Lotus 1-2-3 *for* UNIX* System V

User Guide

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Preface

This manual introduces the *1-2-3 for System V* operating environment, explains how to run 1-2-3 in UNIX, and illustrates how the product can be integrated with other networks and applications.

Understanding how *1-2-3 for System V* operates in the UNIX environment is important because *1-2-3 for System V* actually spans three categories of spreadsheets:

- **PC spreadsheets**: *1-2-3 for System V* is based upon Lotus 1-2-3 Release 3 for MS-DOS and OS/2 personal computers. Like Release 3, *1-2-3 for System V* runs on Intel 80386 PCs and offers the same user interface, keyboard commands, and display drivers familiar to PC 1-2-3 users. You can run *1-2-3 for System V* on a standalone 80386 PC and use it to perform all the tasks associated with a PC single-user version of 1-2-3.

- **Local Area Network (LAN) spreadsheet**: Like the LAN versions of 1-2-3 Release 2.2 and Release 3, *1-2-3 for System V* can take advantage of networking capabilities that you have installed. If you have installed the Multi-user edition of *1-2-3 for System V*, several users in your department can run simultaneous 1-2-3 sessions from the same copy installed on your UNIX/386 PC. Furthermore, these users have immediate access to all the services and tools available in the fastest growing operating system for work groups—UNIX. Without abandoning MS-DOS and your favorite PC applications, you can connect your MS-DOS PC to a UNIX/386 system in your department and run *1-2-3 for System V* with a terminal emulation program.

- **Network spreadsheets:** Running 1-2-3 on a UNIX system also provides you access to high-performance networks that can communicate transparently with other UNIX/386 PCs, UNIX workstations, VAX/VMS minicomputers, and IBM mainframes. If you have installed a version of Sun's Network File System (NFS) or some comparable network software, you can "mount" or register a file system on another system as though it were a directory on your own UNIX/386 hard disk. From within *1-2-3 for System V* you can then retrieve or reference any worksheet file stored anywhere on this network. In this respect *1-2-3 for System V* shares some of the basic networking capabilities available in other networked versions of 1-2-3: *1-2-3 for VAX/VMS*, *1-2-3 for Sun*, 1-2-3/M, and *1-2-3 for ALL-IN-1*.

This manual, consequently, introduces the basic features of *1-2-3 for System V* in light of what you can do beyond the single-user 1-2-3 session: work-group computing, enterprise computing, close integration with PC applications, and integration with other UNIX services and applications.

The information in this manual is organized into the following chapters:

- Chapter 1 "Checking Your Package" lists the items in your 1-2-3 distribution package and includes information about Lotus Product Support.

- Chapter 2 "Using 1-2-3 in the UNIX Environment" explains how *1-2-3 for System V* works with the UNIX file system, shared printers, display drivers, and networks. For users familiar with a version of 1-2-3 running on personal computers, this chapter highlights several of the most important differences between running 1-2-3 on MS-DOS PCs and running it on a UNIX system. For users familiar with how UNIX applications operate, this chapter highlights how 1-2-3 uses standard UNIX conventions for file naming, printing, and networking.

- Chapter 3 "Starting *1-2-3 for System V*" explains how to invoke 1-2-3 from the UNIX command line, how to specify command-line options, and how to start 1-2-3 with UNIX shell scripts.

- Chapter 4 "1-2-3 and Work Group Computing" explores the ways you can share spreadsheet data, graphs, and database tables between *1-2-3 for System V* and other applications running on UNIX or MS-DOS systems. This chapter clarifies the common file exchange formats and conversion strategies that can enhance the integration of 1-2-3 with other applications on your desktop.

Chapter 1
Checking Your Package

Before you begin to use *1-2-3 for System V*, it is important to verify what you have purchased and what Lotus provides for technical support.

Distribution Kit Contents

Lotus distributes *1-2-3 for System V* in three editions. Depending on the edition that you have purchased, the contents and licensing for your distribution kit will differ.

Edition	License(s)	Software and Documentation
Single-user	1 user license for 1 CPU	1 set of 3.5" or 5.25" disks Release Notes *Installation and Administration Guide* *1-2-3 User Guide* *1-2-3 User Reference* *1-2-3 Quick Reference*
Multi-User	10 licenses for 1 CPU	1 set of 3.5" or 5.25" disks Release Notes *Installation and Administration Guide* *1-2-3 User Guide* *1-2-3 User Reference* *1-2-3 Quick Reference*
Documentation	none	Release Notes *1-2-3 User Guide* *1-2-3 User Reference* *1-2-3 Quick Reference*

With the exception of the *Installation and Administration Guide* included with each Single-user and Multi-user Edition of *1-2-3 for System V*, all documentation for each edition of 1-2-3 is the same. The Single-user and Multi-user Editions include distribution disks with licenses for 1 user or 10 users respectively. After purchasing the Multi-User Edition, you can contact Lotus about purchasing additional licenses for a Multi-User Edition installation.

Contacting Lotus Product Support

Lotus provides telephone assistance to registered users of its software. Product Support specialists answer questions about Lotus software and how it performs with equipment that Lotus supports or certifies as compatible with its software. If you have problems using 1-2-3 and you think the problem is related to the spreadsheet software (rather than with your hardware or operating environment), try the following before you call Product Support:

- Read the section in the Lotus documentation that contains information about the commands or procedures you are using.

- Press HELP for additional information about commands, procedures, and error messages.

- Consult your System Administrator if you are running *1-2-3 for System V* on a network.

If You Call Product Support

The Product Support Specialist who answers your call must have sufficient information to diagnose your problem. To assist the specialist, do the following before you call:

- Be at your terminal or system console.

- Write down what you were doing when the problem occurred, listing the steps you followed prior to the occurrence of the problem.

- Write down the exact text of any error messages that 1-2-3 or UNIX displayed on your screen.

- Be able to discuss your question or problem in detail.

- If the printer you selected is working and your problem pertains to printing, select /Print Printer Sample Go. Have the sample printout available when you call.

Product Support Hours and Locations

This section lists the hours and telephone numbers for Lotus Product Support. These hours are subject to change.

Company	Location	Hours (EST)	Telephone
Lotus	United States	24 hours a day, 7 days a week	1-800-223-1662
	Canada	Monday through Friday 8:30 a.m. to 8:00 p.m.	1-800-668-8236

