, Larry	472-67-88	$36,000	1		

Note that, in this example, the numbers in the Order field have changed from the order in which they were displayed for the example used in the section "Primary-key." Having a column of numbers to indicate the order of records is especially useful if you decide to resort the records later. See the section "Numbering Records" later in this chapter for an easy way of casting a column of sequential numbers.

Select the /Data Sort Secondary-key command. Use this command as you did the Primary-key command. The sorting order is decided the same way as it is for the Primary-key command.

The next time you use /Data Sort, the Secondary-key choices you made are displayed if you use this command. Accept or revise them as you would for the Primary-key command.

Reset

The /Data Sort Reset command is used when you wish to clear all Data-range, Primary-key, and Secondary-key choices. You can use this command to clear choices you just made or to clear choices made during a previous /Data Sort operation.

Select the /Data Sort Reset command. Your settings for the Data-Range, Primary-key, and Secondary-key commands are cleared. Naturally, if you wish to continue with the /Data Sort command, you have to make new choices.

Go

The /Data Sort Go command is used when you have made all necessary choices for the Data-Range, Primary-key, and Secondary-key commands and you are ready for the records to be sorted.

Select the /Data Sort Go command. SCO Professional sorts the records you selected in the way you specified. Once the records are sorted, SCO Professional returns to READY mode.

Quit

The Quit command is used to return you to READY mode in the same location you were in before issuing /Data Sort. This command can be used at any point after selecting /Data Sort and before issuing the Go command.

Querying Records

The /Data Query commands allow you to find all records in a database or range that meet certain criteria. For example, you might want to find all customers who live within a certain zip code area, or all sales people on the East Coast who booked sales totalling over $50,000.

The /Data Query menu includes the following commands:

```
A1:                                                              QUERY
Input Criterion Output Find Extract Unique Delete Reset Quit
Selects the range to be queried
```

To use the /Data Query command, you need to create special ranges with the first two commands: Input and Criterion. What the /Data Query command does with these records depends on which of four additional commands you choose: Find, Extract, Unique, and Delete. If you choose Extract or Unique, you must also create an Output range. To change the ranges or exit from /Data Query, use one of the final two commands: Reset or Quit.

Before you access the /Data Query commands, you have to find places in your worksheet that can contain the criteria of your query and the output, both in ranges that are separate from the database. Then, select the /Data Query Input command. The Input range consists of a database or the portion of one that you wish to search. Next, select Criterion to specify a separate range of the worksheet to establish the criteria by which you select records. Finally, if you plan to use the Extract or Unique commands, select Output. The Output range is an empty range that becomes the destination for the data copied (duplicated) from the Input range. All three ranges are created on the same worksheet.

Use the Input, Criterion, and Output commands to specify the ranges that you have constructed. Select each command in sequence. Specify and enter its range. When you specify the Input and Criterion ranges, you need to specify the entire range including the field names. When you specify the Output range, you need only specify the field names, because SCO Professional automatically places the output records in the rows following the field labels.

If you have used the /Data Query command before, SCO Professional remembers your most recent range specifications and displays them when you choose the commands. To accept them, simply press ⟨Return⟩ and go on to the next step.

In the following example, notice that the Criteria range (E1..E2) is separate from the Output range (A12..C15):

```
              A           B        C        D        E        F        G
 1  Name:               State:   Zip:              Zip:
 2  Abrahms, Ethyl      MN       55810             +C2>5581
 3  Brown, Steve        NJ       10446
 4  Hill, Adam          WI       57037
 5  Jamieson, Rose      TX       76114
 6  Johnson, Mary       NY       11323
 7  Roberts, George     FL       33462
 8  Smith, Joe          CA       94681
 9  Stevens, Mike       OH       28735
10
11
12  Name:               State:   Zip:
13  Hill, Adam          WI       57037
14  Jamieson, Rose      TX       76114
15  Smith, Joe          CA       94681
16
17
18
19
14-Feb-91   08:00 AM
```

Input Range

The Input range is the database, or any range in it, from which you plan to query data. Unlike the /Data Sort command, the /Data Query command requires field names at the top row of the database to be included in the Input range. The /Data Query command considers upper- and lowercase letters alike in field names. Spaces are considered part of field names, even those typed at the end of the line.

In the following worksheet, for example, to query data within the entire database you would select A1..C9 as the Input range:

```
C9: [W6] 28735                                                          POINT
Enter Input range: Al..C9
```

	A	B	C	D	E	F	G
1	Name:	State:	Zip:				
2	Abrahms, Ethyl	MN	55810				
3	Brown, Steve	NJ	10446				
4	Hill, Adam	WI	57037				
5	Jamieson, Rose	TX	76114				
6	Johnson, Mary	NY	11323				
7	Roberts, George	FL	33462				
8	Smith, Joe	CA	94681				
9	Stevens, Mike	OH	28735				

Criterion Range

The Criterion range provides the criteria by which records are selected. Entered from the READY mode, it is constructed in an empty area of your worksheet. If you enter the criteria to the right of your worksheet, as opposed to entering it beneath your data, you can add records without overwriting the criteria. Like a database, the Criterion range uses the columns and rows of the worksheet for organization. The first row is used for field names. The field names can be all, or some, of the field names used in the Input range. The only field names you need to include in the Criterion range are those from the Input range containing the fields needed to meet the criteria. It is a good idea to use the /Copy command to copy your field names from the Input range to the Criterion range, because they must match exactly.

Below the first row of the Criterion range, which has the field name, you place the criteria you wish to use for your query. There are two types of criteria: logical ANDs and logical ORs. Using a logical AND, you place all the criteria in one row beneath the field name(s), in which case a record from the Input range must match each *and* every criterion in the corresponding fields to be selected. Using a logical OR, you place the criteria in two separate rows beneath the field name(s), in which case a record must match all the criteria of the first row *or* all the criteria of the second row to be selected.

Using the logical AND operator, a record must meet the criteria of both conditions to be selected. Say you want to query all of the records from the state of Texas with people whose last names begin with a *J*. To do so, copy the field name *Name:* (in cell A1) and the field name *State:* (in cell B1) to a blank spot on the worksheet (cells E1 and F1 in this case). Then, enter the criteria directly beneath the copied field names. In cell E2 enter **J*** (where the asterisk stands for any group of characters); in cell F2 enter **TX**. For more information on the asterisk, and other special characters that can be used in queries, see the section "Using Labels as Criteria" later in this chapter.

The following example shows the criteria range (E1..F2). Because both criteria are on the same row, this is considered to be a logical AND.

```
B13: [W12] 'TX                                              POINT
Enter Criterion range: E1..F2
```

	A	B	C	D	E	F	G
1	Name:	State:	Zip:		Name:	State:	
2	Abrahms, Ethyl	MN	55810		J*	TX	
3	Brown, Steve	NJ	10446				
4	Hill, Adam	WI	57037				
5	Jamieson, Rose	TX	76114				
6	Johnson, Mary	NY	11323				
7	Roberts, George	FL	33462				
8	Smith, Joe	CA	94681				
9	Stevens, Mike	OH	28735				

Using the logical OR operator, a record must meet the criteria of either the first condition or the second condition to be selected; if a record meets either of the conditions, it is selected. Say you want to query either all of the records from the state of Texas or all of the records with people whose last names begin with a *J*. Again, copy the field name *Name:* (in cell A1) and the field name *State:* (in cell B1) to a blank spot on the worksheet (cells E1 and F1 in this case). Then, enter the criteria **J*** (cell E2) directly beneath the copied field name. Enter the criteria **TX** (F3) two rows beneath the copied field name.

The following example shows the Criteria range (E1..F3). Because the criteria are on separate rows, this is considered to be a logical OR.

```
┌─────────────────────────────────────────────────────────────────────┐
│ B13: [W12] 'TX                                               POINT    │
│ Enter Criterion range: E1..F3                                         │
│                                                                       │
│         A            B       C      D       E        F       G        │
│  1 Name:          State:  Zip:              Name:   State:            │
│  2 Abrahms, Ethyl  MN      55810            J*                        │
│  3 Brown, Steve    NJ      10446                     TX               │
│  4 Hill, Adam      WI      57037                                      │
│  5 Jamieson, Rose  TX      76114                                      │
│  6 Johnson, Mary   NY      11323                                      │
│  7 Roberts, George FL      33462                                      │
│  8 Smith, Joe      CA      94681                                      │
│  9 Stevens, Mike   OH      28735                                      │
└─────────────────────────────────────────────────────────────────────┘
```

Once you have entered your criteria, you can select the range with the Criterion command. In doing so, make sure to include both the field name row and the criterion row in the range. Because the criteria cannot be entered while the /Data Query menu is in use, you must perform this step before you select the /Data Query Input command.

Using Labels as Criteria

The criteria you include in a Criterion range can be labels, numbers, formulas, or a combination. If a criterion is a label, the label from the corresponding field of the Input range must match it character for character (excluding the label prefix, but including any spaces). However, there are three special characters that provide more general matching capability:

■ The asterisk ends a criterion label, and it matches remaining characters of an input label. For example, ACCT* matches *ACCTS* or *ACCTG2*, but it does not match *ATSG*.

■ The question mark goes anywhere in a criterion label, and it matches any single character in the same position in the input label. For example, ACCT?1 matches *ACCTG1* or *ACCTS1*, but it does not match *ACCTGS1*.

■ The tilde character goes at the beginning of a criterion label, and it matches every input label *except* the one that has the same characters as in the criterion label after the tilde. For example, ~ACCTS matches *ACCTG* or *ACCTS1*, but it does not match *ACCTS*.

1

These three characters can be used alone or together. When used in combination, the input label must match all characteristics, including each special criterion label character. For example, ˜ACCT* matches *ACTGI* or *RCVBL*, but it does not match *ACCTS* or *ACCTGI*.

Using Numbers as Criteria

If the criterion is a number, then the number or current value in the corresponding field of the Input range must match exactly. A zero in the Criterion range matches a blank or a label in the corresponding field of the Input range.

Looking at the address example used earlier in this section, you could query only those records having the zip code 57037 with the following criterion:

Zip:
57037

Using Formulas as Criteria

If the criterion is a formula, it can be placed anywhere in the Criterion range, as long as it falls beneath the field name. Formulas as criteria test all records from the designated field names, one at a time.

A formula used as a criterion occupies at least one cell address in the Criterion range. Formulas and cell addresses are discussed thoroughly in Chapter 3, "Using Formulas and Functions." Database @ functions cannot be used in criterion formulas. For the purposes of the /Data Query command, all cell addresses referring to cells within the Input range in a relative manner are kept relative; those that are to be considered as they exist in the worksheet (such as range names), and are not modified based on the relative position of the cell being checked, should be made absolute. All cell addresses referring to cells *outside* the Input range must be made absolute. When the entries of cell references are labels or blanks, they are considered to have a value of zero.

Criterion formulas use logical operators that return a value or either true (1) or false (0). If the formula, when applied to the input record, is true, then the record is considered to meet the criterion. If it is false, then the record does not meet that criterion.

Criterion formulas are usually comparisons between the value of one of the record's fields and a given value or a spreadsheet value (described using cell references). The first character of the formula is usually an operational sign, most often a plus sign (+). This is followed by the cell address of the field to be tested. The cell address consists of the column letter of the field and the row number of the first row of your database following the field labels. If the row number is something other than the first row of your database (after the field labels row) the results are inaccurate. (As an alternative, you can use the /Range Name Labels Down command, described in Chapter 3, "Changing the Worksheet Format," to indicate the first record.)

For more information about entering formulas with logical operators, see Chapter 2, "Using Formulas and Functions."

One of the simplest formulas you could write might look like this:

> **Zip:**
> **+C2>70**

This means the value of the field located in column C of the second row of the database has to be greater than 70 to meet the criterion. After the first record is tested, SCO Professional automatically goes on to the next record and tests the value using the same formula.

Looking at the address example used earlier in this section, you could query only those records having zip codes greater than 55810 and less than 94681 with the following criterion:

> **Zip:**
> **+C2>55810<94681**

Another formula might look like this:

> **Zip:**
> **+C2<>G2**

This means the value of the field located at column C in the second row cannot equal that of the field located at column G of the second row.

Of course, as you become more experienced in using formulas as criteria, you may want to create more complex formulas. Any @ function can be used to create criterion formulas, except the database @ functions (discussed later in this chapter). It is a good idea to remember that a formula is tested on each record of the Input range individually, and it should be general enough to be applicable to each one.

Output Range

An Output range only needs to be entered if you intend to use the Extract or Unique commands, described later in this chapter, with /Data Query. The fields from the Input range that are selected based on the criterion are then copied into this range.

The Output range is entered in an empty area of the worksheet. The top row of the Output range consists of the identical field names of the fields that you want copied. You can enter the field names in any order you want. Whether this is all of the ones from the Input range or just some of them depends on whether you want to list entire records or just certain fields from the records. Below the field names, the subsequent rows are used for the duplicated entries that match the criteria from the Criterion range.

If the Output range consists of a row of field names only, all records that match the criteria are copied, until the bottom of the worksheet is met. If the Output range consists of more than one row, records are copied until the range is filled.

In the next example, the Input range is A1..C9, the Criterion range is E1..E3, and the Output range is A12..C15:

```
F18: [W6]                                                        PCINT
Enter Output range: A12..C15

          A          B       C       D       E       F       G
  1 Name:        State:  Zip:            Zip:
  2 Abrahms, Ethyl  MN    55810           NY
  3 Brown, Steve    NJ    10446           FL
  4 Hill, Adam      WI    57037
  5 Jamieson, Rose  TX    76114
  6 Johnson, Mary   NY    11323
  7 Roberts, George FL    33462
  8 Smith, Joe      CA    94681
  9 Stevens, Mike   OH    28735
 10
 11
 12 Name:        State:  Zip:
 13
 14
 15
 16
 17
 18
 19
14-Feb-91   08:00 AM
```

Find

The /Data Query Find command inversely highlights records that match your criteria. You must first have entered an Input and Criterion range.

The Find commands lets you use the up and down arrow keys to move to the records of the Input range that match the criterion. The up and down arrow keys only move from one selected record to the next. If there are no more selected records in that direction, SCO Professional sounds a tone and the cell marker remains in the same position. The left and right arrow keys move the cell marker in the record that you are in.

The ⟨Home⟩ key moves the cursor to the first record of the database, and the ⟨End⟩ key moves the cursor to the last record of the database, even if these records are not among the selected ones. Either the ⟨Escape⟩ key or ⟨Return⟩ takes you back to the /Data Query menu.

To edit a record highlighted by the Find command, press the ⟨Edit⟩ key. You are then put into EDIT mode. When finished, you can return to READY mode by pressing ⟨Return⟩.

Extract

The /Data Query Extract command copies the fields of the records that match the selection criteria into your Output range. You must first have entered an Input, Output, and Criterion range. If there are more records than there is room in the Output range (for example, because of worksheet borders), SCO Professional beeps and sends you an error message. When this happens, you have to reconstruct the Output range to include more cells, and then reissue the /Data Query Extract command.

In the next example, the Input range is A1..C9, the Criterion range is E1..E3, and the Output range is A12..C15:

```
            A              B        C       D      E        F        G
 1 Name:           State:   Zip:            State:
 2 Abrahms, Ethyl  MN       55810           NY
 3 Brown, Steve    NJ       10446           FL
 4 Hill, Adam      WI       57037
 5 Jamieson, Rose  TX       76114
 6 Johnson, Mary   NY       11323
 7 Roberts, George FL       33462
 8 Smith, Joe      CA       94681
 9 Stevens, Mike   OH       28735
10
11
12 Name:           State:   Zip:
13 Johnson, Mary   NY       11323
14 Roberts, George FL       33462
15
16
17
18
19
14-Feb-91   08:00 AM
```

Unique

The /Data Query Unique command copies every unique record to the Output range. It is the same as Extract except that, where there are duplicate records, only the first is copied into the Output range. You must first have entered an Input, Criterion, and Output range. To delete duplicate records in a database, this is an extremely useful command. By constructing a Criterion range without criteria (leaving the rows below the field names blank), you can copy the entire database into the Output range. Since the Unique command does not copy duplicates, the result is a database free from duplication.

Delete

The /Data Query Delete command erases all records from the Input range that meet the criterion. You must first have entered an Input, Criterion, and Output range. The remaining records of the Input range are moved up so there are no gaps left. Once the records are deleted, they cannot be restored. As a precaution, SCO Professional prompts you to confirm deletion. If you choose Delete, the records are deleted. If you choose Cancel, you are returned to the /Data Query menu.

Reset

The /Data Query Reset command lets you start over with all new range specifications. This command resets all the range specifications you have made.

Using the Query Key

If, after you have used /Data Query, you want to redo the last query (for example, if you want to find records that start with a different letter), you may use the special ⟨Query⟩ key. It uses all the specifications you made for the last /Data Query command. If you used the /Data Query Reset command, you must respecify the needed information with the /Data Query command before you can use the ⟨Query⟩ key.

Quit

The /Data Query Quit command returns you to READY mode.

Constructing Tables

The /Data Table commands allow you to construct tables that summarize the results of one or more formulas which each have one or more dependent values (input). SCO Professional organizes and performs the calculations automatically for this what-if process once you have entered the necessary data.

Along with the /Data Table 1 and the /Data Table 2 commands, you also have an option to Reset (that is, clear the settings you have made for either the /Data Table 1 or 2 commands):

```
A1:                                                          TABLE
1 2 Reset
one worksheet cell and one or more formulas
```

Data Table 1

The /Data Table 1 command tries out a series of values (which you specify) in place of the existing value in one input cell (the value cell that is used as a reference). By including in the table all formulas with values that depend on this cell's value, you can see how the entire worksheet would be affected by changing the contents of the input cell. In the worksheet itself, the input cell is not affected by this command.

To perform this procedure, first decide on an input cell from the worksheet. Note which output cells have formulas that reference the input cell. Now, find an empty range in your worksheet for your data table. In the left-most

column of that range, beginning in the second row, list the different values you wish to try in place of the existing input cell value. In the first row of the range, starting in the second column, sequentially enter the formulas of the dependent output cells.

You can do this either by typing the formulas, by using a plus symbol (+) and the cell address (no spaces included), or by using the /Copy command to copy the formula cell. Notice that the top-left cell of the /Data Table range has been left empty. This is reserved for the input cell coordinates, which are entered later. You are now ready to use the /Data Table 1 command to complete the procedure.

Select the /Data Table 1 command. SCO Professional asks you to specify a table range. Enter the range that you have constructed. Now SCO Professional prompts you to specify the input cell. Type its cell address or point to it and press ⟨Return⟩. SCO Professional finishes filling in the table by recalculating each formula using the new values indicated.

In the following example, the sales commission for each salesperson is based on this formula: Sales * Commission Rate (5%). Leon Abrahms' commission (in D2), for instance, is calculated as E11*C2. The total (in D12) is the sum of all salespersons' commissions.