Support in Canada is available in English and French.
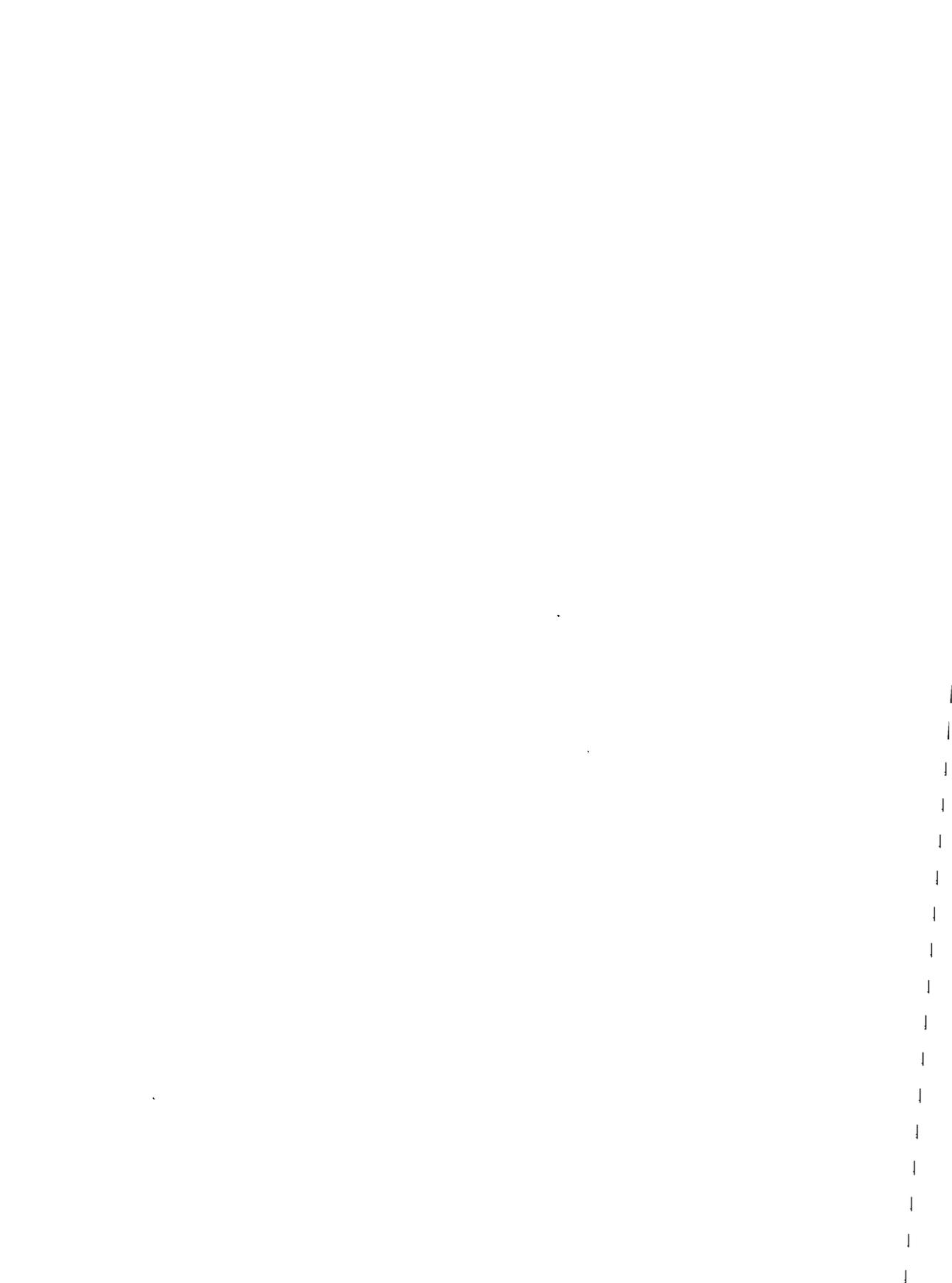
Chapter 2
Using 1-2-3 in the UNIX Environment

This chapter provides an overview of the way 1-2-3 runs on a UNIX System V personal computer. This information should serve as background for all users who want to know how 1-2-3 uses the file system and services available on their systems. Based upon this information, you may want to customize the way worksheet or database files are stored on your system or the way your system shares files with other stand-alone or network systems.

This chapter contains the following sections:

- "The UNIX Application Environment" provides an overview of how a UNIX application like 1-2-3 runs on a UNIX System V personal computer.

- "1-2-3 and the UNIX File System" explains how 1-2-3 is installed on your UNIX system and how to design directories for your 1-2-3 worksheet files.

- "1-2-3 and UNIX Display Devices" explains how 1-2-3 displays text and graphics on UNIX consoles and terminals.

- "1-2-3 and UNIX Printers" explains how 1-2-3 formats your worksheet data and graphs for shared printers and how 1-2-3 uses UNIX print spoolers to manage the printing of these files.

- "1-2-3 and UNIX Databases" explains how 1-2-3 uses Lotus DataLens drivers to access external database files from within 1-2-3.

- "1-2-3 and UNIX Networks" explains how 1-2-3 uses TCP/IP or Sun NFS network services if you have installed them.

| NOTE | This chapter does not explain how to configure 1-2-3 for your hardware or how to select options for your 1-2-3 sessions. For a complete discussion of configuring 1-2-3, see the *1-2-3 Configuration Guide* in this *User Guide* volume.

The UNIX Application Environment

The principal difference between the way *1-2-3 for System V* operates and the way other versions of 1-2-3 for personal computers operate concerns the UNIX operating environment and not the capabilities of 1-2-3 itself. For example, UNIX is a **multiuser operating system** that can support multiple users running 1-2-3 simultaneously. This means that UNIX must manage the central processor (or CPU), printers, terminals, and files so that the activities of one user do not conflict with the activities of another. For example, without UNIX print spoolers managing the data sent to shared printers, several users could not send worksheet data or graphs to the same printer without creating a blockage. Similarly, UNIX cannot assume that all users are working with the same type of terminal or console attached to the system; therefore, you must provide some information about your display device each time you log into the system.

To manage many users running one or more applications, UNIX requires that each application make use of a certain number of services common to all applications on the system: UNIX file-naming conventions, print spoolers (**lp**), keyboard definition databases (**terminfo**), terminal display services (**terminfo**), and process scheduling.

Depending on the number of drivers and devices installed on your system, *1-2-3 for System V* uses these services to manage your display, keyboard, printing, and access to files:
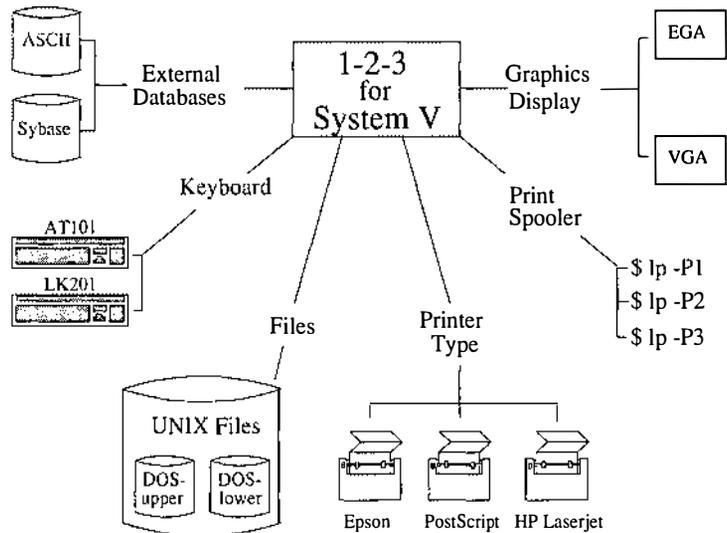
Figure 2-1. *1-2-3 and the UNIX operating environment*

Once you have run the Lotus **setup123** utility to select the appropriate printers, display devices, and file options for your sessions, 1-2-3 will use standard UNIX services to display your graphs, print your data, and manage your files transparently. You can then take advantage of the power and flexibility of UNIX by running multiple copies of 1-2-3 in your session, sharing worksheet files with other users, or by printing multiple files to different printers on your system.

The following sections in this chapter explain in more detail how 1-2-3 uses these UNIX system services and how you can take advantage of these services in your 1-2-3 sessions.

1-2-3 and the UNIX File System

When using *1-2-3 for System V*, or any UNIX application, one of the sets of tasks that you perform most frequently is file management: creating directories, naming files, copying files, setting permissions, and deleting old files. This section explains how *1-2-3 for System V* uses and enhances the file services available under UNIX. This should serve as a foundation for understanding file commands in 1-2-3 such as /File Retrieve, /File Admin, /File List, and /Worksheet Global Default Directory. In addition, this section introduces **DOS file modes**, a feature in *1-2-3 for System V* that lets you work with files stored on the UNIX file system that are named according to MS-DOS conventions. This feature is particularly useful if you are sharing worksheet files developed on MS-DOS versions of 1-2-3.

Useful Terms for Installation and Files

After 1-2-3 is installed on your UNIX system, you or your system administrator copies files from the 1-2-3 distribution diskettes to directories on your system's hard disk. As a 1-2-3 user, you do not need to know where the files are stored or how they were installed, but you do need to know several terms that refer to the 1-2-3 files installed on your system:

- **1-2-3 destination directory** refers to the name of the UNIX directory to which 1-2-3 files are copied during installation. This directory is the destination for installation files. If you accept the default destination directory for 1-2-3, the installation program that copies files to your UNIX/386 system builds a directory tree under the destination directory **/usr**.

- **1-2-3 base directory** refers to the directory tree containing all the executable files, drivers, and sample files distributed with 1-2-3. By default, the installation script creates a directory called **/lotus** under the destination directory **/usr**. The directory path **/usr/lotus** (or some alternate directory specified during installation) is called the base directory because your current release of 1-2-3 and future releases are installed under the parent directory **/usr/lotus: /usr/lotus/123.v10, /usr/lotus/123.v11,** and so on. Your system administrator may run **setup123** to create a default configuration for all users. If this default configuration is appropriate for your hardware, you may not need to run **setup123**. If you need to run the Lotus **setup123** utility, the name of the base directory appears on several of the screens. However, you do not need to know the name of the base directory unless you are adding it to your search path. Editing your search path is discussed later in this section.

- **HOME directory** refers to the name of the directory from which you start all your UNIX sessions. Typically, most users on a UNIX/386 system have a directory under **/usr** that serves as their HOME directory. If you run **setup123** to define your preferences for 1-2-3, 1-2-3 deposits two configuration files in your HOME directory: **.1123set** and **.1123cnf**.

- **Configuration files** contain information about the type of display, keyboard, language set, or file mode that you want to use in your 1-2-3 sessions. The file **.1123set** contains configuration settings that you selected in the Lotus **setup123** utility while the file **.1123cnf** contains information about default settings that you have selected in the 1-2-3 menu /Worksheet Global Default.

1-2-3 Files and your UNIX Search Path

You can run 1-2-3 or any of its related utilities by specifying the full path of the program. If 1-2-3 files were installed in the base directory **/usr/lotus**, you can execute 1-2-3 by entering the following command:

```
$ /usr/lotus/123.v10/sysV386/bin/123
```

As an alternative to this cumbersome method of running applications, many users prefer to include the name of the path to 1-2-3 in their UNIX startup file. A **UNIX search path** consists of a list of the directories that the UNIX shell searches each time you type a command. Most users must have UNIX directories like **/bin** and **/usr/bin** in their search paths. To run 1-2-3 without specifying the full path to the executable program, you can edit your UNIX search path to include the path to the 1-2-3 files.

If you use the UNIX Bourne shell, include the name of the 1-2-3 file path in the **.profile** startup file in your HOME directory:

```
PATH=.:/bin:/usr/bin:$HOME:/usr/lotus/123.v10/
sysV386/bin
```

If you use the UNIX C shell, include the name of the 1-2-3 file path in the **.cshrc** file in your HOME directory:

```
PATH '. /bin /usr/bin /usr/lotus/123.v10/
sysV386/bin'
```

After you have defined the appropriate path to 1-2-3 files, you can log out of the system and log in again (so the new startup file takes effect) or execute the startup file immediately with the command **$ .profile** (Bourne shell) or **# source .cshrc; rehash** (C shell). Once the search path to the 1-2-3 files is active, you can run the **setup123** utility (if you have not already done so) and enter **123** on the command line to run 1-2-3.

1-2-3 and HOME Directory Files

If you need to run the Lotus **setup123** utility before running the 1-2-3 spreadsheet, **setup123** saves all your selections and preferences in your HOME directory in a configuration file called **.1123set**. Each time you run 1-2-3, the main program reads this configuration file and loads the appropriate drivers for your session.

As you work in 1-2-3 you may discover different settings and options that you want to use in all your sessions. The 1-2-3 command /Worksheet Global Default Update saves your current worksheet settings in a file in your HOME directory called **.1123cnf**. 1-2-3 reads this file after it reads the **.1123set** configuration file each time you run the program.

Except for the `.1123set` configuration file and optional `.1123cnf` preferences file, you do not need to store any files in your HOME directory.

1-2-3 and Worksheet Files

1-2-3 for System V stores all your worksheet files in the UNIX file system. Before you can use *1-2-3 for System V* effectively, you need to understand some of the differences between the way *1-2-3 for System V* stores your files and the way an MS-DOS PC stores them. The following notes will assist you in preparing to use 1-2-3 in UNIX.

- **UNIX file directories**

  1-2-3 for System V uses the same 1-2-3 menu commands to manage file directories as 1-2-3 Release 2.2 or Release 3: /File Dir and /Worksheet Global Default Dir. Where a PC version of 1-2-3 uses a directory name like C:\123R3 as a location for worksheet files, *1-2-3 for System V* uses UNIX directory names like **/usr/shared_files** or **/usr/user-name/workfiles.** When you run 1-2-3 for the first time, it uses your HOME directory as the current file directory until you specify a new working directory. The 1-2-3 command /File List Worksheet displays a list of worksheet files (if there are any) in your HOME directory.

  If you want to store your worksheet files in a directory other than HOME, create the new directory before running 1-2-3 and specify this new directory as your default file directory with the 1-2-3 command /Worksheet Global Default Dir. When you save your preferences with the 1-2-3 command /Worksheet Global Default Update, 1-2-3 uses the name of your current default directory as the default file directory for subsequent 1-2-3 sessions. See "Worksheet Commands" in Chapter 2 of *User Reference* for more information about working directories and default file directories.

- **File security**

  1-2-3 Release 2.2, Release 3, and *1-2-3 for System V* provide a system of file locking that prevents more than one user from having write-access to a worksheet file at the same time. **Write-access** means that you have permission to save a worksheet file to disk under the same name as you retrieved it. Each worksheet file has a file lock or **reservation** that 1-2-3 uses to maintain write-access to that file.

When one user retrieves the worksheet file, he or she has the reservation to save the file back to disk under the same name.

This reservation system in *1-2-3 for System V,* however, does not supercede UNIX conventions for write permissions. If the UNIX directory containing a worksheet file has permissions set so that no user can write changes to any files in that directory, users will not be able to obtain a write reservation for that worksheet file in 1-2-3. Similarly, a user or group of users cannot retrieve a file from a directory that denies read-access to that user or group. If you want to store your worksheet files in a directory that gives you exclusive read-and-write or exclusive write permissions, you should use the UNIX **chmod** command to set the appropriate permissions on that directory. If you do not have sufficient privileges to alter directory permissions, see your system administrator.