Say you want to determine the total commissions if the commission rate were inflated to 6%, 7%, 8%, or 9%. First, enter these new variables in the left-most column of an empty range (B15..B18). Next, enter the formula that is going to be affected by this change (+D12, the total commissions) in the second column of the first row (C14). In the following screen, cell C14 is formatted with the /Range Format Text command so you can see the cell reference instead of the value from that cell. Now, select /Data Table 1, using B14..C18 as your range and E11 as your input cell (where the commission rate is stored). Press ⟨Return⟩. The new data in C15..C18 shows you the total commissions with different commission rates.

A	B	C	D	E
1Name:	Units Sold:	Sales:	Commission:	
2Abrahms, Leon	6.50	$1,300,000.00	$65,000.00	
3Brown, Leslie	11.57	$2,314,000.00	$115,700.00	
4Hill, Catherine	13.89	$2,778,000.00	$138,900.00	
5Jamieson, Jack	6.66	$1,332,000.00	$66,600.00	
6Johnson, Andy	11.66	$2,332,000.00	$116,600.00	
7Roberts, Ted	5.56	$1,112,000.00	$55,600.00	
8Smith, Samantha	14.42	$2,884,000.00	$144,200.00	
9Stevens, Julie	12.37	$2,474,000.00	$123,700.00	
10PRICE/UNIT:				$200,000.00
11COMMISSION RATE:				0.05
12TOTAL:	82.63	$16,526,000.00	$826,300.00	
13				
14		+D12		
15	0.06	$991,560.00		
16	0.07	$1,156,820.00		
17	0.08	$1,322,080.00		
18	0.09	$1,487,340.00		
19				
14-Feb-91 08:00 AM				

Using this same example, you can decide to project new commission rates on *several* Sales formulas instead of just one. Say you want to determine the commissions for the sales people Leon Abrahms and Leslie Brown. Having entered the new variables (6% to 9%) in the left-most column of an empty range (B15..B18), you then enter the formulas (+D2 and +D3, respectively) beginning in the second column of the first row (C14). Now, select /Data Table 1, using B14..D18 as your range and E11 (where the commission rate is stored) as your input cell. Press ⟨Return⟩. The new data in C15..D18 shows you the new commissions for Leon Abrahms and Leslie Brown if they received higher commission rates.

```
14                        +D2               +D3
15              0.06       $78,000.00       $138,840.00
16              0.07       $91,000.00       $161,980.00
17              0.08      $104,000.00       $185,120.00
18              0.09      $117,000.00       $208,260.00
```

If you have used either the /Data Table 1 or the /Data Table 2 command, SCO Professional automatically displays your most recent specifications for input cell(s) and table range. If you wish to continue using these, simply press ⟨Return⟩ as each one is displayed. Any of the specifications can be changed. To change the specifications, enter another range; otherwise, press the ⟨Escape⟩ key to remove the anchor cell.

SCO Professional has a special key, the ⟨Table⟩ key, that recalculates the most recent table range. The ⟨Table⟩ key is disabled if you have used the Reset command and have not yet specified a table range and input cell(s).

Data Table 2

The /Data Table 2 command is similar to the /Data Table 1 command. However, it is used to show the effects of changes to two input cell values on one formula's results. Therefore, it is set up a little differently.

Before using the /Data Table 2 command, you must prepare a Table range in an empty area of the worksheet. In the farthest-left column of the range and starting one row down, enter the values you wish to substitute for the first variable of the formula. In the top row of the range, and one column over, enter the values you wish to substitute for the second variable of the formula. In the top-left cell of the range, enter the formula whose results are reflected in the table.

As with the /Data Table 1 command, you can refer to the formula's cell address (for example, +D12) instead of typing the formula. If you format the cell (B14) with the /Range Format Text command, you see the cell reference instead of the value from that cell. Now you are ready to calculate the table.

```
B15:  0.06


           A           B          C          D
  14                  +D12      180000     190000
  15                  0.06
  16                  0.07
  17                  0.08
  18                  0.09
```

Select the /Data Table 2 command. At the prompts, specify the Table range and first input cell. Then, specify a second input cell in the same manner as you did for the first input cell. After you press ⟨Return⟩, SCO Professional calculates the table automatically.

Using the example from /Data Table 1 in the preceding section, suppose you want to determine the change in total commissions if both the commission rate increases and the price per unit decreases. In the following example, the values in B15..B18 show the new commission rates, and the values in C14..D14 show the new prices per unit. After selecting /Data Table 2, the range is B14..D18, the first input cell is E11 (commission rate), and the second input cell is E10 (price per unit).

The figures in C15..D18 show you the projected total commissions if the commission rate is increased and the price per unit is decreased.

```
        A                 B            C               D              E
 1Name:            Units Sold:      Sales:       Commission:
 2Abrahms, Leon         6.50    $1,300,000.00    $65,000.00
 3Brown, Leslie        11.57    $2,314,000.00   $115,700.00
 4Hill, Catherine      13.89    $2,778,000.00   $138,900.00
 5Jamieson, Jack        6.66    $1,332,000.00    $66,600.00
 6Johnson, Andy        11.66    $2,332,000.00   $116,600.00
 7Roberts, Ted          5.56    $1,112,000.00    $55,600.00
 8Smith, Samantha      14.42    $2,884,000.00   $144,200.00
 9Stevens, Julie       12.37    $2,474,000.00   $123,700.00
10PRICE/UNIT:                                                     $200,000.00
11COMMISSION RATE:                                                       0.05
12TOTAL:               82.63   $16,526,000.00   $826,300.00
13
14                    +D12        $180,000.00    $190,000.00
15                     0.06       $892,404.00    $941,982.00
16                     0.07     $1,041,138.00  $1,098,979.00
17                     0.08     $1,189,872.00  $1,255,976.00
18                     0.09     $1,338,606.00  $1,412,973.00
19                            (10% DISCOUNT)   (5% DISCOUNT)
14-Feb-91  08:00 AM
```

If you have used the /Data Table commands before, SCO Professional displays your most recent specifications in response to the prompts. You may accept them by pressing 〈Return〉, or you may change them by specifying new choices. The table calculation can be repeated by using the special 〈Table〉 key. If you have used the Reset command to clear your specifications, however, this key is disabled until you have entered different specifications.

Reset

If you wish to clear all specifications you made for either the /Data Table 1 or the /Data Table 2 command, you may use /Data Table Reset. If you wish to continue using one of the /Data Table commands or the 〈Table〉 key, you have to specify a new input cell(s) and table range.

Numbering Records

The /Data Fill command enters a series of numbers at specified increments or decrements into a range. This command is frequently used to number your records sequentially or to prepare values for an X range of a graph.

To use the /Data Fill command, first decide on the range you want filled. Keep in mind that the ranges are filled columnwise. Each column is filled in the order of first to last row before the next column to the right is begun. Frequently, you specify only one column.

If you want to number the records of a database sequentially before you change the order of those records with the /Data Sort command, for instance, the /Data Fill command is useful.

In the following example, /Data Fill is used in the range A1..A9:

```
A1: 1                                                              READY

      A        B            C           D              E          F
 1       1 First_Name  Last_Name:  Address:        City:      State:
 2       2 Joe         Smith       4401 Concord Ave Berkeley  CA
 3       3 George      Roberts     786 State St     Miami     FL
 4       4 Adam        Hill        12 Windward Lane Madison   WI
 5       5 Steve       Brown       5529 E Eighteenth Newark   NJ
 6       6 Mike        Stevens     2311 Hays Ave    Cleveland OH
 7       7 Rose        Jamieson    121 Lyndon Way   Fort Worth TX
 8       8 Ethel       Abrahms     807 E Main St    Walker    MN
 9       9 Mary        Johnson     8432 Orcutt Ave  Rochester NY
10
11
12
13
14
15
16
17
18
19
14-Feb-91  08:00 AM
```

You have to decide on a start, a step, and a stop value. All three of these are either numbers or formulas. A start value is the value at which the /Data Fill command starts its sequence of numbers. The start value is placed in the top-left cell of the range. A step value is a positive or negative

integer (or formula) that you decide on as the increment or decrement by which each number of the range is further increased or decreased. A stop value is the maximum value you want used in the sequence.

Initially, SCO Professional has defaults set to these values: start value = 0, step value = 1, and stop value = 8191. When you are issuing the /Data Fill command, SCO Professional automatically displays these default settings in response to prompts. If you want to accept the values, press ⟨Return⟩ to enter each in turn. If you wish to use different values, specify and enter those instead.

Select the /Data Fill command. It is a good idea, although not necessary, to have the cell indicator placed over the top-left cell of the range. In response to the first prompt, specify the range and enter it. In response to the subsequent prompts, type the start, step, and stop values that you want, pressing ⟨Return⟩ to enter each. SCO Professional automatically fills in the specified range using your values. It stops when it reaches the last cell of the range or reaches the stop value, whichever comes first.

Looking at the numbering example used earlier in this section, the following specifications were used to number the records of the database:

```
A9:                                                      EDIT
Enter Fill range: A1..A9
Start: 1            Step: 1            Stop: 10
```

Checking Frequency Distribution

The /Data Distribution command finds a frequency distribution for a range of values in a worksheet. It is similar to using a filing system where all values that fall within certain value limits are grouped together. The /Data Distribution command counts how many entries lie within multiple specified sets of limits.

When using the /Data Distribution command, you specify a range to include the values for which you want to check the frequency distribution.

Then, you are prompted to select a Bin range, in which you enter a column of numbers that increase at a preset increment. The /Data Distribution command then determines how many entries in the range have values that lie within each of these incremented numbers.

Before selecting the /Data Distribution command, you need to construct a Bin range in an unused area of the worksheet. The Bin range consists of the value limits that are used to divide the groups of values from the range into levels (or bins, as they are sometimes called). The Bin range is a one-column range that contains a series of numbers increasing incrementally. The column immediately to the right of the Bin range, and extending an extra row below it, displays the results and is not considered a part of the Bin range.

It is easiest to use the /Data Fill command (described in the previous section) to construct the Bin range.

```
A13: 100


        A        B          C
12      Bin: Results:
13      100
14      200
15      300
16      400
17      500
18      600
19      700
```

Say you want to check values in a range from 1 to 700, and you want to see how many values from that range are from 0-100, 100-200, 200-300, and so on, up to 700. When you construct the Bin range, make its lowest value 0 and its highest value 700. Then set the increment at 100.

All of this is done with the /Data Fill command, as the following specifications show:

```
A18: [W15]                                                    EDIT
Enter Fill range: A13..A18
Start: 100          Step: 100          Stop: 700
```

Then select the range of your worksheet that contains the values for which you want to find a frequency distribution. SCO Professional considers both numbers and current formula results as values in the worksheet range when it executes the /Data Distribution command. Select /Data Distribution. In response to the first prompt, specify the range containing the values to be evaluated (the Values range) and enter it. In response to the second prompt, specify the Bin range in the same manner. Do not include the area for your results in your range specification.

SCO Professional uses the results area, the first column of the Bin range, to enter the total number of values it found to belong in each bin. First, it counts all the values less than or equal to the first value limit entered in the Bin range. The resulting number is placed in the results area, in the cell directly to the right of the first bin cell. Then, SCO Professional counts all the values from the range that are greater than the first bin value, but less than or equal to the second bin value. The resulting value is placed in the results area column next to the second bin cell. This process is continued until all the values in the bin cells have been used. The last row of the results area, the one that extends beyond the last row of the Bin range, is used to enter the number of values that are greater than the last value (the largest value) of the Bin range.

In the following example, the Values range is entered as B2..E10, the Bin range is entered as A13..A19, and the results range appears in B13..B20:

```
A1: [W15] 'Name:                                                    READY

        A           B         C         D         E        F        G
 1Name:          Item 1:   Item 2:   Item 3:   Item 4:
 2Stevens, R.       340         0       260       600
 3James, J.         240       350       105       695
 4Adams, M.         130         0         0       130
 5Stevens, R.       125       340       210       675
 6James, J.         200       100         0       300
 7Brown, B.           0       134       190       324
 8Jones, O.         230       245       190       665
 9Eddison, A.       260        90       175       525
10Stevens, R.       120         0         0       120
11
12          Bin: Results:
13          100         9
14          200        11
15          300         7
16          400         4
17          500         0
18          600         2
19          700         3
14-Feb-91   08:00 AM
```

As with many other data commands, SCO Professional remembers the range specifications most recently used and displays them in response to the prompts. To accept them, press ⟨Return⟩ and continue. To change them, enter another range; otherwise, press the ⟨Escape⟩ key to remove the anchor cell.

Performing Matrix Arithmetic

The /Data Matrix commands allow you to multiply or invert matrices of up to 90 square cells. A matrix is a table of data with a number in each cell. Specified by size, a matrix with three rows and two columns is known as a 3 x 2 matrix; a matrix with an equal number of rows and columns is a square matrix. Matrix arithmetic is useful for such tasks as factor analysis, inventory control, and modeling problems.

When you select the /Data Matrix command, you can select commands for inverting or multiplying matrixes:

```
A1:                                                          MATRIX
Invert Multiply Invert a range as a square matrix
```

Invert

The /Data Matrix Invert command lets you invert a matrix. To use this command, the matrix must be square; that is, the number of columns and rows must be equal.

To invert a matrix, first select the /Data Matrix Invert command. At the prompt, enter the range for the matrix you want to invert and press ⟨Return⟩. Next, select Output. Enter the range for the output and press ⟨Return⟩. You need only enter the cell address of the upper-left corner of the range. After you enter the Output range, the inverted matrix appears in the specified range. The Output range is the same size as the matrix. If a solution cannot be calculated, an error message is displayed.

In the following example, the Invert range is A3..C5 and the Output range is A9..C11:

```
         A        B        C
 1Matrix A:
 2---------------------------
 3       10       15       20
 4       83       97      117
 5      318      517      632
 6
 7Inverted Matrix
 8---------------------------
 9 0.03937 0.041545 -0.00893
10 -0.7367 -0.00193  0.02367
11 0.58285 -0.01932  -0.0132
```

Multiply

The /Data Matrix Multiply command lets you multiply matrices. To use this command, the number of columns in matrix A must be equal to the number of rows in matrix B. If matrix A has 3 rows, for example, then matrix B must have 3 columns.

To multiply matrices, first select the /Data Matrix Multiply command. At the prompt, enter the range for matrix A and press ⟨Return⟩. Enter the range for matrix B and press ⟨Return⟩. Next, select Output. Enter the range for the output and press ⟨Return⟩. You need only enter the cell address of the upper-left corner of the range. After you enter the Output range, the multiplied matrix appears in the specified range. The Output range becomes the same size as the matrix.

In the following example, the range for matrix A is A3..C4, the range for matrix B is E3..F5, and the Output range is B9..C10:

```
        A       B      C    D  E        F
 1Matrix A:                Matrix B:
 2-------------------------------------------
 3      2       5     12       3        2
 4      4      10     24       6        4
 5                             9        6
 6
 7        Output:
 8        ---------------
 9           144    96
10           288    192
```

The /Data Matrix Multiply command works by adding the sum of each item in matrix A, row 1, times each item in matrix B, column 1; then, it adds the sum of each item in matrix A, row 1, by each item in matrix B, column 2; and so on, until all the columns of matrix B are used. Next, it adds the sum of each item in matrix A, row 2, times each item in matrix B, column 1; then column 2. This procedure continues until all columns are used. The formula continues in this way until all rows in matrix A have been used against each column in matrix B.

Here is an example of the manual output for the preceding example:

```
144 = (2*3)+(5*6)+(12*9)  96 = (2*2)+(5*4)+(12*6)
288 = (4*3)+(10*6)+(24*9)192  = (4*2)+(10*4)+(24*6)
```

Performing Regression Analysis

The /Data Regression command allows you to perform the statistical technique known as regression analysis. With this technique, you can make predictions about dependent variables on the basis of the values of independent variables. You may want to determine how the volume of a product (dependent variable) is affected, for example, if the price (independent variable) increases.

When you select the /Data Regression command, you call up a menu of subsidiary commands:

```
A1:                                                          REGRESSION
X Range  Y-Range Output-Range Intercept Reset Go Quit
Set independent variable(s), or X, range
```

To perform the regression analysis, first select the /Data Regression command. Then, select X-range to specify the range that contains the independent variables. Next, select Y-range to specify the column that contains the dependent variables. After specifying both ranges, select Intercept. If you want SCO Professional to compute the intercept, select Compute. If you want a zero intercept, select Zero. Now, you can select Output-Range to specify a range that contains the number of independent variables plus two. Finally, select Go to perform the analysis.

The following example shows the regression analysis of a poll taken among students on a college campus. In the worksheet, column A indicates the 10 questions (dependent variable) that were asked. Columns B and C show the percentage of positive responses to the 10 questions, divided into the sex of the respondents (independent variables). The regression analysis determines how the sex of the respondent affects the response to the question.

```
A1: 'Question                                                      READY

        A         B        C       D      E          F          G         H
  1 Question   Female   Male                  Regression Output:
  2      1      0.82     0.93          Constant                      9.040698
  3      2      0.15     0.87          Std Err of Y Est              2.430275
  4      3      0.63     0.87          R Squared                     0.498864
  5      4      0.31     0.67          No. of Observations                 10
  6      5      0.35     0.76          Degrees of Freedom                   7
  7      6      0.92     0.58
  8      7      0.52     0.39          X Coefficient(s)  2.973221 -8.01233
  9      8      0.40     0.36          Std Err of Coeff. 3.254254 3.195729
 10      9      0.61     0.20
 11     10      0.79     0.83
```

X-Range

The X-range command allows you to select the columns that contain the values that are analyzed as the independent variables. In the preceding example, the X-range is B2..C11.

Y-Range

The Y-range command lets you select the column that contains the values for the dependent variable. In the preceding example, the Y-range is A2..A11.

Output-Range

The Output-range command allows you to select the range at which you want to display the results of the regression analysis. This range must be at least nine rows and must contain columns for the number of independent variables plus two. In the preceding example, the Output-range is E1..H9.

Intercept

The Intercept command allows you to select the location at which the Y-axis intercepts the line that is computed. You can make the intercept zero with the Zero command; or, you can calculate the intercept with the Compute command.

Reset

The Reset command allows you to start over if you have made an error in selecting your X-range, Y-range, Output-range, or Intercept. When you select Reset, all of the preceding settings are removed.

Go

The Go command performs the regression analysis, assuming you have already chosen the X-range, Y-range, Output-range, and Intercept.

Quit

The Quit command returns you to READY mode in your worksheet.

Parsing Files

The /Data Parse command places data from long labels into separate columns. When you import an ASCII text file into SCO Professional with the /File Import command, for example, the data is not always separated appropriately into individual cells. When you use the Parse command, the text and numbers are sometimes placed into different columns that do not match the specifications you desire. When you use the Text command, the text and numbers are placed as long labels within a single column.

If you move the cursor to A1, for instance, the status line displays the data for the entire row:

```
A1: 'Lastname   Firstname   Empcode   Deptcode   Salary
```

To use the data in formulas and graphs, you must separate the text and numbers into separate columns. It is suggested that you try the /File Import Parse command before the /Data Parse command, which is more complex. Both the /Data Parse command and the /File Import parse command break up the individual column of long labels into several columns of labels or numbers, as you specify them.

When you select the /Data Parse command, you call up a menu of subsidiary commands:

```
A1:                                                          PARSE
Format-Line  Input-Column Output-Range Reset Go Quit
Create or edit format line at current cell
```

To parse a file, move the cursor to the top cell of the column you want to parse. Select the /Data Parse command. Next, select Format-Line Create. A format line is inserted above the line of text on which the cursor rested. You may need to create addition format lines. If your imported data contains title lines, for instance, the column widths may be different from those in the data lines. To format another line, move the cursor to that line and select Create again.

After you have created all the necessary format lines, select Input Column to specify the range that you want to be parsed. Because the data from the imported file is stored in one column only, you need include only that column in the range. Remember to include the format line in the range. Now, select Output Range to specify the location in which you want the (parsed) individual entries to appear. Make sure that the range is blank.

Finally, select Go. The long labels are parsed according to your specifications, and the data is copied to the Output range. Now, when you move to the Output range, the cursor rests on individual cells instead of long labels.

SCO Professional User's Guide

In this example, rows 1 and 4 are format lines, column A is the Input range, and A15 is the Output range:

```
        A           B           C           D           E           F           G
 1L>>>>>>>>>****L>>>>>>>>>****L>>>>>>>>****L>>>>>>>>>****L>>>>>>>
 2Lastname    Firstname   Empcode     Deptcode    Salary
 3
 4L>>>>>********L>>>>>>********L>>>>>>>>>>**V>*************V>>>>>
 5Pauper      Mildred     003-39-9876  96                      $51357
 6James       Peggy       098-98-1267  96                      $73897
 7Burton      Lester      136-09-8564  96                      $48345
 8Stavinsky   Jewel       369-76-2573  62                      $74563
 9Thomas      Burt        247-92-3471  38                      $52980
10Turner      Brian       279-64-3561  38                      $73789
11Alberts     Susan       901-00-1262  38                      $50921
12
13
14
15Lastname FirstnameEmpcode  Deptcode   Salary
16
17Pauper     Mildred  003-39-98      96     51357
18James      Peggy    098-98-12      96     73897
19Burton     Lester   136-09-85      96     48345
20StavinskyJewel      369-76-25      62     74563
21Thomas     Burt     247-92-34      38     52980
22Turner     Brian    279-64-35      38     73789
23Alberts    Susan    901-00-12      38     50921
14-Feb-91   08:00 AM
```

Notice that when you move the cursor to A15, you get the value for column A only, instead of the long label for the entire row:

```
A1: 'Lastname
```

The data appears more compacted, because it has now conformed to the column widths of SCO Professional, instead of the widths established in its original form. This can be changed by using the /Worksheet Global Column-Width command. The appearance of the worksheet can be changed using any of the /Worksheet and /Range commands discussed in this guide. For more information, see Chapter 5, "Changing the Worksheet Format."

Format-Line

The /Data Parse Format-Line command lets you either create or edit a format line. An important option on the /Data Parse menu, Format-Line lets you determine how to split the long labels into individual cells.

When a format line is created, the worksheet needs recalculating, so the CALC mode indicator turns on.

Create

When you select /Data Parse Format-Line Create, a format line is inserted directly above the row on which your cursor rests. The format line defines the characters on the line as values (V), labels (L), dates (D), or times (T). The greater than symbol (>) represents a continuation of the block started by the preceding letter. The asterisk symbol (*) stands for blank spaces.

In the preceding example, the header line is formatted like this:

```
          A          B          C          D          E          F          G
1L>>>>>>>>>****L>>>>>>>>>>****L>>>>>>>>>****L>>>>>>>>>>****L>>>>>>>
2Lastname    Firstname   Empcode     Deptcode    Salary
3 ─────────  ─────────   ───────     ────────    ──────
4Pauper      Mildred     003-39-9876 96                 $51357
5James       Peggy       098-98-1267 96                 $73897
6Burton      Lester      136-09-8564 96                 $48345
7Stavinsky   Jewel       369-76-2573 62                 $74563
8Thomas      Burt        247-92-3471 38                 $52980
9Turner      Brian       279-64-3561 38                 $73789
10Alberts    Susan       901-00-1262 38                 $50921
11
12
13
14
15
16
17
18
19
14-Feb-91  08:00 AM
```

In this example, the text lines (rows 4 through 10) are spaced differently than the header line, so a second format line is created:

```
        A          B          C          D          E          F          G
1 L>>>>>>>>>>****L>>>>>>>>>>****L>>>>>>>>>>****L>>>>>>>>>>****L>>>>>>>
2 Lastname     Firstname     Empcode      Deptcode    Salary
3 ───────      ─────────     ───────      ────────    ──────
4 L>>>>>********L>>>>>>********L>>>>>>>>>>**V>***********V>>>>>
5 Pauper       Mildred       003-39-9876  96          $51357
6 James        Peggy         098-98-1267  96          $73897
7 Burton       Lester        136-09-8564  96          $48345
8 Stavinsky    Jewel         369-76-2573  62          $74563
9 Thomas       Burt          247-92-3471  38          $52980
10 Turner      Brian         279-64-3561  38          $73789
11 Alberts     Susan         901-00-1262  38          $50921
12
13
14
15
16
17
18
19
14-Feb-91   08:00 AM
```

Notice the different letters to represent the values (V), as opposed to labels (L), in columns D and E.

Edit

Sometimes the /Data Parse Format-Line Create command formats a line in a slightly different way than you desire. It may interpret telephone numbers as values instead of labels, for instance, or it may break up one column into two if the data in that area has blank spaces. If the format line does not reflect the correct block widths, spacing, or datatypes, you have to edit it.

To edit a format line, first place your cursor on the format line that you want to edit. Then, select /Data Parse Format-Line Edit, and the cursor rests on the first character of the format line.

Now, you can edit the format line. While you are in EDIT mode, you can use the left and right arrow keys to move back and forth across the format line. You can also use the up and down arrow keys to scroll up and down. The page left key scrolls the format line one page to the left in the worksheet; the page right key scrolls the format line one page to the right. The page up and page down keys scroll up and down. You can move to the end of the format line with the ⟨End⟩ key; you can move to the beginning with the ⟨Home⟩ key.

You can use the ⟨Escape⟩ key to clear the format line, if you want to start all over. Pressing the ⟨Escape⟩ key twice restores the format line to its original state. You can type new format characters over the incorrect ones and use the ⟨Delete⟩ key to delete unwanted characters. When you have finished editing the format line, press ⟨Return⟩. The new format line appears.

If you are not satisfied with the edit, press Break to cancel the edit and return the format line to its original state.

Input-Column

The /Data Parse Input-column command allows you to specify the range that you want to be parsed. After you format a line, select Input-Column. If you are parsing an imported file, the data is stored in one column only, so you need include only that column in the range. Remember to include the format line in the range as well.

Although the highlight only extends as far as the width that is set in the column, the entire row of the long label is included in the Input range. Consequently, if column A has a column width of nine, only the first nine characters of the long label are highlighted.

In the preceding example, column A is highlighted as the Input-Column:

	A	B	C	D	E	F	G
1	L>>>>>>>>>>****L>>>>>>>>>>****L>>>>>>>>>****L>>>>>>>>>>****L>>>>>>>						
2	Lastname	Firstname	Empcode	Deptcode		Salary	
3	--------						
4	L>>>>>*********L>>>>>>*******L>>>>>>>>>>**V>************V>>>>>						
5	Pauper	Mildred	003-39-9876	96		$51357	
6	James	Peggy	098-98-1267	96		$73897	
7	Burton	Lester	136-09-8564	96		$48345	
8	Stavinsky	Jewel	369-76-2573	62		$74563	
9	Thomas	Burt	247-92-3471	38		$52980	
10	Turner	Brian	279-64-3561	38		$73789	
11	Alberts	Susan	901-00-1262	38		$50921	

Output-Range

The /Data Parse Output-Range command lets you select the range at which you want to display the results of the data parse. Select Output-Range after you have formatted lines and specified the Input column. You need only specify the cell address of the upper-left corner of a blank range in which you want your parsed data to go.

In the preceding example, A15 is the Output range:

	Lastname	Firstname	Empcode	Deptcode	Salary
15	Lastname	Firstname	Empcode	Deptcode	Salary
16	--------				
17	Pauper	Mildred	003-39-98	96	51357
18	James	Peggy	098-98-12	96	73897
19	Burton	Lester	136-09-85	96	48345
20	Stavinsky	Jewel	369-76-25	62	74563
21	Thomas	Burt	247-92-34	38	52980
22	Turner	Brian	279-64-35	38	73789
23	Alberts	Susan	901-00-12	38	50921

Reset

The /Data Parse Reset command allows you to start over if you have made an error in selecting your Input-Column or Output-Range. When you select Reset, all the preceding settings are removed.

Go

The /Data Parse Go command performs the data parse. Select Go after you have formatted lines and specified the Input column and the Output range.

Quit

The Quit command removes you from the /Data Parse menu and returns you to READY mode in your worksheet. Select Quit when you are finished parsing a file.

Generating Statistics with Database @ Functions

Seven database @ functions generate statistics regarding a database. These @ functions are excellent for the purpose of numerical analysis.

The seven database @ functions work as follows:

Database @ Functions

Name	Action
@DCOUNT	Counts all the entries
@DSUM	Finds the sum of all the entries
@DAVG	Finds the average value of all the entries
@DVAR	Finds the variance value of all the entries

(Continued on next page.)

Database @ Functions (*Continued*)

Name	Action
@DSTD	Finds the standard value of all the entries
@DMAX	Finds the largest value of all the entries
@DMIN	Finds the smallest value of all the entries

Database @ functions are written as a formula. Their definitions are very similar to the statistical @ functions discussed in Chapter 3, "Using Formulas and Functions," except that they are designed specifically for database use.

The database @ functions are entered as formulas in the following manner:

@ function (input range, offset, criterion range)

As with most other formulas, a space is never used when entering a function. The Input range and the Criterion range serve the same purpose as they do for the /Data Query command. Refer to the section "Querying Records" earlier in this chapter for more information. The Input range specifies the area of the database to be analyzed, including both the records for analysis and the field names.

The Criterion range consists of the selection criteria for the records. Like the Criterion range of the /Data Query command, the Criterion range of the database @ function is constructed in an empty section of the worksheet. It can contain one, some, or all of the field names from the Input range. The criteria themselves can be numbers, formulas, or labels.

When you specify ranges as part of the @ function, type the cell addresses or range names. Do not use your arrow keys. If you use formulas in the ranges. make the ranges absolute by using the ⟨Absolute⟩ key (for example, **$ACCTSRCVBL** or **$B$10..$F$100**).

The offset portion of the @ function is a number indicating which field from the Input range is used. To determine this number, count the columns of the Input range from left to right, starting with 0 (zero) for the left-most column, until you reach the field of your choice (the offset).

Once you have typed your database @ function and pressed ⟨Return⟩, SCO Professional calculates it and then displays the results. First, records are selected from the Input range that match the criteria in the Criterion range. Then, the @ function operates on the values corresponding to the field offset defined.

In the following example, database @ functions generate statistics for sales. This example uses the columns for Names and Sales (cells A1..B9) as its Input range, a criteria of sales greater than $2,000,000.00 (cells B15..B16), and the Sales column (B1..B9) as the offset:

```
E5:  [W20] @DCOUNT($A$1..$B$9,1,$B$15..$B$16)                                    READY


    1Name:                   Sales:           |
    2Abrahms, Leon      $1,299,667.00          |
    3Brown, Leslie      $2,314,764.00          |
    4Hill, Catherine    $2,778,432.00          |
    5Jamieson, Jack     $1,332,887.00          |   Count:                         5
    6Johnson, Andy      $2,332,778.00          |   Sum:           $12,784,245.00
    7Roberts, Ted       $1,112,343.00          |   Avg:            $2,556,849.00
    8Smith, Samantha    $2,884,928.00          |   Var:       $54,504,213,686.40
    9Stevens, Julie     $2,473,343.00          |   Std:              $233,461.38
   10                                          |   Max:            $2,884,928.00
   11TOTAL:            $16,529,142.00          |   Min:            $2,314,764.00
   12                                          |
   13                   _____
   14
   15                     Sales:              |
   16                   +B2>2000000           |
   17
   18
   19
14-Feb-91  08:00 AM
```

This table lists the values for the database @ functions, as applied to the table in the preceding screen:

Value entered	Result
@DCOUNT(A1..B9,1,B15..B16)	5
@DSUM(A1..B9,1,B15..B16)	$16,529,142.00
@DAVG(A1..B9,1,B15..B16)	$2,556,849.00
@DVAR(A1..B9,1,B15..B16)	$54,504,213,686.40
@DSTD(A1..B9,1,B15..B16)	$233,461.38
@DMAX(A1..B9,1,B15..B16)	$2,884,928.00
@DMIN(A1..B9,1,B15..B16)	$2,314,764.00

Chapter 12

Exchanging Data between Applications

≡ 12

Exchanging Data between Applications

With SCO Professional, you can easily exchange information with other applications such as SCO Lyrix® and dBASE II®. SCO Professional offers a variety of features for exchanging data: you can bring ASCII text files into an SCO Professional worksheet; you can extract SCO Integra™ databases into an SCO Professional worksheet; you can export files from SCO Professional to other spreadsheet programs, and vice versa; and you can exchange SCO Professional files with files that are formatted for other SCO applications, such as word processing and database management programs. SCO Professional also works with SCO Multiview.

You may want to take a dBASE II or dBASE III® file, for instance, and bring it into SCO Professional for use as a worksheet. You can also take a worksheet from SCO Professional and translate it into a format that is readable by the word processing package; in that way, a worksheet or graph can be incorporated into a letter or a written report. You may also decide to fold an SCO Integra database file or an ASCII file into SCO Professional for use in a worksheet. All of these options are possible with the features discussed in this chapter.

Contents of This Chapter

This chapter is divided into the following sections:

- ■ "Importing ASCII Files" describes how to bring ASCII files into SCO Professional so that they can be used as SCO Professional worksheets.

- ■ "Transferring Files between Non-SCO Programs" describes the command that lets you translate files from SCO Professional to other spreadsheet program formats and vice versa.

- "Transferring Data between Other SCO Applications" describes the Clipboard utility. This utility allows you to move data from SCO Professional to the Clipboard to be used in other SCO applications; the utility also allows you to transfer files from other SCO applications onto the Clipboard, for use in SCO Professional.

- "Extracting SCO Integra Databases with SQL" describes how to bring SCO Integra databases into SCO Professional so that they can be used as worksheets.

Importing ASCII Files

You might need to incorporate some data into your worksheet from a word processing package or another application that generates an ASCII file. To do so, use the /File Import command. The two limitations on the ASCII file that you import are that the file cannot contain special characters, and that the filename must end with *.prn*.

The /File Import command menu offers three choices. Depending on the format and content of the original ASCII file and the results that you want to achieve, choose one of the following commands:

- The Text command places each row from an ASCII file composed of both text and numbers into a single column of long labels in the worksheet. This command is appropriate for importing word processing files.

- The Numbers command places the numbers of the ASCII file, along with any text that is delimited by quotation marks ("), into columns in the worksheet. The numbers become values within cells, and the delimited text strings become labels. This command is appropriate for files that contain columns of numbers, and for files whose columns and rows contain some null (empty) fields.

- The Parse command places each row from the ASCII file, both text and numbers, into several columns of labels or values in the worksheet. (You do not need to delimit the text with quotation marks.) Appropriate for files that contain both numbers and text, this command breaks up the contents of each line of the ASCII file into separate worksheet cells. This command also recognizes dates and times.

An alternative to /File Import Parse, the /Data Parse command also breaks up text and numbers into separate cells within an SCO Professional worksheet. While /File Import Parse both imports an ASCII file and separates long labels into cells, /Data Parse only separates labels into cells. This command is described in Chapter 11, "Working with Databases."

To import an ASCII text file:

1. If the name of the ASCII text file does not end with *.prn*, change the filename to include the *.prn* extension.

2. Select the /File Import command to read in the ASCII file.

3. Select Text, Numbers, or Parse to convert the ASCII file into a standard SCO Professional worksheet in the format in which you want it.

Here is an example of an ASCII text file in which the text and null fields in the "Award" column are delimited with quotation marks. The examples on the following pages show the results you get when you use each of the three /File Import commands to import this file:

Lastname	Firstname	Empcode	Award	Salary
Pauper	Mildred	003-39-9876	"High"	$51357
James	Peggy	098-98-1267	" "	$73897
Burton	Lester	136-09-8564	"Honors"	$48345
Stavinsky	Jewel	369-76-2573	"Honors"	$74563
Thomas	Burt	247-92-3471	" "	$52980
Turner	Brian	279-64-3561	" "	$73789
Alberts	Susan	901-00-1262	" "	$50921

If you select the /File Import Text command, your worksheet looks like this:
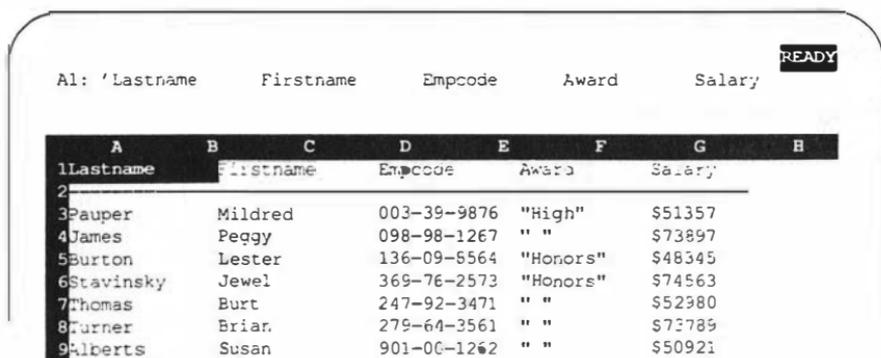
```
A1: 'Lastname      Firstname      Empcode      Award      Salary        READY

     A          B        C        D          E         F         G         H
1Lastname     Firstname       Empcode     Award      Salary
2
3Pauper       Mildred         003-39-9876 "High"     $51357
4James        Peggy           098-98-1267 " "        $73897
5Burton       Lester          136-09-8564 "Honors"   $48345
6Stavinsky    Jewel           369-76-2573 "Honors"   $74563
7Thomas       Burt            247-92-3471 " "        $52980
8Turner       Brian           279-64-3561 " "        $73789
9Alberts      Susan           901-00-1262 " "        $50921
```

The Text command places the numbers and text into a single column of long labels. With the cursor positioned on cell A1, the status line reads the data for the entire row (all five columns rolled into one).

The Text command imports the quotation marks from the ASCII file literally.