> NOTE   File security across a network is dependent upon your network software and how your system is configured to use the network.

For more information on file permissions and the **chmod** command, see your UNIX operating system manual. For more information on the 1-2-3 reservation system, see "File Commands" in Chapter 2 of *User Reference.*

- **Case sensitivity**

  Unlike MS-DOS or OS/2, the UNIX operating system treats a file named in uppercase characters differently than one named in lowercase characters. The file **/usr/shared_files/budget.wk3** and **/usr/shared_files/BUDGET.WK3** are stored separately. *1-2-3 for System V* can use standard UNIX System V file-naming conventions for all the files that you work with. **UNIX file mode** lets you display, retrieve, or save any file that conforms to these UNIX conventions.

- **MS-DOS file specifications**

  1-2-3 for System V lets you use worksheet files that contain file specifications referring to MS-DOS disk drives and directories. If many of the worksheet files that you use in *1-2-3 for System V* were developed originally on MS-DOS versions of 1-2-3, it is likely that some of the macros or formulas contain references to MS-DOS disk drives and

directories, for example: /FRE:\123R3\BUDGET.WK3~ or
@SUM(<<C:\123R3\FILE1>>+<<C:\NEWFILES\
FILE2>>). These macro commands and formulas would
not work properly unless *1-2-3 for System V* had a way to
translate MS-DOS file references into file specifications
compatible with UNIX file directories. *1-2-3 for System V*
offers two file modes that preserve compatibility between
MS-DOS file references and UNIX file directories.
DOS-lower file mode is a subset of UNIX file mode and
lets you list, retrieve, or save files in lowercase that con-
form to the MS-DOS file-naming conventions (8.3 file-
name.ext). **DOS-upper file mode** is a subset of UNIX file
mode and lets you list, retrieve, or save files in uppercase
that conform to the MS-DOS file-naming conventions (8.3
filename.ext).

- **UNIX environment variables**

  DOS-upper and DOS-lower file modes can also use
  MS-DOS disk drive names (A:\, B:\, D:\, etc.) if you use
  UNIX environment or shell variables to define them for
  1-2-3. For example, if many of your macros refer to files
  stored on an MS-DOS disk drive called D:\, you can have
  1-2-3 look for those files in a UNIX directory that you
  equate with the MS-DOS disk drive D:\. To define the
  UNIX directory **/usr/files/pc_worksheets** as drive D:\
  for 1-2-3, define one of the following variables in your
  startup file:

  ```
  DOS_D=/usr/files/worksheets (Bourne shell)
  export DOS_D

  setenv DOS_D "/usr/files/pc_worksheets" (C shell)
  ```

  The next time one of your macros refers to a file stored on
  the DOS disk drive D:\, 1-2-3 will search the UNIX
  directory **/usr/files/pc_worksheets** for that file. For
  more information on file modes and defining DOS disk
  drives for 1-2-3, see "Working with Files" in Chapter 1 of
  User Reference.

- **File compatibility**

  All worksheet (.WK3, .WK1) and graph files (.PIC, .CGM)
  created in *1-2-3 for System V* are fully compatible with those
  used by 1-2-3 Release 3, *1-2-3 for Sun*, *1-2-3 for VAX/VMS*,
  and 1-2-3/M. Text files created with the 1-2-3 command
  /Print File are compatible with the UNIX convention of

ending lines with a line feed and not a combination line feed and carriage return. For more information on exchanging files with other systems running versions of 1-2-3, see Chapter 5 "Integrating 1-2-3 with Other Applications" in this manual and *Quick Start for PC Users* in this volume.

1-2-3 and UNIX Display Devices

The following display devices and graphics adaptors are some of the displays supported by *1-2-3 for System V*:

- **ANSI character displays**

  The minimal display device for 1-2-3 is an ANSI or ASCII terminal such as the Digital VT100 or Wyse 50. ANSI terminals or personal computers using ANSI emulation software cannot display colors or graphs in *1-2-3 for System V*.

- **EGA/VGA graphics adaptors**

  If the console device connected to your UNIX system is an IBM PC/AT/PS2 or compatible with an Enhanced Graphics Adaptor (EGA) or Video Graphics Array (VGA), you can display color worksheets and color graphs in *1-2-3 for System V*.

- **Sun River graphics terminals**

  If you are running *1-2-3 for System V* from a Sun River graphics terminal, you can display 1-2-3 worksheets and graphs in color. Sun River terminals emulate EGA/VGA graphics.

For more information about selecting an appropriate graphics driver for your system, see the *1-2-3 Configuration Guide.*

1-2-3 and UNIX Printers

By default, *1-2-3 for System V* uses standard UNIX print spoolers like **lp** to manage the scheduling and printing of your 1-2-3 data and graphs. Before you can print any data from *1-2-3 for System V*, you or your system administrator should have selected one or more **print drivers** (types of printers) and **print spoolers**. When you are working in *1-2-3 for System V*, you specify ranges of data or graphs to print with 1-2-3 commands like /Print Printer Range and /Print Printer Go. 1-2-3 formats the data or graphs that you specify for specific types of printers (selected in **setup123**) and builds a print job file containing all the formatted data. When you enter the command /Print Printer Quit, 1-2-3 closes this file of formatted data and passes it to the UNIX print spooler. From that point on, the UNIX print spooler manages the scheduling and actual printing of 1-2-3 print jobs.

Lotus provides print drivers for the following types of printers:

- **PostScript printers**

  If you have a laser printer that supports Adobe PostScript attached to your system, you can print 1-2-3 data and graphs with many advanced formatting options. For example, you can print reports that use separate font types and pitches for the worksheet data, borders, or frames. In addition, you can print data and graphs in the same report by specifying multiple data or graph ranges.

- **Hewlett Packard Laserjet and Paintjet printers**

  1-2-3 for System V supports HP Laserjet, Laserjet+, Laserjet II, and Paintjet printers, and a variety of standard font cartridges.

- **Epson dot matrix printers**

  1-2-3 for System V supports the Epson MX-80, FX-80, LQ-series, and LX-series of dot matrix printers. With any of these Epson printers, you can print data ranges or graphs.

- **Generic line printers**

  If you have a generic line printer or high-speed line printer attached to your system, you can print 1-2-3 data ranges.

If you do not have one of these printers directly attached to your system, but still need to produce reports from 1-2-3, you can use the 1-2-3 command /Print Encoded to build a ready-to-print file for particular types of printers. For example, you may have a generic line printer attached to the system in your department while another department has a PostScript printer. If you need to develop a report that reflects data and graphs in your 1-2-3 files, you can use /Print Encoded and Lotus PostScript drivers to build a file containing all the PostScript formatting codes that the PostScript printer in the other department requires to print the report. Encoded files increase your options for printing 1-2-3 reports on a variety of printers in your organization.

For more information on printing in 1-2-3, see "Print Commands" in Chapter 2 of *User Reference*.

1-2-3 and UNIX Databases

One of the principal benefits of running 1-2-3 on a networked UNIX system concerns access to database information shared by the many people in your organization. If your department uses a relational database manager like Sybase, Oracle, Ingres, or Informix, for example, it is likely that you have a considerable investment in the information stored in those shared database files. *1-2-3 for System V* provides transparent access to those database files through 1-2-3 /Data External commands and DataLens drivers.

The Lotus DataLens architecture consists of a set of conventions that allows 1-2-3 to read and write database records from external database files. If your department stores its most current sales figures in an Oracle database file, for example, you can use an Oracle DataLens driver to read this data into your current 1-2-3 worksheet for analysis and charting. The database management software itself does not have to reside on your system for you to access the files with DataLens drivers and /Data External commands.

For more information about DataLens drivers compatible with your database management program, contact your database vendor.

1-2-3 and UNIX Networks

1-2-3 for System V can use whatever network you have installed to exchange or share worksheet files. The following distinction between file exchange and file sharing should help you plan how to work with files developed on your network.

- **File exchange** involves moving files from one system on your network to another. If some of the computers attached to your UNIX system run MS-DOS, OS/2, or Macintosh/ OS, users can upload and download 1-2-3 files for use with *1-2-3 for System V*. In this case a PC and your UNIX system do not share the same **file system** (or set of directories) known to both systems. You cannot retrieve a file stored on a PC directly into *1-2-3 for System V* if the PC and your UNIX system are connected only by serial lines. The PC file must first be transferred to a directory on your UNIX system.

- **File sharing** provides transparent access to files stored on machines anywhere on your network. If you have a high-performance Ethernet network connecting your UNIX system to other UNIX systems, you can **mount** (or register) the file system on a remote system as a directory on your system. If your system is called DEPT1 and another system is called DEPT2, you can use a network application like Sun's NFS to build a network file system (`/network`) that is a superset of the files on both systems. You can then access files on the DEPT2 system by referencing the network directory shared by DEPT1 and DEPT2: `/network/ DEPT2/usr/worksheets` or `/network/DEPT1/local/ files.` When you are running *1-2-3 for System V* on your DEPT2 system, you can then retrieve a worksheet file stored on the DEPT2 system simply by referencing its network path: `/network/DEPT2/usr/worksheets/ budget.wk3`.

1-2-3 for System V supports as much file sharing as your network does. The degree of file locking is also dependent on the network software installed on your system and how it has been configured. For more information about using *1-2-3 for System V* with your UNIX network, see your system or network administrator.

Chapter 3
Starting 1-2-3 for System V

Once *1-2-3 for System V* has been installed on your UNIX/386 system and once it has been configured for available file directories and printers, you have three options for starting a 1-2-3 session: you can start 1-2-3 from the command line without options, you can use command-line options, or you can start 1-2-3 from a UNIX shell script. The following sections explain these options:

- "Configuring 1-2-3" discusses the role of the Lotus `setup123` utility in configuring 1-2-3 for your available hardware and operating preferences.

- "Starting and Ending 1-2-3" describes the command syntax to start and end your sessions with 1-2-3.

- "Starting 1-2-3 with Command-Line Options" provides instructions to use command-line options to configure 1-2-3 for a single session.

- "Starting 1-2-3 with a UNIX Shell Script" explains how to use UNIX shell scripts to automate complex or repetitive tasks, such as setting up the data needed for calculations and running 1-2-3 as a batch process.

If you are unfamiliar with UNIX System V shells (Bourne shell or C shell) or with UNIX text editors, you should consult the user's guide that accompanied your operating system.

Configuring 1-2-3

When your system administrator installs 1-2-3 on your UNIX system, he or she must provide 1-2-3 with information about all the printers, file systems, and display devices that may be used by people running 1-2-3. If you need to change your 1-2-3 configuration options, you (as user) must run the Lotus **setup123** configuration utility before running the 1-2-3 program. The **setup123** utility creates two types of configuration files depending upon who is running it.

- **Default configuration file**

  When your system administrator runs **setup123 -s**, he or she creates a configuration file called **.1123set** that contains information about printers and file systems relevant to all users on your system. As a user, you cannot alter the default configuration file created by your system administrator because it is stored in the installation directories containing other 1-2-3 files.

- **User configuration files**

  If the defulat configuration settings set by the system administrator do not match your needs, you must specify the kind of keyboard, display graphics adaptor (if any), file mode (UNIX or DOS), and languages you want in all your 1-2-3 sessions. When you run **setup123**, it presents easy-to-use menus listing your options and offering help screens on each issue. After you specify your options for 1-2-3, **setup123** creates a file in your home directory called **.1123set**. When you start your 1-2-3 session, this **.1123set** file provides 1-2-3 with all the information it needs to display graphs correctly or interpret your keyboard correctly.

For information on running **setup123** and configuring 1-2-3 for your available hardware and operating environment, see the *1-2-3 Configuration Guide* in this *User Guide*.

Starting and Ending 1-2-3

1-2-3 for System V provides two approaches to running the main spreadsheet program: running with a default configuration that you specified in **setup123** or running with alternative settings specified on the UNIX command line. This section discusses the first of these options, starting with your **setup123** defaults, and ending the program.

Starting 1-2-3 with setup123 Defaults

If you are starting 1-2-3 for the first time, you may be unsure whether your configuration is appropriate for your terminal or workstation. Although you can read about all your configuration options in the *Configuration Guide*, one way to determine whether you need to modify your selections in **setup123** is to run the program and see how it operates. The following procedures and troubleshooting guide explain how to start 1-2-3 for the first time from the command line on a terminal or in an X Windows **xterm** window.

Starting 1-2-3 from the UNIX Shell

If you are running *1-2-3 for System V* from an ASCII terminal or PC running a terminal emulation program, you do not need to configure your terminal in any special way to run 1-2-3. The following general procedure describes how to log into your UNIX system and run 1-2-3 with **setup123** default settings:

1. Connect to your UNIX system. You should see the opening login screen and the login prompt.

2. Type in your username at the prompt and press ENTER.

3. Type in your password at the prompt and press ENTER.

   If you have entered a valid username and password, your UNIX system responds in two ways. First, it displays a series of messages indicating that you have successfully logged into the system and informing you of the status of UNIX mail. Second, it creates a command process (Bourne shell or C shell) ready to accept commands.

   NOTE   If you make a typing mistake, you get several chances to retype the username/password correctly. If you cannot get onto the network and you know you typed in both the username and password correctly, you probably do not have a valid username/password combination. Ask your system administrator for help.

4. Type **123** at the command line and press ENTER.

```
$ 123
```

Figure 3-1.   *Invoking 1-2-3*

If you have selected appropriate display and keyboard options in **setup123**, you should see a copyright screen, then an empty worksheet screen.

```
A:A1:                                                          READY

      A    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
     16 Feb 90 01:49 PM
```
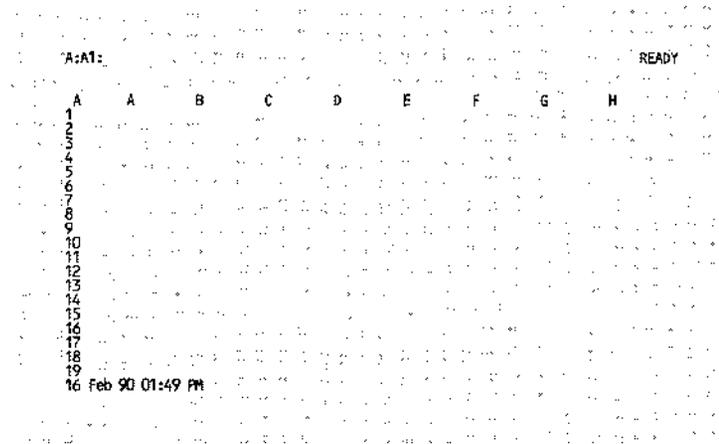
Figure 3-2.   *1-2-3 blank worksheet*

5. Using the keyboard template included in your distribution kit, test the 1-2-3 pointer-movement keys and function keys appropriate for your keyboard.