If you select the /File Import Numbers command, your worksheet looks like this:

```
A3: 3                                                              READY    1

        A         B         C        D        E       F       G       H
  1
  2
  3        3      -39     -9876    High      51357
  4       98      -98     -1267              73897
  5      136       -9     -8564    Honors    48345
  6      369      -76     -2573    Honors    74563
  7      247      -92     -3471              52980
  8      279      -64     -3561              73789
  9      901        0     -1262              50921
```

The Numbers command places all of the numbers and delimited text from the ASCII text file into separate cells. With the cursor positioned on cell A3, the status line reads only the data for column A, row 3.

The Numbers command treats all numbers as values, so it converts the "Empcode" numbers and dashes into three separate columns of values instead of creating one column of labels. The command converts the delimited text and null fields in column D into labels, but does not import the quotation marks. The Numbers command also ignores any text that is not enclosed in quotation marks, such as the names and column headings in the ASCII text file.

■ NOTE: Generally, you do not delimit numerical values with quotation marks, because /File Import Numbers turns delimited fields into labels. However, you might want /File Import to treat a string of numbers as a label. For example, if you use quotation marks to delimit each "Empcode" in the example ASCII file, the Numbers command treats them as labels, and does not break them into separate columns.

Before you import an ASCII file with null (empty) fields, enclose each text and null field in quotation marks, and separate each field with a comma for further clarity. Using the comma ensures that SCO Professional does not break fields at a space or tab where you do not want a break. The Numbers command does not import the commas.

If you select the /File Import Parse command, your worksheet looks like this:

```
A2: 'Lastname

        A         B        · C        D         E         F         G         H
1
2Lastname  FirstnameEmpcode  Award     Salary
3
4Pauper    Mildred  003-39-98"Honors"    51357
5James     Peggy    098-98-12"        "            73897
6Burton    Lester   136-09-85"High"      48345
7StavinskyJewel     369-76-25"High"      74563
8Thomas    Burt     247-92-34"        "            52980
9Turner    Brian    279-64-35"        "            73789
10Alberts   Susan    901-00-12"        "            50921
```

The Parse command places the numbers and text into separate columns of labels and values. With the cursor positioned on cell A2, the status line reads only the data for column A, row 2.

The Parse command imports the quotation marks literally. In the rows that contain a null field, the Parse command places each quotation mark into its own cell and pushes the salary value for that row into the next column.

The data appears more compacted than it did with the Text command, because some of the column entries from the ASCII text file are longer than the default column width of 9. You can make the worksheet columns wider with the /Worksheet Global Column-Width command. The appearance of the worksheet can be changed using any of the /Worksheet and /Range commands discussed in Chapter 5 of this guide.

The Parse command also imports date and time formats. If the file being imported has a date, such as 8/19/91, then the Parse command imports that date and converts it to a value (32374 in this example). To display that value as a date, you can simply format that cell with the /Range Format Date command.

- **NOTE:** If you set the International Date/Time separator using the /Worksheet Global Default Other International Date (or Time) command, then only dates (or times) with the International separator are parsed properly.

Transferring Files between Non-SCO Programs

The /File Type command allows you to store data to, and retrieve data from, spreadsheet files whose formats differ from that of SCO Professional. With the /File Type command, you select a format in which to save or retrieve a worksheet, without having to leave SCO Professional first or save your file in WK1 format and then run a translator from the SCO Professional Manager menu.

Here are the format types allowed in SCO Professional:

Format Types

Name	Description
WK1	SCO Professional format
SLK	Multiplan® format
DIF	Data Interchange Format
DBF	dBASE II or dBASE III format
WKS	SCO Professional format (Release 1)

Because many features of SCO Professional are not available in other formats, some data can be lost when you translate the files from one format to another. This section lists which features are *not* preserved by each of the six translation types. It also describes the procedures for both translating WK1 files to other formats and translating files from other formats into SCO Professional.

Retrieving Files from Different Spreadsheet Formats

You may decide to incorporate within SCO Professional a file from another spreadsheet program. For example, you may want to use a dBASE II file within a current SCO Professional worksheet. To do so, you use the /File Type command to specify the file format; and then you use the /File Retrieve command to access the file as a worksheet.

Using the /File Retrieve command after /File Type is similar to using /File Retrieve alone. The difference is that, in this instance, the file catalog list for /File Retrieve contains only files of the type specified with the /File Type command.

To retrieve a file from another spreadsheet format:

1. Select the /File Type command. The menu displays the selection of available file formats:

```
  A1:                                                              WK1
  Natural 2 (SLK) 3 (DIF) 4 (DBF III) 5 (DBF II) 6 (WKS)
  SCO Professional/1-2-3 Release 2 file
```

2. Select the file type of the file that you want to translate by typing its number or by pointing to it with the arrow keys; then press ⟨Return⟩. The mode indicator changes to highlight the specified file type.

3. Select **R**etrieve. A list of filenames of the type you selected is displayed, with the first item on the list highlighted.

4. Choose the file by typing its name or by pointing to it with the arrow keys. The file that you select should be in the format you chose in the preceding step. Then press ⟨Return⟩.

The /File Type command translates the file from its original format into SCO Professional format. You are then able to use the file as an SCO Professional worksheet.

Limitations

Some of the file formats have limitations when translated into SCO Professional:

From SLK to WK1:

■ **NOTE:** SCO Multiplan can create files in both NAT (native) and SLK formats. SCO Professional can read files in SLK format only. If you want to use Multiplan files with SCO Professional, make sure that they are in SLK format before translating them to WK1.

The following information is *not* converted when translating from SLK (a symbolic worksheet format from SCO Multiplan) to WK1 file format:

■ SLK windows and titles are not translated.

■ Because there is no WK1 equivalent, the following SLK functions cannot be translated:

COLUMN	DOLLAR	FIXED
INDEX	LEN	REPT
ROW	SIGN	VALUE

■ The following SLK functions are altered only in their syntax. They should work the same in an SCO Professional worksheet as they do in Multiplan:

LOOKUP   Changed to either HLOOKUP or VLOOKUP.

AND   Changed from a function with a variable number of parameters to a sequence of binary operators.

OR   Changed from a function with a variable number of parameters to a sequence of binary operators.

NOT   Changed from a function with one parameter to a unary operator.

■ Protection is not translated.

From DIF to WK1:

When DIF file format is translated to WK1, all functionality is preserved.
From DBF to WK1:

- If the decimal precision of a numeric field is greater than 15, it is reduced to 15.

- If a character field is longer than 240 characters, it is truncated to 240 characters.

- Deleted records are not translated.

- Only the first 8191 active records are translated; the remaining records are ignored.

Saving SCO Professional Files to Different Spreadsheet Formats

You may decide to use an SCO Professional file in another spreadsheet program. For example, you may want to use an SCO Professional worksheet in dBASE II. To do so, use the /File Type command to specify the file format; then use the /File Save command to save the worksheet in dBASE II format.

Using the /File Save command after /File Type is similar to using /File Save alone. The difference is that, in this instance, the worksheet data is saved in the format selected by /File Type.

To save a file to another spreadsheet format:

1. Select the /File Type command. The menu displays the selection of available file formats.

2. Select the file type of the file that you want to translate by typing its name or by pointing to it with the arrow keys; then press ⟨Return⟩. The mode indicator changes to highlight the specified file type.

3. Select Save. A list of filenames is displayed, with the first filename on the list highlighted.

4. Select the translated file by typing its name or by pointing to it with the arrow keys; then press ⟨Return⟩.

The SCO Professional file that you save with this procedure can now be used in the format you chose. If you selected dBASE II, for example, that file would now be formatted for use by the dBASE II program, or by other programs that can read dBASE II files.

Limitations

Some of the file formats have limitations when translated into SCO Professional:

From WK1 to SLK:

The following information is ignored when translating from WK1 to SLK file format:

- Graphics information is lost because there is no similar capability within the SLK file format.

- Windows and titles are not translated.

■ Named ranges that contain characters other than letters, digits, the underline character (_), or the dot character (.), are not translated, because these are the only characters allowed for range names within SLK files.

■ None of the database functions are translated, because SLK files do not contain a database.

■ Print-setup and margin information are lost, because there are no corresponding SLK records.

■ Because there is no SLK equivalent, the following functions cannot be translated:

ATAN2	SEL	DATE	TODAY
PMT	PV	FV	DAY
MONTH	YEAR	CNT	VLOOKUP
VAR	IRR	HLOOKUP	DSUM
DCNT	DMIN	DMAX	DVAR
DSTD	ERR		

■ The following WK1 functions are altered only in their syntax. They should function the same as in SCO Professional:

AND   Changed from a sequence of binary operators to a function with a variable number of parameters.

OR   Changed from a sequence of binary operators to a function with a variable number of parameters.

NOT   Changed from a unary operator to a function with one parameter.

From WK1 to DIF:

Because DIF files contain information on only the cell contents of the worksheet, the following is not converted when translating from WK1 to DIF file format:

- Graphics information

- Print-setup and margin information

- Window and title information

- Named-range information

- Database information

- Formulas (DIF files do not have a structure for containing them)

- All format and protection information

From WK1 to DBF:

To translate from WK1 to DBF format, the worksheet must be in a database format. To be in a database format, a worksheet must obey the following rules:

- It must be a rectangular range of fields where the first non-blank row contains the field names.

- Field names must conform to the DBF syntax, which requires that the first character be alphabetic and all other characters be alphanumeric. The field name must contain 10 characters or less.

- NOTE: You can satisfy the above requirements by using the /File Xtract command from SCO Professional to create a WK1 file that contains just the database. This command is described in the section "Saving Portions of a Worksheet" in Chapter 2.

Because of the simplicity of DBF files, the following restrictions apply when converting from WK1 to DBF:

- Only data that can be displayed within the column width is translated and placed in the DBF field.

- All value cells are displayed in fixed-decimal format in the DBF numeric field. Therefore, some values in other formats (for example, exponential) that do not overflow their WK1 display cells are not translated, because they are too large for the DBF field.

- The first row of cells after the label row of field names determines the type, size, and format of the DBF fields. Cells in subsequent rows that are different from the type in that column are not translated.

Some information is lost when converting from WK1 to DBF, because there are no DBF equivalents:

- Only the first 32 columns of data are translated; all others are ignored.

- DBF files from dBASE II and FoxBASE have a maximum record length of 1000. DBF files from dBASE III and FoxBASE+ have a maximum record length of 4000. The sum of the lengths of all fields in a row must not exceed these record lengths.

- Only the value of a formula is translated; the formula itself is ignored.

- Graphics information is ignored.

- Print-setup and margin information is ignored.

- Window and title information is ignored.

- Named-range information is ignored.

- Protection and format information, except for number of decimal places, is ignored.

Transferring Data between Other SCO Applications

You can transfer worksheet ranges or graphs between SCO Professional and other SCO applications by using the Clipboard utility. The Clipboard provides temporary storage while you are copying the range from one application to another. The Clipboard translates the range from the current worksheet format (usually *.wkl*) into a format usable by the other application.

You can access the Clipboard from two different SCO Professional menu commands: /Transfer and /Graph Graph-Transfer. The /Transfer command transfers worksheet ranges, and the /Graph Graph-Transfer command transfers graph ranges.

There are two aspects to using the Clipboard: copying a range from SCO Professional to the Clipboard so that it can be used in another application, and pasting (originally from another application) from the Clipboard so that it can be used in SCO Professional.

If you decide to include part of a spreadsheet and a graph into a letter, for example, use the /Transfer command to copy the worksheet range to the Clipboard and the /Graph-Transfer command to copy the graph to the Clipboard. This worksheet and graph data can then be pasted from the Clipboard into a word processor file, where they can be edited.

Without SCO Portfolio, you can still use the Clipboard to move data between worksheets. You may decide to paste a worksheet from the Clipboard onto the Resident window of a multiple screen, for example. While the worksheet is on the Clipboard, it cannot be altered. The Clipboard provides a safe storage for the worksheet file until, or unless, you decide to remove it from the Clipboard. See Chapter 7, "Using Multiple Worksheets," for more information on External and Resident windows.

Copying a Range to the Clipboard

You may decide to copy a worksheet range to the Clipboard, where it can be accessed by another SCO application. If you need to incorporate a worksheet into a form letter, for instance, or if you want to fold a worksheet into a database, the /Transfer Copy command is useful. The Copy command allows you to place an SCO Professional worksheet range onto the Clipboard.

To copy ranges from a worksheet to the Clipboard:

1. Retrieve the worksheet file that you want to transfer.

2. Select /Transfer. The following menu is displayed:

```
A1:                                                    TRANSFER
Copy Paste Remove
Copies data to the Clipboard
```

3. Select Copy.

4. Specify the range of the worksheet that you want copied to the Clipboard, by pointing, by entering range coordinates, or by typing the name of an existing range. After you specify the range, you are prompted to name the Clipboard item. The default name for a Clipboard item is *temp*.

5. Press ⟨Return⟩ if you want to use the default name. To give the item a different name, type that name and press ⟨Return⟩. If you choose an existing name, the contents of that file are overwritten.

After you name the Clipboard item, you return to your worksheet. To transfer the data on the Clipboard to a different SCO application, you have to exit SCO Professional and enter the application to which you want the file transferred. Make sure that the SCO application has a Clipboard.

For more information on specifying ranges, see the section "Using Ranges" in Chapter 2. Also refer to the section "Using SCO Professional Files," in Chapter 2, for more information on files.

Pasting a Range from the Clipboard

You may decide to transfer a file from another SCO application to the Clipboard, where it can be accessed by SCO Professional. If you need to incorporate a database file into a worksheet, for instance, the /Transfer Paste command is useful.

The Paste command allows you to take an item from the Clipboard and place it into the current SCO Professional worksheet. Data is pasted starting at the cell pointer's position.

■ **IMPORTANT:** Because data can be overwritten with this command, make sure that the range is empty.

To transfer an item from the Clipboard to a worksheet:

1. Use the /File Retrieve command to display the worksheet file into which you want the item to be pasted.

2. Move the cursor to the location where you want the new data.

3. Select /Transfer Paste. A list of Clipboard items is displayed. with the first item on the list highlighted.

4. Use the arrow keys to move the cursor to the item that you want.

5. Press ⟨Return⟩. You are returned to the READY mode.

The Clipboard item you selected is copied from the Clipboard. The name of the original file is not changed, and it remains on the Clipboard until you delete it with the /Transfer Remove command. You can paste an item as many times as you want.

For more information on files, see the section "Using SCO Professional Files" in Chapter 2.

Deleting an Item from the Clipboard

When you have completed the procedure for copying or pasting a file, and you are sure that you no longer need a copy of that file on the Clipboard, you can remove it.

To remove an item from the Clipboard:

1. Select /Transfer Remove. A list of Clipboard items is displayed.

2. Use the arrow keys to move the cursor to the item that you want to remove.

3. Press ⟨Return⟩.

The item is removed from the Clipboard, and you are returned to READY mode.

Transferring Graph Ranges to the Clipboard

In addition to transferring worksheets (data ranges), you can also transfer graphs for use in other SCO applications. Unlike data files, however, graph files cannot be pasted into SCO Professional from other applications. You can only transfer graph files *out* of SCO Professional.

The following procedure describes how to transfer SCO Professional graphs to the Clipboard, from which they can be used by other SCO applications.

To transfer a graph to the Clipboard:

1. Create or load a previously named graph as described in Chapter 9, "Creating Graphs," of this guide. Use the /Graph View command or press ⟨F10⟩ to view your graph before transferring it.

2. Select **/Graph Graph-Transfer.** The following menu is displayed:

```
A1:                                              GRAPH-TRANSFER
Copy Remove
Copies graphs to the Clipboard
```

Because graphs from other applications cannot be imported into SCO Professional, there is no Paste command.

3. Select Copy to transfer the current graph from SCO Professional to the Clipboard.

4. You are prompted to enter a name under which you want the graph stored on the Clipboard. The default name for a Clipboard item is *temp*. Press ⟨Return⟩ if you want to use the default name. To give the item a different name, type that name and press ⟨Return⟩. If you choose an existing name, the contents of that file are overwritten.

Both commands work the same way as the Copy and Remove commands described in the previous section. Refer to the sections "Copying a File to the Clipboard" and "Deleting a File from the Clipboard" earlier in this chapter.

Extracting from Databases with SQL

You can use data from a database in an SCO Professional worksheet. If the database supports the Structured Query Language, you can enter an SQL **select** statement into a worksheet cell. The SQL **select** statement allows you to query a database, extract information, and load it into the current worksheet. For more information on SQL **select** statements, see the SQL section of your database documentation.

Once the data is loaded into an SCO Professional worksheet, you can modify it with any of the SCO Professional commands. However, the

original SQL database remains the same. In other words, the SQL database still exists, and a copy of the database also exists in SCO Professional. For more information on databases, see Chapter 11, "Working with Databases," in this guide.

Data extracted by the **select** statement is loaded into the worksheet either one row beneath the current cell pointer position or at a range that you specify. Each field is assigned its own cell, and every record is assigned its own row in the worksheet. Cells are created according to the datatype of the field. For instance, strings become labels and numbers become values.

SCO Professional is configured to extract data from databases created by the SCO Open Desktop database management system; to extract from other databases, see "Accessing Databases Other than the Default" later in this chapter.

Using the SQL select Statement

When you have determined where you want to place the extracted data in your worksheet, move to a blank cell above where the data appears. If you are not going to specify a range, make sure the empty area of the worksheet below the blank cell is large enough for the extracted data.

Enter the SQL command containing the **select** statement in the blank cell. The syntax for using an SQL command with SCO Professional is as follows:

| **SQL**(*<databasename>*,*< select statement>* [,*<range>*])

If, for example, you want to write a simple SQL statement in cell A1, to extract all the data from a database named "test" and put that data in the range between cells C10 and G14, enter the statement in the following form on your worksheet.

```
A1:                                              LABEL
|sql(test,sel ct all from sample,C10..G14)
```

As you review the syntax that precedes the example, and the syntax of the **select** statement that follows, note that words or punctuation that are displayed in **boldface** must be typed exactly as shown; words that are shown in *italics* should be replaced with a value of your own. The pipe character (|) is optional. The word *SQL*, the parentheses ( ) that enclose the database name and **select** statement, and the comma separating the names are all required. You should replace *databasename* with the name of the database you wish to query; replace the words *select statement* with the actual statement, surrounding it in quotation marks when selecting more than one field separated by commas; and (as an optional feature), replace *range* with a cell range of your choice.

This is the syntax for the **select** statement:

> **select** [{ **all** | **distinct** | **unique** }]
> [{ *field-list* | ***** }]
> **from** *table-list*
> [**where** *where-condition*]
> [**group by** *fieldname*]
> [**having** *having-condition*]
> [**order by** *fieldname* [{ **asc** | **desc** }][, ...]]

If your database program calls for embedded double quotation marks (" ") in **select** statements, Professional requires that you precede each set of double quotes with a backslash (\). For example, the **select** clause **where** *field-name* = *"value"* would be entered like this:

> [**where** *fieldname* = \"value\"]

If your database program calls for embedded single quotation marks (' ') you do not have to precede them with backslashes.