At this point, you have started *1-2-3 for System V* with all the configuration options that you selected in **setup123**. To display your default configuration options, enter the 1-2-3 commands /Worksheet Status and then /Worksheet Global Default Status.

```
                                                                        STAT

                                                        International:
        Printer:
           Interface..... (No interface available) Punctuation..... A
           Auto linefeed. No                                 Decimal Period
                                                            Argument Comma
        Margins                                            Thousands Comma
            Left 4       Top 2                    Currency........ $ (Prefix)
            Right 78     Bottom 2                 Date format D4.. A (MM/DD/YY)
                                                  Date format D5.. A (MM/DD)
        Page length... 66                         Time format D8.. A (HH:MM:SS)
        Wait.......... No                         Time format D9.. A (HH:MM)
        Setup string..
        Name.......... Device driver not installed
                                                  Negative........ Parentheses
        Automatic graph: Columnwise               Release 2....... LICS
                                                  File translate.. Country
        File list extension: wk?
        File save extension: wk3                  Clock on screen: File name
        Graph save extension: cgm                 Undo: No    Beep: Yes
                                                  Autoexec: Yes
        Default directory: /usr/lbertram
        Temporary directory: /usr/lbertram

        file0001.wk3
```

Figure 3-3.   *Global defaults in 1-2-3*

Starting 1-2-3 in an Xterm Window

If you are running UNIX System V under a graphical user interface based upon the MIT X Windows 11.3 or 11.4, you can display *1-2-3 for System V* worksheets and Help screens in an **xterm** window, but you cannot display any 1-2-3 graphs. The following general procedure describes how to create a **xterm** terminal window and how to run 1-2-3 in it.

1. Move your mouse pointer to an empty region of your desktop and press the appropriate mouse button to display your desktop management menu.

2. Select **xterm** (or the equivalent option for your desktop) to create a new **xterm** terminal window with a UNIX shell prompt.

   | NOTE | The procedures that you use to create and manage windows on your desktop will differ according to the user interface implemented on your system.

3. Type **123** at the command line and press ENTER.

   If you have configured the **xterm** terminal window and your **setup123** options correctly, you should see the following copyright banner and empty worksheet in your **xterm** window:

```
┌─────────────────────────────────────────────────────────┐
│ ▽                Commands: C Shell                        │
├─────────────────────────────────────────────────────────┤
│                                                           │
│           Lotus (R)   1-2-3 (R)    for System V           │
│                   Version 1.0                             │
│                                                           │
│         The new dimension in spreadsheet power and        │
│        performance, featuring 3-D worksheets, business    │
│          graphics, and advanced database features.        │
│                                                           │
│        Copyright 1990 Lotus Development Corporation       │
│                  All Rights Reserved                      │
│                                                           │
│                                                           │
│                 LICENSE   INFORMATION                     │
│                                                           │
│          User name:    sdoherty                           │
│          Company name: syncopation                        │
│  !16                                                      │
│          Use, duplication or sale of this product, except as │
│         is strictly prohibited.  Violators may be prosecuted.│
│                                                           │
└─────────────────────────────────────────────────────────┘
```

```
┌─────────────────────────────────────────────────────────┐
│ ▽                Commands: C Shell                        │
├─────────────────────────────────────────────────────────┤
│ A:A1:                                               READY │
│                                                           │
│   A      A      B     C     D     E     F     G     H      │
│  1                                                        │
│  2                                                        │
│  3                                                        │
│  4                                                        │
│  5                                                        │
│  6                                                        │
│  7                                                        │
│  8                                                        │
│  9                                                        │
│ 10                                                        │
│ 11                                                        │
│ 12                                                        │
│ 13                                                        │
│ 14                                                        │
│ 15                                                        │
│ 16                                                        │
│ 02-Apr-90 04:21 PM                                        │
└─────────────────────────────────────────────────────────┘
```

Figure 3-4.   *1-2-3 in an xterm window*

4. Using the keyboard template included in your distribution kit, test the 1-2-3 pointer-movement keys and function keys appropriate for your keyboard.

At this point you have started *1-2-3 for System V* with all the configuration options that you selected in **setup123**. To display your default configuration options, enter the 1-2-3 commands /Worksheet Status and then /Worksheet Global Default Status.

Troubleshooting

If you cannot start 1-2-3 at all or if it does not operate correctly, consult the following troubleshooting tips:

- **UNIX reports "No such file or command."**

  Contact your system administrator. It is possible that 1-2-3 has been installed on a server to which you do not have access. You will need to work with your system administrator to modify the file paths in your environment.

- **1-2-3 reports "Cannot find file filename."**

  Contact your system administrator. 1-2-3 has attempted to locate configuration or driver files appropriate for your session. You will need to work with your system administrator to modify the file paths in your environment.

- **The cursor-movement keys or function keys do not work correctly**.

  Verify that you have selected the correct keyboard type in **setup123**. Most likely you are using a template that does not correspond to your keyboard.

If 1-2-3 is running correctly, you should read the remaining sections in *Introducing 1-2-3 for System V* and continue to the *1-2-3 Tutorial*.

Ending a 1-2-3 Session

Whether you have started 1-2-3 from the command line with or without command-line options, or from a UNIX shell script, the following command ends your worksheet session and returns you to the point at which you started 1-2-3.

| CAUTION | Before you end 1-2-3, make sure you use /File Save if you want to save you work. Ending 1-2-3 clears your worksheets from memory without saving them.

Procedure

1. Select /Quit.

    A:A1:   MENU
    Worksheet Range Copy Move File Print Graph Data System Quit
    End the 1-2-3 session
        A   A   B   C   D   E   F   G   H
    1
    2
    3
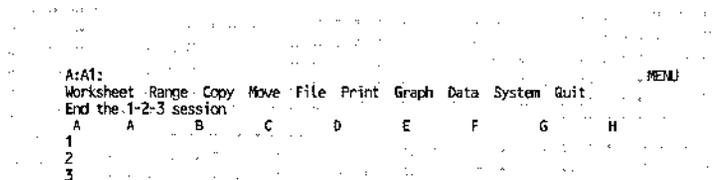
Figure 3-5. */Quit command on the main menu*

2. Select No to return 1-2-3 to READY mode or Yes to end the current 1-2-3 session.

    A:A1:   MENU
    No Yes
    End 1-2-3 session
        A   A   B   C   D   E   F   G   H
    1
    2
    3
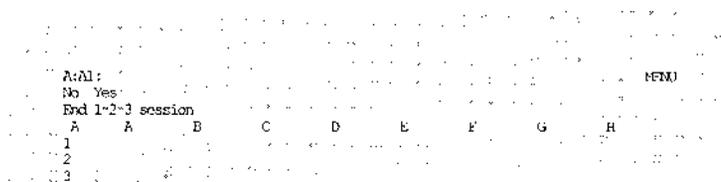
Figure 3-6. *Prompt to quit*

If you select Yes and have worksheets you have changed but not saved, 1-2-3 displays another No/Yes menu and asks if want to end the 1-2-3 session anyway.