If you want to preserve the standard SQL select statement format, you can enter the select statement and its conditions in a one-column range of cells. Then you can create an SQL statement that references the range of cells, as described in the "Cell Referencing" section that follows. For more information about the **select** statement and its syntax, refer to the documentation for your SQL database application.

When you have finished entering the complete **select** statement and range in the correct syntax, press ⟨Return⟩ as you would after completing the entry of a label or value in a cell. The extracted data appears either directly beneath the cell in which you entered the SQL statement or in the range that you specified. If any errors occur during the query, the first error message generated by your SQL database application is displayed on the error line at the bottom of the spreadsheet. For concrete examples of SQL statements and the data they extract, see "Examples of Database Extraction" at later in this chapter.

Cell Referencing

You can also enter cell references as arguments in an SQL statement. Instead of entering a database name and a **select** statement as the first two arguments of the SQL statement, you enter cell addresses (or a range of cell addresses for the **select** statement). You must then enter the database name and **select** statement in the cells referenced.

Because you can reference a second cell in an SQL statement, you can create statements that are over 240 characters long. However, this does not allow for more than one **select** statement to be specified in the range.

If you specify a single cell address, Professional reads down the column to the first non-label or non-string formula cell. This allows a **select** statement to be broken up into more than one cell. If you specify a range instead of a single cell address, only the first column of the range is read. This column is treated in the same way as the single cell reference, except that it does not read past the last row of the range.

For example, if you want to break up the SQL statement

|sql(test, select all from sample)

you can enter the database name *test* in cell A1 and the **select** statement *select all from sample* in cell A2. Then you can enter the SQL statement **|sql(a1,a2)** in cell A3 (or in any unoccupied cell of the worksheet).

Limitations

When you use SQL in SCO Professional, keep in mind that permissions must be set for specific SQL database files and users. Also, the SQL commands entered in a worksheet are executed under only a few circumstances. Each of these items is explained in the following paragraphs.

Before SQL can be used with SCO Professional, the following permissions must be set:

■ When using the SCO Open Desktop database management system, the database administrator must run **accessdb** and give each user permission to access the database.

■ When using any database program, the proper database file permissions must be set for users who want to query the files.

Contact your database administrator to make sure you have the proper access and file permissions before you use SQL to extract data for use in SCO Professional.

The SQL commands entered in a worksheet are executed only under the following circumstances:

■ After the SQL cell is edited, either initially or subsequently

■ When the worksheet file containing the SQL command is retrieved

■ When the ⟨Query⟩ key (by default, ⟨F7⟩) is pressed

■ When the range for the extracted data is copied to a new place in the worksheet.

Accessing Databases Other than the Default

In the *$PROLIB* directory there are four files containing scripts for database extraction; *sqlscript, integra, oracle,* and *ingres.* The file *sqlscript,* which controls the database extraction process, is written to access the databases created by the SCO Open Desktop database management system, by default. You can replace it with either an *oracle* or *integra* extraction script file to access those databases. If you later decide you want to access databases created by the SCO Open Desktop database management system, you can replace the *sqlscript* file again, with the *ingres* file.

To prepare for accessing a database other than the default, change to the *$PROLIB* directory and use the **cp** command to replace the default *sqlscript* file with the *oracle* or *integra* file. For example, to prepare for accessing an Oracle database, enter this:

    cp oracle sqlscript

If you have met the other prerequisites outlined in the "Limitations" section of this chapter, you can now use the SQL **select** command to access an Oracle database.

If you want to access a database other than Oracle, Integra, or the default, you must edit the system line in the *sqlscript* file. This task requires a knowledge of not only SQL but shell script writing. See your system administrator for assistance.

The system line in the script echos the SQL command line to the operating system's shell, which in turn pipes it all to the SQL program. In the following example, the system line for SCO Integra is used.

```
echo " select database " $1 " ; " $2 " into file " $3
" delimited by | ; " | sql > /dev/null
2 > $4
```

The line has four arguments that are sent to it from SCO Professional:

Argument	Description
$1	The database name
$2	The select statement
$3	A temporary output file
$4	A temporary error file

The command line that is sent to the SQL program can be altered, and then piped to a different database application that may have a different syntax from the current program.

For more information, see Chapter 4, "Customizing Command Sequences," in the *SCO Professional Configuration Guide*. See also the chapters on **sed** and **awk** in your operating system documentation.

Examples of Database Extraction

The following examples of database extraction show how to retrieve data from a simple SCO Integra database. Before extracting from an SCO Integra database, you must replace the *sqlscript* file in the *$PROLIB* directory. Use the following command:

cp integra sqlscript

This procedure is explained in more detail in the "Accessing Databases Other than the Default" section earlier in this chapter.

The examples that follow assume that there is a database file named *test*, and that the permissions for this file allow access to it by the user who wants to extract data. The general principles and procedures shown in these examples are applicable to to the default database and any other SQL database, but details may vary.

Suppose you want to extract data from a table called *sample* in the database *test*. The entire *sample* table looks like this:

Sample Table

Last_Name	First_name	SS_number	Dept_number	Salary
Anderson	Larry	472-67-8871	46	$46,000.00
Brewster	Janice	332-56-5455	32	$24,000.00
Calvin	Thomas	221-45-6690	46	$37,000.00
Dodds	Mike	882-90-8821	25	$28,500.00
Emerson	Paul	445-99-9033	32	$52,000.00
Ferguson	Beth	554-54-5353	46	$48,000.00
Gustavson	Richard	223-34-4455	32	$32,000.00
Hildegard	Wanda	443-54-8892	25	$17,000.00
Ingersol	Janine	442-43-8849	68	$33,000.00
Jacobson	Renee	442-43-8383	32	$54,000.00
Klondike	Kevin	424-33-4293	25	$37,000.00
Lambert	Mary	998-89-8990	25	$46,500.00
Malhoney	Patrick	430-59-5909	46	$28,500.00
Newman	Debra	839-89-3345	46	$42,000.00
Oppenheimer	Zachary	349-59-3894	32	$32,500.00
Peterson	Pauline	443-45-4434	32	$27,500.00
Queens	Carl	883-45-3329	32	$37,000.00
Rothman	Sandra	334-44-2232	46	$54,000.00
Saliera	Samuel	443-45-8856	32	$62,900.00
Tomlinson	Kristin	443-56-8822	25	$38,500.00
Uberall	Anthony	883-89-8334	32	$34,500.00
Vortell	Vera	332-33-4454	25	$37,500.00
Walsh	Anne	442-33-4224	32	$32,500.00
Xylar	Wendall	499-22-3989	46	$54,000.00
Yarlborough	Kenneth	883-32-8898	32	$35,000.00
Zanadu	Kris	889-34-8845	25	$27,500.00

Here are some examples of data extracted from this SCO Integra database and brought into SCO Professional with the **select** statement of SQL.

In the first example, the entire table is extracted from SCO Integra and brought into the SCO Professional worksheet with this syntax:

```
A1:                                          LABEL
|sql(test,select all from sample)
```

Here, you are asking SCO Professional to use SQL to access the database *test* and select all the records from the table *sample*.

The first screen of this **select** statement follows:

	A	B	C	D	E	F	G	H
1	SQL(test,select all from sample)							
2	Anderson	Larry	472-67-88	46	46000			
3	Brewster	Janice	332-56-54	32	24000			
4	Calvin	Thomas	221-45-66	46	37000			
5	Dodds	Mike	882-90-88	25	28500			
6	Emerson	Paul	445-99-90	32	52000			
7	Ferguson	Beth	554-54-53	46	48000			
8	Gustavson	Richard	223-34-44	32	32000			
9	Hildegard	Wanda	443-54-88	25	17000			
10	Ingersol	Janine	442-43-88	68	33000			
11	Jacobson	Renee	442-43-83	32	54000			
12	Klondike	Kevin	424-33-42	25	37000			
13	Lambert	Mary	998-89-89	25	46500			
14	Malhoney	Patrick	430-59-59	46	28500			
15	Newman	Debra	839-89-33	46	42000			
16	Oppenheim	Zachary	349-59-36	32	32500			
17	Peterson	Pauline	443-45-44	32	27500			
18	Queens	Carl	883-45-33	32	37000			
19	Rothman	Sandra	334-44-22	46	54000			

14-Feb-91   08:00 AM

In this example, the extracted data begins in cell A2. Because no range is specified, SCO Professional creates one that begins directly beneath the SQL statement.

Notice that the data has been neatly separated into rows and columns. Using the SCO Professional commands discussed throughout this chapter, you can now format the worksheet, alter the data, and sort it in any way you wish.

To specify a range, you could enter a **select** statement like this:

```
A1:                                          LABEL
|sql(test,select all from sample,C10..G14)
```

Because the range does not include the entire table, the following error message is displayed:

```
        Output range too small at (A1) (21 row(s))
```

The error message indicates that the range you have specified in cell A1 is too small by 21 rows to show all of the data in the table *sample*.

To continue, simply press ⟨Return⟩. Now the extracted data appears at the specified range instead of directly beneath the **select** statement. Only that portion of the table that fits within the range is extracted:

```
     A        B          C         D         E        F        G        H
1SQL(test,select all from sample,C10..G14)
2
3
4
5
6
7
8
9
10                   Anderson  Larry    472-67-88    46       46000
11                   Brewster  Janice   332-56-54    32       24000
12                   Calvin    Thomas   221-45-66    46       37000
13                   Dodds     Mike     882-90-88    25       28500
14                   Emerson   Paul     445-99-90    32       52000
15
14-Feb-91  08:00 AM
```

Using the choices available from the **select** statement, you can also choose to extract only specified records from this table. Suppose you want to extract the data for salaries and last names only. Because you are selecting more than one field, you need to enclose that portion of the **select** statement in quotation marks. Use this syntax:

```
A1:                                                           LABEL
|SQL(test,"select Last_Name, Salary from sample")
```

In this example, Last_Name and Salary are names of fields in the *sample* table. The range of the extracted data automatically begins directly beneath the **select** statement. The **select** statement extracts only those records you specified:

```
        A          B          C       D        E        F        G        H
 1SQL(test,select Last_Name, Salary from sample)
 2Anderson    46000
 3Brewster    24000
 4Calvin      37000
 5Dodds       28500
 6Emerson     52000
 7Ferguson    48000
 8Gustavson   32000
 9Hildegard   17000
10Ingersol    33000
11Jacobson    54000
12Klondike    37000
13Lambert     46500
14Malhoney    28500
15Newman      42000
16Oppenheim   32500
17Peterson    27500
18Queens      37000
19Rothman     54500
14-Feb-91  06:00 AM
```

To further limit the records selected, you can use logical operators in the where clause of the **select** statement, as follows:

```
A1:                                                    LABEL
|SQL(test,"select Last_Name, Salary from sample where Salary > 40000")
```

In this example, the clause *where Salary > 40000* asks SQL to extract only those records showing salaries greater than $40,000.00:

	A	B	C	D	E	F	G	H
1	SQL(test,"select Last_Name, Salary from sample where Salary > 40000")							
2	Anderson	46000						
3	Emerson	52000						
4	Ferguson	48000						
5	Jacobson	54000						
6	Lambert	46500						
7	Newman	42000						
8	Rotman	54000						
9	Saliera	62900						
10	Xylar	54000						

Again, the range of the extracted data automatically begins directly beneath the **select** statement.

Although you can use the /Data Sort command to change the order of records once the data has been extracted from SCO Integra, you can also use the order by clause of the **select** statement to select records in a specified order:

```
A1:                                                       LABEL
|SQL(test,"select Last_Name, Salary from sample where Salary > 40000 order by
Salary")
```

In this example, the clause *order by Salary* asks SQL to sort the extracted records by the data in the Salary field:

	A	B	C	D	E	F	G	H
1	SQL(test,"select Last_Name, Salary from sample where Salary > 40000 order"							
2	Newman	42000						
3	Anderson	46000						
4	Lambert	46500						
5	Ferguson	48000						
6	Emerson	52000						
7	Jacobson	54000						
8	Rothman	54000						
9	Xylar	54000						
10	Saliera	62900						

As you can see, the **select** statement provides a wealth of commands, not all of which can be covered in this section. The preceding examples give you some idea of the scope of SQL. For more information on using SQL select statements, see your database program's documentation.

≡ Chapter 13

Using the
Professional Manager

13

Using the Professional Manager

SCO Professional is more than just a spreadsheet. The spreadsheet is the key element of a package that includes a wide range of features. The *Professional Manager* organizes and controls the overall package by acting as a central clearinghouse and placing all of SCO Professional's power at your fingertips. From the Professional Manager menu, you can manipulate files, print graphs, convert files to a format readable by SCO Professional, and configure your system to allow you to use SCO Professional to the fullest extent. Many of the Professional Manager's functions are also available in a comparable area of the worksheet. References to these functions are provided in this chapter.

Contents of This Chapter

This chapter is organized into the following sections:

- "Entering the Professional Manager" introduces you to the Professional Manager menu, and briefly describes each menu command.

- "Using SCO Professional" describes how to enter SCO Professional and where to find more information about the worksheet.

- "Managing Files" shows you how to use the File-Manager command to move, change, rename, and delete files on your system.

- "Printing Graphs" explains how to use the GraphPrint command to format and print worksheet graphs.

- "Translating Worksheet Files" tells you how to translate files from other popular worksheet formats to a format readable by SCO Professional, and vice versa.

- "Configuring Your System" describes how to configure your terminals, consoles, and printers to make the most of SCO Professional's capabilities.

Entering the Professional Manager

Enter the Professional Manager by typing **pro** at your system prompt. The following screen appears:

```
                                                                    MENU
SCO Professional  File-Manager GraphPrint Translate Configuration Quit Enter
SCO Professional — SCO Spreadsheet/Graphics/Database program




                          Sun 14-Feb-91
                          2:14:44 PM








     Use the arrow keys to highlight a command choice and press <RETURN>
   Press <ESC> to cancel a choice; Press Function Key 1 or <CTL>f1 for help
```
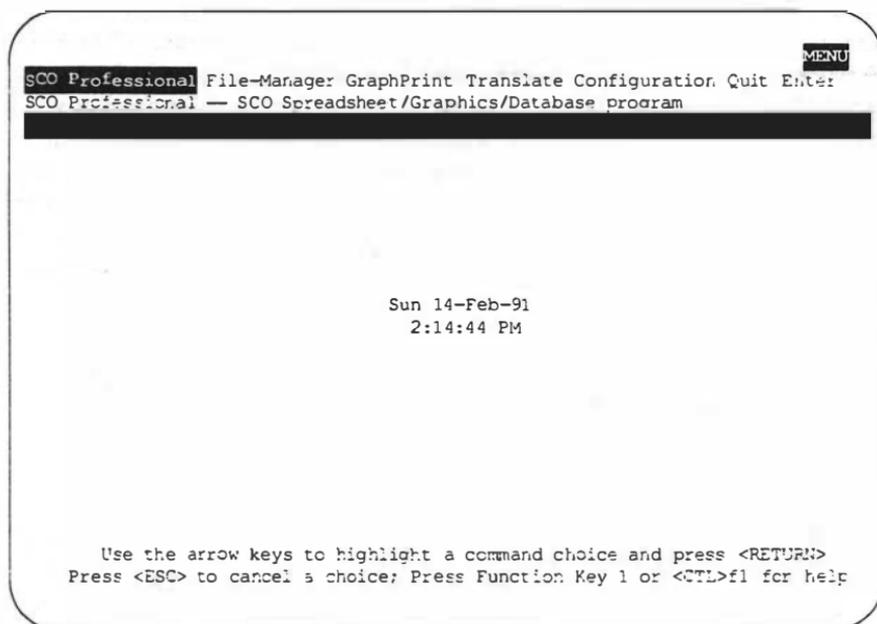
Each command offered on the Professional Manager menu governs an aspect of the overall system. The menus work the same as those in the spreadsheet. In addition, when you enter information or perform certain functions the mode indicator changes to reflect the current action. For more information on menus and modes, see Chapter 1, "Getting Started."

To exit the Professional Manager, select **Q**uit from the Professional Manager menu and you are returned to your system prompt.

Using SCO Professional

When you enter the Professional Manager, the menu selection **SCO Professional** is highlighted. By pressing ⟨Return⟩, or typing the first letter (S), you enter directly into the spreadsheet program. See Chapters 1 through 12 for detailed information on how to get the most out of your spreadsheet.

Managing Files

The File-Manager utility allows you to maintain and organize files easily. With it, you can create new directories, remove old ones, and list the files in any directory. It also supplies the tools to copy or rename files and to remove files no longer needed.

In addition, it is strongly recommended that you keep copies of all computer work on removable media (tapes or floppy disks). Removable media, since they are stored outside your computer, are less vulnerable to hardware failure, so they provide a more secure form of storage. These extra copies are called media ARCHIVES or BACKUPS.

The File-Manager provides a link to your backup media through the Media-Archive command. This command makes it possible to keep archive copies of your work in any of three different formats. It controls the process of writing files to and from the backup media and even allows you to format floppy disks in the operating system format.

Entering the File-Manager

To enter the File-Manager from the Professional Manager, either highlight the correct selection and press ⟨Return⟩, or type **F**. The File-Manager menu appears on the screen:

```
                                                            File-Manager
List Copy Rename Erase Directory Media-Archive Quit List an alternate direc-
tory
           Current Directory: /y/doc/new/applics/profess/ug/pmgr
         ..          drwxr-xr-x 22 admin    pub         448 Jul 26 09:33
         l.temp.err  -rw-r—r—  1 admin    pub        4805 Jul  7 10:02
         l.temp.s    -rw-r—r—  1 admin    pub       23750 Jul  7 10:00
         13.mngr.err -rw-r—r—  1 admin    pub        6158 Jul 25 15:33
         13.mngr.s   -rwxrw-rw- 1 admin    pub       37679 Jul 26 14:03
         junk        -rw-r—r—  1 admin    pub        2098 Jul 25 14:34
         newscrl     -rw-r—r—  1 admin    pub         553 Jul 26 14:14
         pfile       -rw-r—r—  1 admin    pub         282 Jul 26 14:10
         screen1     -rw-r—r—  1 admin    pub        1128 Jul 14 13:04
         table       -rw-r—r—  1 admin    pub         862 May 31 17:59
         table2      -rw-r—r—  1 admin    pub        1216 Jul 25 13:05
```

Just below the menu items is a brief description of the highlighted menu item. The name of the current directory is displayed, and below that is a listing of all of the directories and files in the current directory. If the current directory contains more files than can be displayed on the screen, you can scroll through the listing using the ⟨Up⟩, ⟨Down⟩, ⟨PageUp⟩, and ⟨PageDown⟩ keys, or use the standard sequences ⟨Ctrl⟩**k**, ⟨Ctrl⟩**j**, ⟨Ctrl⟩**u**, and ⟨Ctrl⟩**d**.