• Select No to cancel /Quit so you can save the worksheets.

• Select Yes to end 1-2-3 without saving the worksheets.

Starting 1-2-3 with Command-Line Options

In the previous section, you learned how to start *1-2-3 for System V* so that all the options you selected in **setup123** are in effect. This section explains how to run 1-2-3 with alternative configurations and additional options for one session. The UNIX **command line** consists of the operating system prompt and whatever application commands you enter: **$ ls, $ ps,**

or **$ 123**. **Command-line options** qualify basic UNIX commands with a series of switches (usually beginning with a dash) and parameters: **$ ls –lR, $ ps –aux,** or **$ 123 –w workfile.wk3.**

When you use command-line options to start 1-2-3, you can specify alternative configurations for features that you defined in **setup123** or features not specified in **setup123**.

NOTE   Using command-line options does *not* permanently alter the configuration of 1-2-3 that you defined in **setup123**. The alteration applies only for that session.

General syntax for command-line options

$ 123 [–cfknpw specifiers]

The following table explains command-line options available in *1-2-3 for System V* and provides examples of each option.

Option	Explanation
–c [upper|lower]	Specifies that 1-2-3 should run in uppercase or lowercase mode in DOS file mode. This option is used in conjunction with an **–f dos** setting. This command-line option overrides the default file mode that you defined in **setup123**.
–f [unix|dos]	Specifies whether 1-2-3 should use UNIX file names or DOS-style file names. This command-line option overrides the default file mode that you defined in **setup123**.
	$ 123 –c upper –f dos specifies that 1-2-3 should use DOS-upper file-naming conventions for the current session.

(continued)

Option	Explanation
−k mapname	Specifies an alternate keymap definition in the keymaps database. This command-line option overrides the default keyboard layout that you defined in **setup123**.
	$ 123 −k lk201 specifies that 1-2-3 should interpret all your keystrokes, assuming that you are on a DEC LK201 (VT2xx, VT3xx) keyboard for this session.
−n	Suppresses output to the current display device. In effect, this executes *1-2-3 for System V* as a noninteractive background process until the 1-2-3 macros in the worksheet file encounter a /Quit Yes command. There is no equivalent setting in **setup123** for the **−n** option.
	$ 123 −n −w STARTUP.WK3 specifies that 1-2-3 should read the worksheet file **STARTUP.WK3** and execute any autoexecute macro commands as a noninteractive batch process. Note that the worksheet file that you retrieve in batch mode must have an autoexecute macro, no interactive commands, and a final macro command to exit 1-2-3.
−p [3−26]	Specifies the maximum number of windows to display in perspective mode. The number of windows that 1-2-3 can actually display on your terminal or workstation depends upon the number of lines supported by your terminal driver. There is no equivalent **setup123** setting for the **−p** command-line option.
	$ 123 −p 6 specifies that 1-2-3 will display 6 worksheet windows when you enter the command /Worksheet Window Perspective.

(continued)

Option	Explanation
-w filespec	Specifies an alternative file name for the 1-2-3 autoexecute worksheet file. By default 1-2-3 executes the autoexecute macro (\0) contained in the file **auto123.wk3** (in UNIX and DOS-lower file modes) or **AUTO123.WK3** (in DOS-upper file mode). Note that 1-2-3 differentiates uppercase and lowercase names for this autoexecute worksheet file and that it looks for these files in your 1-2-3 default directory (defined with /Worksheet Global Default Dir). There is no equivalent definition in **setup123** for the **-w** option.

$ 123 -w MYSTART.WK1 specifies that 1-2-3 should read the **MYSTART.WK1** startup file (with its autoexecute macro) instead of the default **AUTO123.WK3** or **auto123.wk3** files. |

Starting 1-2-3 with a UNIX Shell Script

Any command and its options that you use to start 1-2-3 from the command line can also be placed in an ASCII file called a shell script and then executed with a single command. Basic shell scripts can involve only a line or two of instructions; advanced scripts may involve dozens of commands with sophisticated shell procedures.

Occasionally your work lends itself well to being automated with shell commands. You may, for example, want to copy a file from a remote network node before loading it into 1-2-3. In this case you can simplify your task by starting 1-2-3 from a UNIX shell script that includes all the UNIX commands and 1-2-3 command-line options that you need.

Basic Shell Scripts

You may have one or more worksheet files, for example, that contain frequently used macros that you want to use in every 1-2-3 session. From the UNIX shell prompt you would start 1-2-3 with the following command-line options:

```
$ 123 -w macro1
```

The file **macro1.wk3** contains a list of 1-2-3 macro commands to load macro worksheet files.

You can use a single command to start 1-2-3 and specify these command-line options by creating the text file called **rollup123.sh** that contains the following commands:

```
# Runs 1-2-3 for System V with default macro
# libraries
123 -w macro1.wk3
```

You can start 1-2-3 with the following script command:

```
$ sh rollup123.sh
```

The UNIX shell automatically interprets the commands in **rollup123.sh**, retrieves the autoexecute worksheet **macro1.wk3**, and performs all the macro commands contained in its \0 autoexecute macro.

Advanced Shell Scripts

Although you can execute many shell commands from within *1-2-3 for System V* (with /System), it is more practical to use shell scripts that use UNIX system services to set up the data appropriate for a 1-2-3 session. Once the data sources have been placed in a directory that 1-2-3 can easily access, you can then start 1-2-3 with the appropriate options.

For example, suppose that you want to monitor purchase orders from three field sales offices that upload summary figures to your UNIX/386 system. You can write a shell script that copies the summary order files from the user directories of the field sales representatives to a working 1-2-3 directory. The script then consolidates them into a single file that 1-2-3 can import, parse, and analyze overnight.

A shell script that automates those tasks would be similar to the one shown below. This script uses TCP/IP network commands to manage network files and 1-2-3 macros to import and analyze the list of sales orders.

```
# Move to the rollup directory
cd /usr/work_123/rollup

# Copy Detroit sales figures to working directory
rcp detroit:/sales_wk3/det_sales.wk3 .

# Copy New York sales figures to working directory
rcp newyork:/sales_wk3/ny_sales.wk3 .

# Copy LA sales figures to working directory
rcp la:/sales_wk3/la_sales.wk3 .

# consolidate worksheet files with the worksheet
# file do_orders.wk3
123 -n -w /usr/macros/do_orders.wk3
```