File Naming Conventions

Each file you create is identified by a unique name. Filenames can be up to 14 characters. However, when you save a file in SCO Professional, the program automatically adds a file extension of a period and three additional characters, so filenames must be limited to 10 characters. Punctuation marks are considered characters, and a filename cannot contain blank spaces. SCO Professional distinguishes between upper- and lowercase characters. For further information on file naming and valid file characters, refer to Chapter 2, "Worksheet Basics."

When you use the File-Manager utility, you are often asked to specify files by typing their names. File pathnames customarily contain slashes (/) between each directory level on a machine running XENIX or UNIX systems and backslashes (\) serving a similar function on a machine running DOS. For this reason, SCO Professional accepts \ and / interchangeably as filename separators. For more information on the structure of file hierarchies, refer to your operating system documentation.

You can also select a file by highlighting it on the screen. When you are prompted for a file, a highlight bar appears at the top of the listing. Use the cursor control keys to move the highlight bar through the filenames, then press ⟨Return⟩ to select the highlighted file.

Listing Directory Files

The List command allows you to display the file listing for any directory on the screen. Using this command, you can find the location of a particular file without having to change your current directory.

To use the List command, select List from the File-Manager menu. A submenu appears with the choices Current and Alternate.

If you select Current, your current directory is listed on the screen, even while you use the other commands in File-Manager. If you change your current directory by using the File-Manager Directory command, the listing changes to reflect the new current directory. Current is the default selection.

If you choose Alternate, you are prompted for the name of the directory you want listed. You may type the name using a relative or absolute

pathname, or highlight it from your current list of files and directories. Press ⟨Return⟩ after entering the directory name, and the new directory listing appears on the screen.

The alternate directory listing stays on your screen until you list a different alternate directory, choose the List Current command, or leave the File-Manager. While the Alternate command is active, changing your current directory does not change the directory listing on the screen. The first line of the listing area shows the full pathname of the alternate directory listed.

Copying Files

The Copy command makes a copy of any desired file. First select Copy from the File-Manager menu. You are prompted for the name of the file you want to copy (the file to "copy from"). You can select the file in the displayed listing by highlighting the correct file or by typing the filename. Enter the "copy from" filename by pressing ⟨Return⟩.

SCO Professional then asks for the name of the file you wish to create, or copy to. This filename must be a name that does not exist in the current directory, as the File-Manager cannot overwrite another file. When you type the new filename and press ⟨Return⟩, the program makes the copy and returns you to the File-Manager menu.

If you attempt to copy a file to a different directory by typing in a directory name at the "copy to" prompt, you are asked if you want to Cancel or Proceed. This reminder may save you from losing track of a file unintentionally since the new file is created using the same name in the directory specified. If you select Proceed, the file is copied to the directory specified with the same filename. If you type the directory name *and* the filename you wish to copy to, instead of just the directory name, SCO Professional assumes that this is an intentional choice and does not ask you to confirm it.

If a file with the name you wish to copy to already exists in the indicated directory, File-Manager does not overwrite the file. To copy to that directory and filename successfully, you must first remove the pre-existing file using the Erase command.

Renaming Files

Use the Rename command to rename a file. This command also makes it possible to move a file to a different directory. Start by selecting the Rename command from the File-Manager menu. You are prompted for the name of the file you want to rename. You can select the file from the displayed listing or type the filename.

After pressing ⟨Return⟩ to enter the old filename, you are prompted for the new name you wish to give the file. You must type this name. When you enter the new name by pressing ⟨Return⟩, the file is renamed and you are returned to the File-Manager menu.

You can also use the Rename command to move a file. You can move a file from one directory to another, but you cannot move a directory. If a file with a name you wish to use already exists in the indicated directory, the File-Manager cannot overwrite the file. To rename (or move) a file to that name successfully, you must first remove the pre-existing file using the Erase command.

Erasing Files

The Erase command deletes a file. Since there is no way to restore a file once erased, use this command carefully. To use the command, select Erase. You are prompted for the name of the file to erase. Specify which file you wish to erase by highlighting the file on the displayed list or by typing its name. Once the name is entered, File-Manager asks you to confirm your selection, because the file cannot be recovered once it is erased. After you confirm your selection, the file is erased and you are returned to the File-Manager menu.

Manipulating Directories

The Directory command makes it possible to change your current directory, to create a new directory, or to remove an existing empty directory. When you select Directory from the File-Manager menu, a submenu appears on the screen:

```
                                                                    Directory
Change-Dir Make-Dir Remove-Dir Change to a new working directory
           Current Directory: /y/doc/new/applics/profess/ug/pmgr
    ..              drwxr-xr-x  22 admin    pub          446 Jul 26 09:33
    1.temp.err      -rw-r—r—    1 admin    pub         4805 Jul  7 10:02
    1.temp.s        -rw-r—r—    1 admin    pub        23750 Jul  7 10:00
    13.mngr.err     -rw-r—r—    1 admin    pub         6158 Jul 25 15:33
```
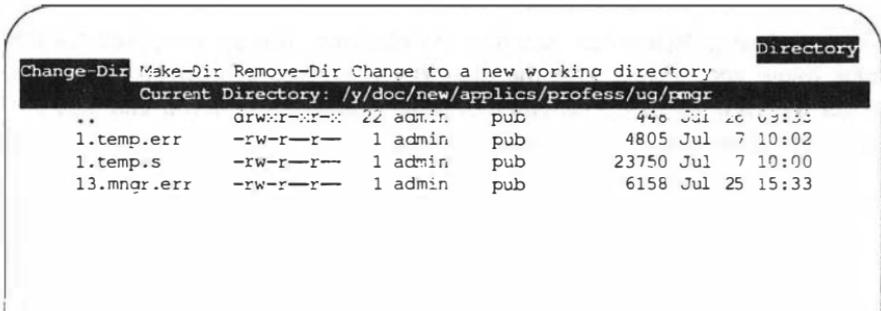
If you choose Change-Dir, you are prompted for the name of the directory you wish to become your current directory. You can select it from the listing on the screen or type its name. When you press ⟨Return⟩, the onscreen directory listing is updated, unless the List command has been set to an alternate directory.

Use Make-Dir to create a new empty directory. When you select it, you are prompted to type the name of the new directory. When you press ⟨Return⟩ to enter the name, the directory is created as a subdirectory of the current directory.

Use Remove-Dir to delete a directory. Choose one directory by typing its name or highlighting it on the listing. Enter your choice by pressing ⟨Return⟩. Professional Manager removes only directories that contain no files, so move or erase the files in the directory you want to remove.

Using Archive Media

The Media-Archive command allows you to generate backup copies of your work on removable media such as floppy disks or tape. If you have a DOS partition on your hard disk, you can also use Media-Archive to move files back and forth between XENIX or UNIX system directories and the DOS partition. This is important because the files on your computer may be vulnerable to hardware, electrical, or even operator failure. Before using Media-Archive, you should verify that your archive device has been correctly configured by checking with your system administrator or consulting the Professional Manager's Configuration utility described later in this chapter.

When you select Media-Archive, the following submenu appears on the screen:

```
                                                                    TAR
Type List Extract Create Format Quit Select the the method of archival to use:
tar, cpio, or DCS
          Current Directory: /y/doc/new/applics/profess/ug/pmgr
    ..                drwxr-xr-x  22 admin    pub        448 Jul 26 09:33
    1.temp.err        -rw-r—r—   1 admin    pub       4805 Jul  7 10:02
    1.temp.s          -rw-r—r—   1 admin    pub      23750 Jul  7 10:00
    13.mngr.err       -rw-r—r—   1 admin    pub       6158 Jul 25 15:33
```

Selecting a Backup Format

The first decision to be made is what type of format you will use for the command you select. File-Manager can back up files in *tar, cpio*, or *DOS* format (DOS format is not available on all machines). The default format is *tar*. If you are not sure which format to use, check with your system administrator.

To specify which format to use, select Type from the Media-Archive menu, then select the correct format.

Listing Archive Media

The List command displays the contents of the archive media. To use this command, select List. Be sure that the floppy disk, tape, or other medium is properly mounted.

A list of the contents of the archive media appears on the screen. Media-Archive displays the first page of filenames. If the listing is longer than a page, scroll down with the cursor movement keys until the desired file is reached. Pressing ⟨Return⟩ after the last page returns you to the Media-Archive submenu and restores the directory contents listing. If you want to see the media listing again, you must request it again.

Retrieving Archived Files

The Extract command copies files from the archive media into your current directory. When you select Extract, you are prompted to specify which files you wish to copy. If you select All, then the entire contents of the archive media are copied into your current directory. **Be very careful. This command overwrites any files in your current directory that have the same names as files in the archive media.**

If you choose Select, you must type the names of the files you wish to have copied. The filenames must be typed exactly as they appear on the Archive Listing. You can type more than one name by leaving a blank space between the names.

The extraction process begins when you select All or press ⟨Return⟩ after typing the filenames when using Select. When the extraction is complete, you are returned to the File-Manager menu, and your directory listing is updated to reflect any new files.

Creating Backup Copies

The Create command saves files from your directory to the archive media. Use the cursor control keys to point to a file, then press the ⟨Space ⟩ bar to select it. This marks the file on the screen with a # to the left of the filename. It also acts as a toggle switch. If you select a file you do not want, press the ⟨Space ⟩ bar again to cancel that selection. When you press ⟨Return⟩, all the selected files are copied together onto the archive media.

When making a **tar** or **cpio** archive, any existing files on the archive media are overwritten. When making a DOS archive, only those files on the archive media with the same name are overwritten. All others are left intact.

You can save files from only one directory at a time. However, you can select files from either your current directory or an alternate directory listing. If you want to archive files from two different directories, combine them into a single directory first by using the Rename command. If you archive a directory, File-Manager transfers the entire contents of the directory, including any subdirectories and their contents, onto the archive media.

Formatting Archive Media

The Format command formats floppy disks or any other formatable medium. When you select Format, a message appears on the screen warning you that the formatting process erases the contents of the entire medium. You are prompted to confirm the Format request. With the confirmation, File-Manager formats the medium and returns you to the Media-Archive submenu.

Printing Graphs

GraphPrint is a utility that prints graphs you have created with SCO Professional. It asks you to specify a graph file (*.gph*) for printing, and allows you to choose such things as color, font style, and which printer or graphics device you use to print your graph.

Many of the commands found in GraphPrint may also be found in the worksheet's /Graph Print menu, and a more thorough discussion of these commands is found in Chapter 9, "Creating Graphs." The primary difference between GraphPrint and /Graph Print is that GraphPrint allows you to print any graph file you had previously created and saved, while /Graph Print allows you to print only the named and un-named graphs associated with the worksheet you are currently working on.

Using GraphPrint

To use the GraphPrint command, select GraphPrint from the Professional Manager menu. The following screen appears:

```
                                          Default       GraphPrint

 Name Colors Fonts Location Page-Feed Select Go Quit
 Select the graph to be printed
                    Current Directory: /y/doc/new/applics/profess/ug/pmgr

 ColorsFontsOptions
 -----------------
 Main Title:1 Main Title:1 L  cation: Full Page
 Sub-Title:1 Sub-Title:1 Page Feed: Manual
 Grid:1Text:1
 Range A:1
 Range B:2
 Range C:3Graph Filename
 Range D:4-------------
 Range E:5
 Range F:6
```
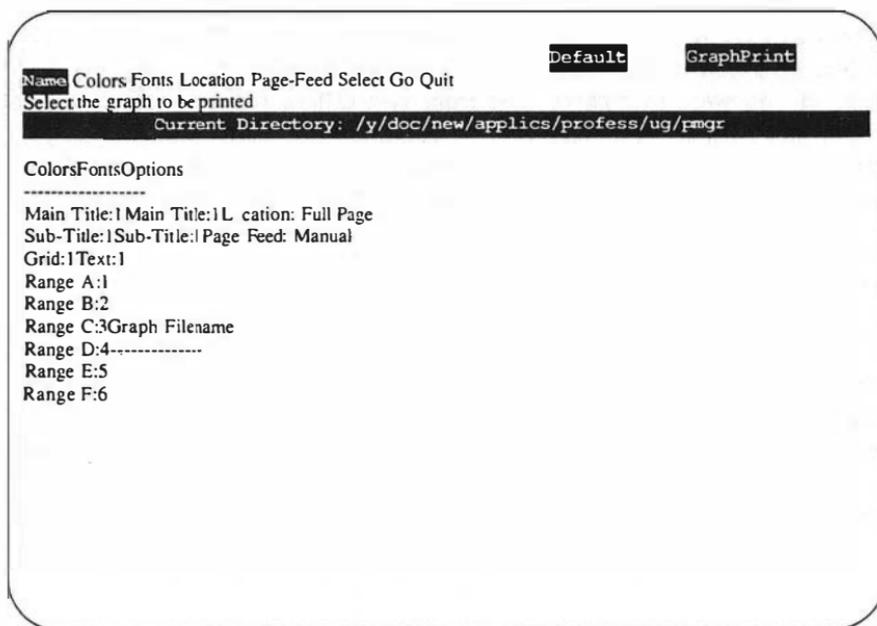
Selecting a Graph for Printing

The Name command allows you to select the graph you want to print. When you choose this item a listing of the *.gph* files in the current directory is displayed. The first file is highlighted, and you may use the arrow keys to highlight a file or type its name. Then select it by pressing ⟨Return⟩. The filename then appears on the menu display below the current directory (this field is blank upon entry to GraphPrint).

Choosing Colors and Fonts

Use the Colors and Fonts commands to specify which colors and fonts are used in your graph. After selecting Colors or Fonts, you are asked to choose an area of your graph in which to specify a color or font, such as a range or a title. When you select one of these areas, you are prompted for a value between 0 and either 32767 or 65535. The fonts and colors available are dependent on the device and the device driver. See your system administrator or your device manual for more information.

Changing the Size and Location of Your Graph

The Location command allows you to specify the size of the graph, and where you want it to print on the page. When you choose this command, nine commands are displayed: 0-8. These numbers have the following meaning:

0	-	Full page
1	-	Upper half of page
2	-	Lower half of page
3	-	Left half of page
4	-	Right half of page
5	-	Upper left quadrant of page
6	-	Upper right quadrant of page
7	-	Lower right quadrant of page
8	-	Lower left quadrant of page

The default setting is Full page (0). Choose the appropriate scale and placement by typing the number or by highlighting it and pressing ⟨Return⟩. You are returned to the GraphPrint Main menu.

Advancing Paper in the Printer

The Page-Feed command specifies whether or not the graphics device should attempt to advance the paper after drawing the graph. When you select Page-Feed, you are given the choice between Automatic and Manual. The default setting is Manual. Use this setting when you wish to prevent the current sheet of paper positioned in the printer from being advanced. The Automatic setting sends a Page-Feed to the graphics device after each graph is printed.

Selecting a Printer

The Select command allows you to specify which graphics device prints your graph. When you choose Select, a list of the available devices is displayed on the screen. The current device is highlighted. Select a device with the appropriate arrow keys or by entering its name.

Sending a Graph to the Printer

When you choose Go, the program sends your graph and its settings to the graphics device specified. In response, the device prints your graph.

If the device does not print your graph, make sure it is turned on and ready for printing. You might also want to check that the graphics device is correctly defined on your computer. Refer to the *SCO Professional Config-uration Guide* for more information on setting up printers and graphics devices.

Quitting GraphPrint

The Quit command allows you to leave GraphPrint when you are ready. To use the command, select Quit. You are asked to confirm your decision before you exit GraphPrint. Type **Y**, for Yes, to exit.

If you reenter GraphPrint before exiting the Professional Manager, all settings that you previously specified are re-displayed. For instance, you may use SCO Professional to make changes to a worksheet, and when you return to GraphPrint, the settings are still in effect.

Translating Worksheet Files

You can convert files created by other popular software packages into files that SCO Professional can use by running the Professional Manager's Translation utility. This utility can also convert SCO Professional *.wkl* files into a format that can be used by other programs.

The Conversion Process

Starting from the Professional Manager, use the arrow keys to highlight Translate and press ⟨Return⟩, or type **T**. The main Translate menu appears on the screen:

```
                                                                    SLK
Conversion-Type To-WK1 From-WK1 Quit
Select the file type to use in translating to/from SCO P ofes ional WK1 file
            Current Directory: /y/doc/new/applics/profess/ug/pmgr
```
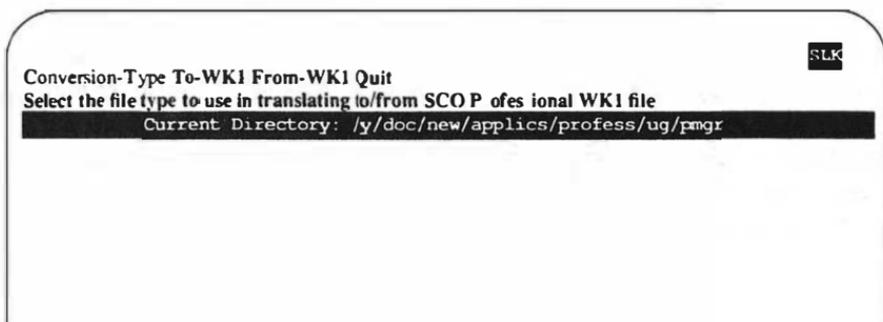
Choose which type of file you want to convert. The choices are:

SLK	Symbolic Link format (SYLK) used by Multiplan
DIF	Data Interchange Format
DBF II	dBaseII format
DBF III	dBaseIII format
WKS	SCO Professional release 1 format

To select the type you are converting to or from, select Conversion-Type from the Translate menu. The Translate menu is replaced with a submenu that includes each of the selections listed above. The default setting is **SLK** (Symbolic Link format). Make your selection by using your arrow keys to highlight your selection, then press ⟨Return⟩. Selecting one of these formats returns you to the Translate menu.

Next, specify whether you are converting a file from a different format to an SCO Professional file or vice versa. Select either **To-WK1** or **From-WK1**. You are prompted for the name of the file you wish to convert. Translate lists only the files with the appropriate extension, and you can either highlight or type the desired filename. When you press ⟨Return⟩ to enter the name, the Cancel Proceed menu confirms that the conversion process takes place.

If the program you are using does not create files in any of the above formats, consult the program's documentation to see if it can export or translate files into one of the five formats SCO Professional supports. In addition to these formats, SCO Professional can also read or print ASCII files. See Chapter 12, "Exchanging Data between Applications," for more information on ASCII file importation and the /File Import command.

Configuring Your System

The Configuration menu provides you with tools to specify your default archive devices, as well as default colors, graphics characters and the key sequences you use to execute commands, function, and macros from within SCO Professional.

When you select Configuration from the Professional Manager menu, you see the following menu:

```
Terminal  UNIX-Device DOS-Device Color
Customize the terminal's special keys for SCO Professional
```
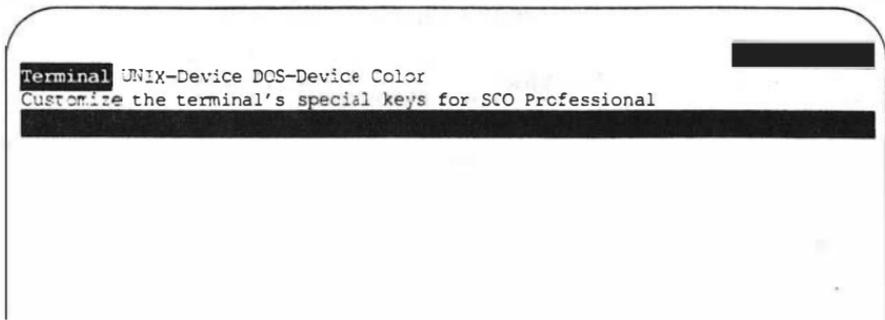
From this menu you can customize command keystrokes and graphics characters by selecting Terminal, specify the *tar* or *cpio* device by selecting Unix-device, specify a DOS partition by selecting **DOS-Device**, or modify your color scheme by selecting Color.

Configuring Commands and Graphics Characters with the Professional Manager

SCO Professional command keystrokes and graphics characters are completely user-definable, making SCO Professional compatible with a wide variety of terminals. SCO Professional provides a utility with which you can map keyboard commands, special functions, macros, and terminal graphics to keys and graphics characters of your liking.

This utility, **tconfig**, is executed when you select Terminal from the Configuration menu. For a thorough discussion of using **tconfig** to add function keys and other keyboard commands, refer to Chapter 3, "Defining Terminal Capabilities," of the *SCO Professional Configuration Guide*.

To specify or modify graphics capabilities for the terminal that you are using, select Terminal from the Configuration menu and Graphics from the Terminal menu.

SCO Professional looks for the graphics configuration file. If the file does not exist, SCO Professional asks for confirmation before creating it. When creating a new file, the default characters shown below are used as a starting point.

Graphics Character Defaults

Graphic	Default(s)
Driver Invocation	'char'
Graphics Start	none
Graphics End	none
Graph Space	' '
Upper Right	'+'
Upper Left	'+'
Lower Left	'+'
Lower Right	'+'
Up Tick	'+'
Down Tick	'+'
Horizontal	'-'
Vertical	'|'
Right Tick	'+'
Left Tick	'+'
Cross	'+'
Texture 1	'#'
Texture 2	'@'
Texture 3	'$'
Texture 4	'*'
Texture 5	'='
Texture 6	'$'

(Continued on next page.)

Graphics Character Defaults (*Continued*)

Graphic	Default(s)
Start Color 1	none
Start Color 2	none
Start Color 3	none
Start Color 4	none
Start Color 5	none
Start Color 6	none
End Color 1	none
End Color 2	none
End Color 3	none
End Color 4	none
End Color 5	none
End Color 6	none
Symbol 1	'A'
Symbol 2	'B'
Symbol 3	'C'
Symbol 4	'D'
Symbol 5	'E'
Symbol 6	'F'
Graphics Init	none
Graphics Deinit	none

If you choose to create a new file, you are shown a screen containing the graphics characters that you can modify.

```
Cursor keys point to command; (Return) selects, q returns to menu

Driver Invocation  =  char

Driver Invocation   Graphics Start    Graphics End      Graph Space
Upper Right         Upper Left        Lower Left        Lower Right
Up Tick             Down Tick         Horizontal        Vertical
Right Tick          Left Tick         Cross             Texture 1
Texture 2           Texture 3         Texture 4         Texture 5
Texture 6           Color 1 Start     Color 2 Start     Color 3 Start
Color 4 Start       Color 5 Start     Color 6 Start     Color 1 End
Color 2 End         Color 3 End       Color 4 End       Color 5 End
Color 6 End         Symbol 1          Symbol 2          Symbol 3
Symbol 4            Symbol 5          Symbol 6          Graphics Init
Graphics Deinit
```

As indicated, you can use any cursor movement keys to highlight the graphic capability for which you want to assign a new character. In the example above, the cursor rests on *Driver Invocation*, and the default setting is shown.

To add, change, or delete a graphics character, highlight its name with the cursor and press ⟨Return⟩. You are given the choice of adding a new character, changing an old character, or deleting an unwanted character. Here are your choices:

Add Adds another definition. You can only have one graphics entry per menu choice. The **Add** option is only available if no character has been specified for a capability.

Change Changes a current character to a new one.

Delete Deletes a character for the given capability. Graphics capabilities are not always available on every type of terminal. In this case, delete unavailable graphics characteristics.

Adding or Changing Entries

To use the Add or Change commands, follow this procedure:

1. Select Add or Change from the current menu.

2. Type the new character, followed by a space and a ⟨Return⟩.

3. If the character is not acceptable, you are informed of the reason, and you are allowed to try another. Possible reasons for unacceptability include the use of reserved characters or the duplication of another capability's character.

   If the character is acceptable, type a space and a ⟨Return⟩ to accept it, or q to cancel your entry.

   When the character is accepted, or you cancel by typing q, you are returned to the menu listing of graphics capabilities.

Deleting a Character

To use the Delete command, use the following procedure:

1. Select Delete from the current menu.

2. Type a ⟨Space⟩ and ⟨Return⟩ to delete the string, or q to cancel the deletion.

   When the deletion occurs, or you cancel the Delete command by typing q, you are returned to the menu listing of commands.

Ending Your Configuration Session

When you are finished configuring your terminal, type q from the Modification menu of commands. At this point, if any changes have been made to an existing file, you are prompted to replace the file with a new one reflecting the changes you just made. If you want to save changes, type y, if not, type n. You now return to the the SCO Professional Manager Main menu.

Configuring Your Archive Device

The devices you use to produce archive or backup copies of your work (such as floppy disk or tape drives) must be specified by the Professional Manager. To specify this device, select UNIX-Device or DOS-Device from the Professional Manager's Configuration menu.

If you choose UNIX-Device, you are asked to enter the device name for your archive device. This device is used by all Media-Archive operations that are done by **tar** and **cpio**. If the file *.archivedev* does not exist in your home directory, then the Professional Manager displays the Cancel/Proceed submenu to allow you to confirm its creation.

If the device you specify is the same as the system-wide default archive device, an *.archivedev* file is not created in your home directory.

If you choose DOS-Device, you can enter a device name for your DOS archives, such as *A:* or *C:/mydir*. If the file *.dosdev* does not exist in your home directory, then the Professional Manager prompts you with a Cancel/Proceed submenu before creating it.

Generally, A is floppy drive 1, B is floppy drive 2, and C and D are hard disk partitions. The partition name before the colon may be upper- or lowercase. The Professional Manager uses either the file */etc/default/msdos* or the file */etc/default/dos* to interpret the identifier you provide.

Configuring Your Color Scheme

If you have the necessary hardware to display SCO Professional in color, you can modify the default color scheme by selecting the Color option in the Manager Configuration menu. For more information, see "Configuring Colors for Professional" in Chapter 3, "Defining Terminal Capabilities," in the *SCO Professional Configuration Guide*.

≡A

Information for Lotus 1-2-3 Users

While SCO Professional contains many of the features contained in Lotus 1-2-3, there are differences in the ways that commands are executed, files are manipulated, and so on. In addition, SCO Professional contains several additional features not found in Release 2 of Lotus 1-2-3. Users familiar with Lotus 1-2-3 should use this appendix as a reference to sections of the *SCO Professional User's Guide*, where both new features and differences between SCO Professional and Lotus 1-2-3 are discussed.

A

Terminals vs. Consoles

Lotus 1-2-3 was designed for single-user personal computers. These computers usually have a device called a CONSOLE. SCO Professional is designed for multiuser systems, in which the most common input device is called a TERMINAL. Both the console and the terminal have a screen and keyboard, but the console may have special capabilities, such as the ability to use color or graphics, that are not available on a terminal.

Throughout this guide, references are made to the differences between commands and keystrokes that you can issue depending on whether you are logged on to a terminal or a console. For example, many terminals do not have function keys, and a special key sequence is required to access a particular function. For a detailed discussion of this and other differences between terminal and console commands, see Chapter 1, "Introduction to Worksheets."

The Professional Manager
vs. the Access System

The Professional Manager is the central clearinghouse for the various components of SCO Professional in the same way the Access System is the link to Lotus 1-2-3's supporting utilities. Although they provide similar features, they are not identical. Each utility in the Professional Manager corresponds to a Lotus 1-2-3 Access System utility, but each follows its own format in terms of prompting the user for information. For instance, the GraphPrint utility in the Professional Manager is used to print graphs, as is PrintGraph in Lotus 1-2-3. However, the two utilities differ in the menus and choices they present to the user. Refer to Chapter 13, "The Professional Manager," of the *SCO Professional User's Guide* for a discussion of how to use the Professional Manager and such utilities as GraphPrint and the File-Manager.

Using Lotus 1-2-3 Files
with SCO Professional

The format of SCO Professional files is compatible with Lotus 1-2-3 Release 2 files. However, the naming conventions associated with the two are different. When using files of the two types interchangeably, you must be aware of these differences.

Naming Lotus 1-2-3 Files

When using Lotus 1-2-3, worksheet filenames can be up to eight characters long (Lotus then adds a DOS extension). The characters you may use are A-Z, 0-9, and period (.). Characters other than these are considered illegal. If you use characters from the alphabet, Lotus 1-2-3 recognizes lower- and uppercase letters as being alike. For example, the filename *accts3* is interchangeable with the filename *ACCTS3*.

Naming SCO Professional Files

When using SCO Professional, worksheet filenames can be up to 10 characters long. SCO Professional then adds a period and a three-character filename extension: *.wkl*, *.gph*, or *.prn*. A punctuation mark, such as a comma or a period, counts as a character. A filename cannot contain blank spaces. SCO Professional does differentiate between lower- and uppercase letters, so *accts3* and *ACCTS3* are interpreted as being different filenames.

In addition, the file extension must be in lowercase characters or SCO Professional cannot recognize it. Generally, SCO Professional adds the correct filename extension automatically. However, files transferred from DOS need to have only lowercase extensions. If you run SCO Professional with the flag **-l**, all uppercase filenames and macro names are folded to lowercase when imported from a DOS device. For information on this command line flag, see Appendix B, "Command Line Flags," of this guide. For more extensive information on file naming in SCO Professional, refer to Chapter 2, "Worksheet Basics," of this guide.

File Naming for Compatibility

If you plan to transport SCO Professional files to a computer with a DOS operating system, you should limit your filenames to eight characters with no distinction between upper- and lowercase.

When you use either *absolute* or *relative* pathnames on a UNIX system, there is customarily a slash (/) between each directory level. A backslash (\) serves a similar function on a DOS system. For this reason, SCO Professional accepts \ and / interchangeably as filename separators. For more information on the structure of file hierarchies, refer to your operating system documentation.

Moving Files between SCO Professional and Lotus 1-2-3

SCO Professional and Lotus 1-2-3 Release 2 worksheet files (with the filename extension *.wkl*) are compatible with one another. Once transferred, Lotus 1-2-3 *.wkl* files can be used just like worksheet files originally created on SCO Professional. Transfer files from one program to another by using the Media-Archive command of the Professional Manager. Refer to Chapter 13, "The Professional Manager," for more information on using Media-Archive for copying DOS and XENIX files back and forth.

In moving files from Lotus to SCO Professional, the XENIX **doscp** command is also available. When bringing a Lotus 1-2-3 file to SCO Professional, be sure to use lowercase characters when you specify the destination file. See your XENIX Operating System documentation for more information.

A Note about Size

SCO Professional worksheets have a size capability of 8192 rows by 1024 columns, while Lotus 1-2-3 Release 2 is limited to a size of 8192 rows by 256 columns. Therefore, when transferring files from SCO Professional to Lotus 1-2-3, you should limit your worksheet size to 256 columns if possible.

If you transfer a SCO Professional worksheet with more than 256 columns to a Lotus 1-2-3 file, the data in the columns to the right of the IV column is lost. If there are not too many columns of data to the right of IV, delete blank columns to the left of IV in order to reduce the width of the worksheet to 256 columns. If you reduce the width by this method, both absolute and relative cell references are adjusted correctly.

Transferring Graph Files

Graph files require special handling when they are transferred between programs. A *.gph* file in SCO Professional serves the same function as a *.pic* file in Lotus. However, *.pic* files are not identical to *.gph* files and cannot be transferred directly to SCO Professional. Instead, you must transfer a *.wk1* file, then use the /Graph Save command to produce a *.gph* file. Likewise, when you create a graph using SCO Professional, you must transfer the *.wks* file to Lotus, then use Graph Save to generate a *.pic* file.

Internationalization Issues

SCO Professional does not support the Lotus International Character Set (LICS). However, you can remap any 8-bit character to coincide with LICS by using the XENIX utility **mapchan**. Refer to Chapter 7, "International Formats," of the *SCO Professional Configuration Guide* for more information on how to configure SCO Professional to work in an international setting.

Additional SCO Professional Commands
Not Found in Lotus 1-2-3

Command	Purpose
/File Combine Link	Links data between two worksheets
/File Combine Unlink	Unlinks data between two worksheets
/File Import Parse	Separates data into individual cells
/File Save Backup	Creates Back-up copy of file
/File Type	Transfers spreadsheet types
/Graph Graph-Transfer Copy	Copies graph to clipboard
/Graph Graph-Transfer Remove	Removes graph from clipboard
/Graph Print	Enters Graph Print menu
/Learn	Enters Macro Learn mode
/Learn Append	Appends keystrokes to an existing macro
/Learn Erase	Substitutes new keystrokes in an existing range
/Learn Create	Specifies a name and range for a macro
/Print Printer Select	Selects a printer device
/Quit Save	Saves a file when quitting
/Transfer	Enters the Clipboard menu
/Transfer Copy	Copies to the Clipboard
/Transfer Paste	Pastes from the Clipboard
/Transfer Remove	Removes Clipboard item

(Continued on next page.)

Additional SCO Professional Commands
Not Found in Lotus 1-2-3 (*Continued*)

Command	Purpose
/Window External	Displays two different worksheets simultaneously
/Window Resident	Displays one worksheet in two windows

Additional SCO Professional Keystrokes
Not Found in Lotus 1-2-3

Special Key	Purpose
ˆb	Changes preselected range (such as /Data Fill) to current cell
ˆd	In EDIT mode, deletes to end of line
ˆe	Executes END mode
ˆf	Presents a function key menu
ˆg	The <GoTo> key, moves to last cell in specified direction containing data
ˆo	Opens a new row at the current cell pointer
ˆt	Moves cursor to cell A-1
ˆw	In EDIT mode, deletes a word
ˆz	Executes LEARN mode

≡B

B

Command Line Flags

This appendix describes SCO Professional command line options. When invoking SCO Professional, the commands **pro** or **procalc** are followed by one or more options, also called flags.

If you are using SCO Open Desktop, you must open SCO Professional from a command line in a window rather than using the icons if you want to use a command line option. If you want to have one of the options take effect every time you use SCO Professional, you can add the options in the rules files for the Pro, Procalc, and worksheet icons, as explained in Chapter 7, "Desktop Manager Reference," in the "Administering ODT-VIEW" book of the *Open Desktop Administrator's Guide*.

Command Line Options

Option	Purpose
-e [*x*]	Changes the length of the timeout interval between the input of an escape character and that of the character immediately following. The default number of seconds (*x*) is 1 (one). If your system is running slowly, arrow or function keys may be interpreted as Escape followed by a character sequence, thereby causing your terminal to beep. To avoid this misinterpretation, you can use the **-e** option followed by a space and a number (such as 3) to increase the amount of time SCO Professional allows to complete each sequence.
-f	Suppresses the output of the current worksheet filename on the bottom line of the screen. This may be used as a security measure when you do not want the filename to be visible to others.

(Continued on next page.)

Command Line Options (*Continued*)

Option	Purpose
-H	Turns off the Hotgraph feature if you are using SCO Professional in the X environment. If you do not use this flag, you can display a spreadsheet in one **scoterm** window, and display a graph based on that spreadsheet in another **scoterm** window. If you modify the spreadsheet, the graph updates immediately.
-l	Changes all filenames to lowercase, regardless of how they were entered. This is to ensure DOS compatibility where filenames are case-insensitive. A worksheet created on DOS containing both upper- and lowercased macros and filenames has those macros and filenames changed to lowercase with the **-l** command, thereby ensuring compatibility with SCO Professional.
-M	Starts SCO Professional in monochrome mode if you have a color terminal that is configured to display Professional in color, or if you are using a non-color terminal that displays Professional in multiple shades or tones. Use this flag if you prefer to see SCO Professional in two tones.
-s	Suppresses the ability to do shell escapes from SCO Professional menus by use of the ! and /System commands. This option allows your operating system more security against commands issued in error.
-w [*x*]	Specifies a worksheet width, rounded down to a multiple of 128 columns, up to 1024 columns. The default value of the **-w** option is 256 columns. To specify a different value enter a space after the **-w** option and then enter the desired number of columns (x).

≡C

Introducing ASCII

When you use the Data Sort command, SCO Professional sorts the records in ascending or descending order (see Chapter 11, "Data Commands," in the *SCO Professional User's Guide*). Labels in the sort range are arranged in ASCII order. The other cells are sorted as specified in the Data Sort section. You can choose to sort the labels in either ascending or descending order.

In addition to using this list to determine ASCII order for the /Data Sort command, you can also use it to find the decimal or octal codes for characters used in printer setup and reset strings.

Use decimal codes for /Print Printer Options Setup strings, for /Print File Options Setup strings, for /Worksheet Global Default Printer Setup strings, and for embedded print strings. See the "Setup" section in Chapter 10, "Printing Worksheets" in the *User's Guide* for more information.

Use octal codes for non-printing characters and leave all other characters in literal form for the pconfig setup strings and the strings in interface scripts. See "Using pconfig" in Chapter 3, "Setting Up Your Printers and Graphics Devices" of the *Configuration Guide*.

Use your printer manual to determine the keyboard characters in the setup and reset strings you need, then convert them to three-digit decimal or octal codes. Always precede each three-digit code with a backslash (\) character.

ASCII Order

Character	Decimal Code	Octal Code
⟨Ctrl⟩**@** (nul)	\000	\000
⟨Ctrl⟩**A** or ⟨Ctrl⟩**a** (soh)	\001	\001
⟨Ctrl⟩**B** or ⟨Ctrl⟩**b** (stx)	\002	\002
⟨Ctrl⟩**C** or ⟨Ctrl⟩**c** (etx)	\003	\003
⟨Ctrl⟩**D** or ⟨Ctrl⟩**d** (eot)	\004	\004
⟨Ctrl⟩**E** or ⟨Ctrl⟩**e** (enq)	\005	\005
⟨Ctrl⟩**F** or ⟨Ctrl⟩**f** (ack)	\006	\006
⟨Ctrl⟩**G** or ⟨Ctrl⟩**g** (bel)	\007	\007
⟨Ctrl⟩**H** or ⟨Ctrl⟩**h** (bs)	\008	\010
⟨Ctrl⟩**I** or ⟨Ctrl⟩**i** (ht)	\009	\011
⟨Ctrl⟩**J** or ⟨Ctrl⟩**j** (nl)	\010	\012
⟨Ctrl⟩**K** or ⟨Ctrl⟩**k** (vt)	\011	\013
⟨Ctrl⟩**L** or ⟨Ctrl⟩**l** (np)	\012	\014
⟨Ctrl⟩**M** or ⟨Ctrl⟩**m** (cr)	\013	\015
⟨Ctrl⟩**N** or ⟨Ctrl⟩**n** (so)	\014	\016
⟨Ctrl⟩**O** or ⟨Ctrl⟩**o** (si)	\015	\017
⟨Ctrl⟩**P** or ⟨Ctrl⟩**p** (dle)	\016	\020
⟨Ctrl⟩**Q** or ⟨Ctrl⟩**q** (dc1)	\017	\021
⟨Ctrl⟩**R** or ⟨Ctrl⟩**r** (dc2)	\018	\022
⟨Ctrl⟩**S** or ⟨Ctrl⟩**s** (dc3)	\019	\023
⟨Ctrl⟩**T** or ⟨Ctrl⟩**t** (dc4)	\020	\024
⟨Ctrl⟩**U** or ⟨Ctrl⟩**u** (nak)	\021	\025
⟨Ctrl⟩**V** or ⟨Ctrl⟩**v** (syn)	\022	\026
⟨Ctrl⟩**W** or ⟨Ctrl⟩**w** (etb)	\023	\027
⟨Ctrl⟩**X** or ⟨Ctrl⟩**x** (can)	\024	\030
⟨Ctrl⟩**Y** or ⟨Ctrl⟩**y** (em)	\025	\031
⟨Ctrl⟩**Z** or ⟨Ctrl⟩**z** (sub)	\026	\032

(Continued on next page.)

ASCII Order (*Continued*)

Character	Decimal Code	Octal Code
⟨Ctrl⟩[or ⟨Esc⟩	\027	\033
⟨Ctrl⟩\ (fs)	\028	\034
⟨Ctrl⟩] (gs)	\029	\035
⟨Ctrl⟩^ (rs)	\030	\036
⟨Ctrl⟩_ (us)	\031	\037
⟨Space⟩	\032	\040
!	\033	\041
"	\034	\042
#	\035	\043
$	\036	\044
%	\037	\045
&	\038	\046
'	\039	\047
(	\040	\050
)	\041	\051
*	\042	\052
+	\043	\053
,	\044	\054
-	\045	\055
.	\046	\056
/	\047	\057

(Continued on next page.)

ASCII Order (*Continued*)

Character	Decimal Code	Octal Code
0	\048	\060
1	\049	\061
2	\050	\062
3	\051	\063
4	\052	\064
5	\053	\065
6	\054	\066
7	\055	\067
8	\056	\070
9	\057	\071
:	\058	\072
;	\059	\073
<	\060	\074
=	\061	\075
>	\062	\076
?	\063	\077
@	\064	\100

(Continued on next page.)

ASCII Order (*Continued*)

Character	Decimal Code	Octal Code
A	\065	\101
B	\066	\102
C	\067	\103
D	\068	\104
E	\069	\105
F	\070	\106
G	\071	\107
H	\072	\110
I	\073	\111
J	\074	\112
K	\075	\113
L	\076	\114
M	\077	\115
N	\078	\116
O	\079	\117
P	\080	\120
Q	\081	\121
R	\082	\122
S	\083	\123
T	\084	\124
U	\085	\125
V	\086	\126
W	\087	\127
X	\088	\130
Y	\089	\131
Z	\090	\132
[	\091	\133
\	\092	\134
]	\093	\135
^	\094	\136
_	\095	\137
`	\096	\140

(Continued on next page.)

ASCII Order (*Continued*)

Character	Decimal Code	Octal Code
a	\097	\141
b	\098	\142
c	\099	\143
d	\100	\144
e	\101	\145
f	\102	\146
g	\103	\147
h	\104	\150
i	\105	\151
j	\106	\152
k	\107	\153
l	\108	\154
m	\109	\155
n	\110	\156
o	\111	\157
p	\112	\160
q	\113	\161
r	\114	\162
s	\115	\163
t	\116	\164
u	\117	\165
v	\118	\166
w	\119	\167
x	\120	\170
y	\121	\171
z	\122	\172
{	\123	\173
|	\124	\174
}	\125	\175
-	\126	\176
⟨Delete⟩ or ⟨Del⟩	\127	\177

≡ Glossary

ABSOLUTE CELL REFERENCE. One type of cell or range address contained in a formula. This type of address remains fixed, or absolute, when the formula is copied to a different area in the worksheet. See also MIXED CELL REFERENCE and RELATIVE CELL REFERENCE.

ALIGNMENT. The placement of labels and values in cells. A label or value can be aligned to the right or left, or it can be centered in the cell.

ANCHOR CELL. The initial cell selected when defining a range. In POINT mode, this cell remains fixed while you move the cursor to the end of the range. Also known as the start cell.

ARCHIVE. A process by which backup copies of worksheet files are made and stored on either floppy disks or magnetic tape.

ARGUMENT. A set of values operated on by an @ function or macro. Arguments can consist of other functions, formulas, numeric values, range values, or string values.

AUTO-EXECUTE MACRO. A macro that is named \0. SCO Professional executes all auto-execute macros automatically when a worksheet is retrieved.

BACKUP. A duplicate copy of a worksheet file.

BAR GRAPH. A graph that displays one or more sets of data in a horizontal orientation. The height of each bar indicates the value represented.

BREAKPOINTS. Markers within a macro which cause macro execution to pause and enter Single-Step mode. These are used to debug macros.

BUGS. Flaws in a macro that prevent proper macro execution or results.

CELL. The basic worksheet unit of space, consisting of the intersection of a column and a row.

CELL ADDRESS. The coordinates of a cell, as defined by its column letter and row number.

CELL POINTER. The highlighted area that indicates the current cell.

CIRCULAR REFERENCES. Two formulas that refer to each other for results. SCO Professional displays the CIRC message when it tries to calculate a formula but encounters a circular reference.

CLIPBOARD. A utility that allows you to transfer files between applications or within the SCO Professional application. The Clipboard provides temporary storage for information and translates it into the correct application format if necessary.

COLUMN. A vertical area one cell wide, stretching from the top of the worksheet to the bottom. Each column is designated by a letter or letters, beginning with A and ending with AMJ.

COLUMN WIDTH. The number of characters displayed in a column. The default column-width is nine characters.

COMMAND. An instruction you choose that tells SCO Professional to perform a particular action.

COMMENTING. Using a column of labels containing explanatory notes to document each step of the macro.

COMPOUND STATEMENTS. Mathematical equations that meet more than one condition. The logical operator #AND#, for example, finds values that fulfill two conditions.

CONSOLE. A keyboard and monitor which serve as an interactive interface for a single user with a computer.

DATABASE. A set of records pertaining to a particular subject. In SCO Professional, a worksheet arranged in a series of horizontal records and organized into vertical fields. Databases are used for data management. See also FIELD and RECORD.

DATA MANIPULATION COMMANDS. A group of advanced macro commands that allow you to manipulate the information stored in cells in the worksheet.

DATE FORMAT. The way in which SCO Professional formats date serial numbers and displays them the screen.

DEBUG. To locate and correct flaws which cause errors or prohibit macro execution.

DEFAULT. The initial format setting or global configuration that SCO Professional uses.

DEPENDENT WORKSHEET. When using the /File Combine command, the worksheet that is currently loaded into SCO Professional. See also PRINCIPAL WORKSHEET.

DESTINATION AREA. The portion of the worksheet that will contain copied or moved data once the /Copy or /Move command is executed. See also SOURCE RANGE.

ERROR MESSAGE. A message informing you that SCO Professional cannot do what you have asked of it. The error message appears in the lower-left corner of the screen and is accompanied by a beep.

EXTERNAL WINDOW. The window displayed at the bottom of the screen when you split your worksheet horizontally, or on the right of the screen when you split your worksheet vertically. See also RESIDENT WINDOW.

FIELD. A column or cell in a database containing one piece of information.

FILE. A named storage area for worksheets and graphs. SCO Professional uses three types of files which may be saved and retrieved: worksheet files, print files, and graph files.

FILE LOCKING. A process that prevents two or more users from editing the same worksheet at one time.

FILE MANIPULATION COMMANDS. A group of advanced macro commands that allow you to work with ASCII files from within a macro.

FILENAME. The name given to a saved worksheet, graph, or print file.

FILE POINTER. The starting position in a file.

FORMULA. A value entry the tells SCO Professional to calculate results. A formula can contain operators or @ functions, values or cell addresses.

FORMULA CELLS. Cells that contain formulas.

FORWARD REFERENCES. A formula that refers to a cell whose contents have not yet been calculated (in rowwise and columnwise mode only).

FREE CELL. The cell, found opposite the anchor cell, that designates the end of a range. Also known as the end cell.

FREEZING TITLES. To lock rows and columns so that they remain visible on the screen when you scroll through the worksheet. See also TITLE LOCKING.

FUNCTION. 1. An action performed by the computer. 2. One of the 10 special functions accessed by function keys F1 through F10, each of which supplements or parallels commands from various aspects of the program. 3. One of the @ functions, built-in formulas that perform various calculations.

GLOBAL. A numeric value setting or alignment that affects the entire worksheet.

HARD COPY. A printed copy of your worksheet.

HIGHLIGHT. To accent characters on the screen, usually by displaying them in reverse video (where the text and background colors are reversed). SCO Professional allows you to make command and menu selections by highlighting the choice that you want. SCO Professional also lets you use the cell pointer to highlight and indicate a range.

ICONS. Small pictures that represent files and directories.

ITERATIONS. The number of times a routine performs a task.

KEYBOARD INTERACTION COMMANDS. A group of advanced macro commands that allows the user to interact with the macro through the keyboard.

LABEL. A worksheet entry that begins with a letter or is preceded by one of the label-prefix characters (', ^, or "). See also LABEL-PREFIX.

LABEL-PREFIX. One of the four characters used to determine the alignment of a label or value in a cell. The label-prefix appears in the status line, but not in the worksheet cells. The apostrophe (') character aligns the label to the left, the double-quote (") character aligns to the right, the caret (^) centers the label, and the backslash (\) repeats the label in its cell. See also LABEL.

LEVEL OF PRECEDENCE. The priority that one operator has over others, which helps determine the order in which formulas are calculated. Exponentiation has first precedence; make negative and make positive have second precedence; the mathematical operators have third and fourth precedence; and the logical operators have precedence five, six, and seven.

LINE GRAPH. A graph that displays sets of data in a horizontal orientation, with lines, labels, or symbols at heights that represent the different values.

MACRO. A group of labels containing keystrokes that perform a task. See also /X COMMANDS and SUBROUTINE.

MATRIX. A table of data with a number in each cell. A square matrix has an equal number of rows and columns.

MENU. A group of related commands that are presented on a line above the worksheet area. Commands are selected by typing the first letter of the command or by highlighting the command and then pressing return. See also MODE.

MESSAGE AREA. The area at the bottom-left corner of the screen where information about operations in progress, error messages, and requests for data are displayed.

MIXED CELL REFERENCE. A type of cell or range address, contained in a formula, that is half absolute and half relative. A mixed-cell reference is created by placing a $ symbol in front of the part (row or column) that you want made absolute. When copied or moved to another location in the worksheet, the absolute half of the reference remains fixed, while the relative half changes to reflect the new location. See also ABSOLUTE CELL REFERENCE and RELATIVE CELL REFERENCE.

MODE. An operating state that interprets commands and keystrokes in a particular way. Important SCO Professional modes include READY, MENU, EDIT, and POINT.

MODE INDICATOR. The highlighted box in the upper right-hand corner of the screen that indicates the current mode.

MOUSE. Mechanical device connected by a cable to a terminal or console; used to move a cursor and register input on the monitor screen.

OPERATOR. A symbol used to compute expressions or to create query criteria. SCO Professional uses arithmetical operators (+, -, x, /), logical operators (>,>=,<, <=, =, #AND#, #OR#, NOT#), and the ampersand operator (&).

PIE CHART. A round chart divided into slices; the size of each slice indicates the value represented.

PRINCIPAL WORKSHEET. When using the /File Combine command, the saved worksheet that is not currently loaded into SCO Professional. See also DEPENDENT WORKSHEET.

PROGRAM FLOW COMMANDS. A group of advanced macro commands that allows you to determine and change the flow of macro execution.

PROMPT. A line on the screen where the user enters some required information.

QUERY. A request to the database for specific information.

QUERY CRITERION. A set of conditions that determines which records are selected in a query. A record must satisfy the query criterion before it is selected.

RANGE. A cell or rectangular group of contiguous cells that can be used in a command procedure. The range may be named by the user, or may be referred to by its range coordinates.

RANGE ADDRESS. The coordinates of a range, specified by the anchor cell, one or two periods, and the free cell.

RANGE NAME. A name associated with a cell or group of adjacent cells. Use the /Range Name Create command to name a range. You can use up to 15 characters in a range name. See also RANGE.

RECORD. All the information from a single source arranged in one row of a database. See also DATABASE and FIELD.

RECTILINEAL PIE CHARTS. Pie charts as they appear on terminals that are unable to display graphics. The charts are displayed as rectangles divided into rectangular segments.

REFERENCE CELLS. Cells within a formula that are referred to as values.

RELATIVE CELL REFERENCE. One type of cell or range address contained in a formula. With this type of address, a cell has a certain relationship to (one row above and two columns to the left of, for example) the formula cell; that cell changes when the formula is copied or moved to another part of the worksheet. See also ABSO-LUTE CELL REFERENCE and MIXED CELL REFERENCE.

REPEATING LABEL. A label that repeats itself across the width of its cell. Use the backslash (\) label prefix to indicate a repeating label.

RESIDENT WINDOW. The window which is displayed at the top of the screen when you split your worksheet horizontally, or on the left of the screen when you split your worksheet vertically. See also EXTER-NAL WINDOW.

ROW. A horizontal area that is one cell high, stretching from the left side of the worksheet to the right side. Each row is designated by a number, beginning with 1 and ending with 1024.

SCATTERPLOT. A type of graph that tests the strength of a correlation between two variables, such as age and income, sex and educational level, or sales and promotional expenditures. Also called an XY graph.

SCREEN CONTROL COMMANDS. A group of advanced macro commands that controls the worksheet display during macro execution.

SERIAL NUMBER. A positive number that is generated internally. Used as a means of identification, a serial number indicates placement in a series. The serial numbers between one (January 1, 1900) and 73050 (December 31, 2099) are used to generate date values; the serial numbers between 000 (12:00 midnight) and 0.99999 (11:59:59 PM) are used to generate time values.

SOFT COPY. The electronic version of your worksheet.

SOURCE RANGE. The area of your worksheet which will be copied, moved, or transposed to a destination area. See also DESTINATION AREA.

SPECIAL CHARACTERS. The question mark (?), asterisk (*), and tilde (˜) characters, which can be used in queries to represent one or more other characters.

SPECIAL KEYS. A group of function key combinations and cursor movement commands in macro sequences which cannot be interpreted by single characters.

SPREADSHEET. A computer program used primarily for financial planning and forecasting.

SQL. Abbreviation for Standard Query Language, which allows you to select records from databases and incorporate them into worksheets.

STACKED-BAR GRAPH. A bar graph with sets of data stacked on bars, so the values are represented cumulatively.

STRING. A series of characters that is dealt with as a unit. Strings can be letters, numbers, and special characters, as long as they are labels. In SCO Professional, string @ functions manipulate text entries similarly to how the other @ functions manipulate numbers.

SUBROUTINE. A group of macro instructions that is executed from within the calling (original) macro. When the subroutine ends, the control returns to the original macro. See also MACRO.

SUBROUTINE CALL. A macro command that invokes another complete macro (subroutine). When the subroutine ends, the execution of the calling macro continues.

SUBROUTINE STACK. The layers of macros called by the original macro. Use the {RESTART} command to clear the subroutine stack.

TERMINAL. A keyboard and monitor attached by a cable to a computer, for use as an interactive interface.

TIME FORMAT. The way in which SCO Professional formats time serial numbers and displays them on the screen.

TITLE. A row or column of information on the top or to the left of the worksheet window. You can lock freeze these titles so that they remain in the worksheet window as you scroll up or down. See also TITLE LOCKING and FREEZING TITLES.

TITLE LOCKING. To lock row and columns so that they remain visible on the screen when you scroll through the worksheet. See also FREEZING TITLES and TITLE.

TYPE-AHEAD BUFFER. The buffer where SCO Professional stores the input entered from the keyboard during macro execution for access by the {LOOK} command. The type-ahead buffer holds approximately 10 keystrokes.

VALUE. A worksheet entry that is a number or the result of a formula.

WINDOW. The section of the worksheet that is currently displayed on the screen.

WORKSHEET. The area of SCO Professional where you enter data.

/XCOMMANDS. A group of commands that you can use within a macro. /X commands control the flow of instruction in the macro. See also MACRO.

≡ Index

C

S

Type-ahead buffer 8-54

U

Unfreezing titles, procedure for 5-42
Unifying split windows
  default settings 7-11
  from External mode 7-11
  from Resident mode 7-11
  procedure for 7-11
Unifying split windows, procedure for
  5-44
Unlinking data
  definition of 7-18
  example of 7-21
  procedure for 7-21
  results 7-17
Uppercase, converting strings to 3-82
Using label-prefix characters 5-26
Using SQL, *See* SQL 12-19

V

VALUE mode
  affecting keyboard commands 1-19
  entering formulas 1-7
  setting entries in 1-17
  using 1-6
Values, definition of 1-14
Variance, calculating 3-73, 11-47
Vertical table search 3-65
Vertical window
  defining size 7-4
  description of 7-4
  example of 7-6
Viewing global international settings
  currency 5-6
  date 5-6
  page settings 5-6
  printer settings 5-6
  procedure for 5-5
  punctuation 5-6
  time 5-6

Viewing global settings
  column-width 5-5
  format 5-5
  label-prefix 5-5
  procedure for 5-4
  zero suppression 5-5
  cell display 5-5
  circular reference 5-5
  recalculation 5-5

W

WAIT mode
  definition of 1-8
  using 1-6
Window function
  cell indicator 5-43
  defined 1-23
  switching between multiple windows
    8-7
  using with macros 8-7
Window key
  using with multiple windows 5-44,
    7-3
Worksheet
  columns 1-4
  definition of 1-1
  files 2-10
  rows 1-4
  screen 1-4
  size 1-4
Worksheet Global commands, definition
  of 5-1

X

/X Commands, using tilde (˜) character
  8-7
X environment, viewing graphs in 9-13
XENIX A-4
XY graph
  definition of 9-8, 9-9
  example of 9-10

XY graph *(continued)*
    introduction to 9-3
    scatterplot 9-8
    special meaning of X range in 9-11

Zero suppression *(continued)*

Z

Zero suppression
    definition of 5-23
    procedure for 5-24

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