The worksheet file **/usr/macros/do_orders.wk3** should then contain all the macro commands to retrieve the worksheet files **det_sales.wk3, ny_sales.wk3,** and **la_sales.wk3** and to perform the consolidation analysis. The **-n** switch in the last line of the **daily_orders.sh** script instructs 1-2-3 to run as a noninteractive process (terminal output is suppressed).
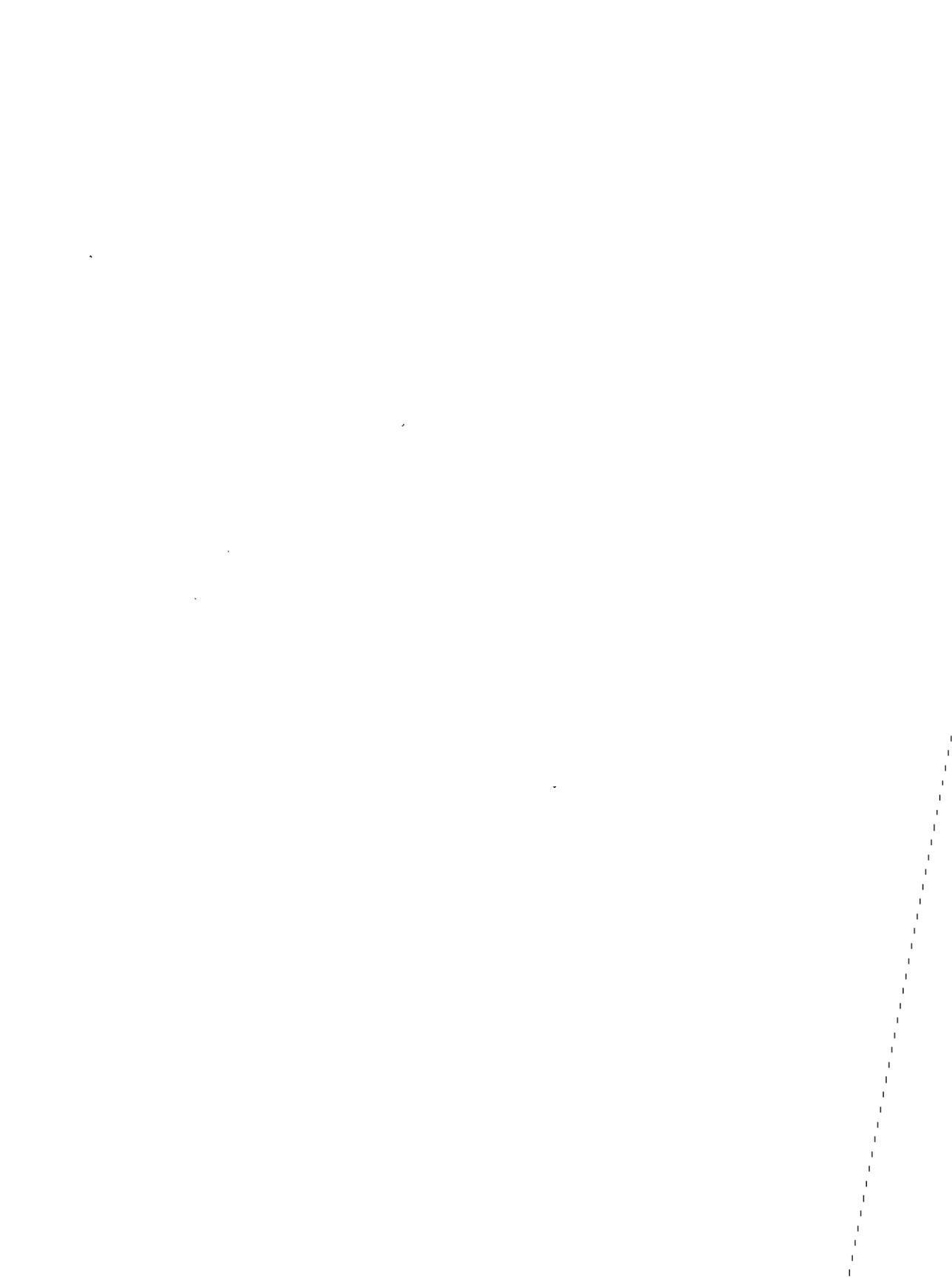
Chapter 4
1-2-3 and Work-Group Computing

Lotus has designed *1-2-3 for System V* to be compatible with the tools that are commonly available to UNIX/386 systems: UNIX networks, enterprise gateways, UNIX programming tools, distributed databases, and PC-to-UNIX communications. Whether you use *1-2-3 for System V* as a dedicated spreadsheet server or as a more general tool for managing your data, it represents an investment in supporting work groups that use PCs, terminals, workstations, and enterprise systems to solve common business problems.

This chapter explains how *1-2-3 for System V* supports many of the day-to-day tasks performed in a work group that uses a combination of desktop systems, UNIX/386 systems, and networked systems. This chapter contains the following sections:

- "The Work Group Environment" explains how a UNIX/386 system running *1-2-3 for System V* can act as a bridge between the tasks performed by individual users and those performed collectively by a work group.

- "Designing Work Group Applications" explains how to use UNIX and 1-2-3 programming tools to build worksheet archives on your UNIX/386 system.

- "Sharing 1-2-3 Files in a Work Group" provides an overview of the file formats supported by *1-2-3 for System V* and suggests ways that these files can be integrated with other applications running in a work group.

The Work-Group Environment

One of the principal benefits of running *1-2-3 for System V* in a UNIX/386 environment is connectivity with both larger networked systems and single-user desktop systems. Frequently, UNIX/386 systems act as department work-group systems or gateways between the applications that run on PCs or Macintoshes and those that run on larger networked systems. The following illustration depicts a common UNIX/386 installation:
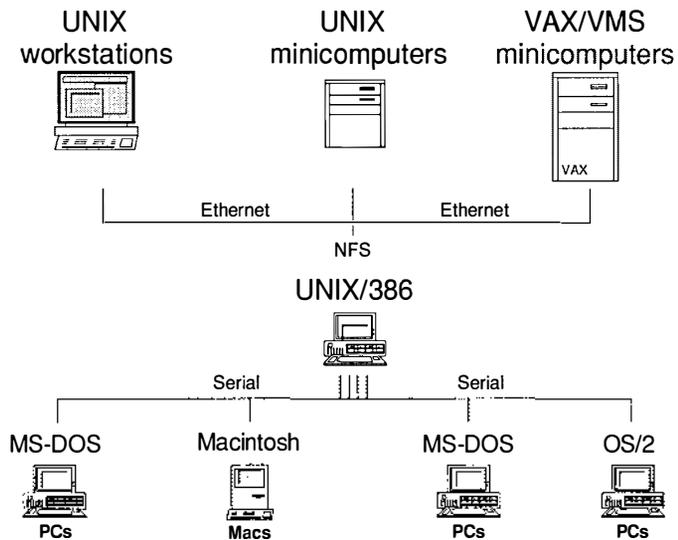
Figure 4-1.   *A UNIX/386 installation*

Each type of system in this illustration offers applications and services appropriate for the tasks assigned to those systems:

- **Enterprise minicomputers and workstations** support high-performance networks, specialized tools, and production-class applications.

- **UNIX/386 systems** support cost-effective networking, shared file systems and devices, work-group development tools, and convenient file transfers.

- **Desktop systems** support applications designed for personal productivity.

1-2-3 for System V running on UNIX/386 systems occupies the middle ground between applications designed for individual users and those designed for high-volume tasks.

Enterprise Applications

Report Generators	Enterprise Spreadsheets	CAD/CAM Graphics
Electronic Publishing	*NETWORKING*	Production Databases

1-2-3 for System V

Desktop Publishing	*TERMINAL EMULATION and FILE TRANSFER*	File Managers
Word Processors	Personal Spreadsheets	Desktop Graphics

Desktop Applications
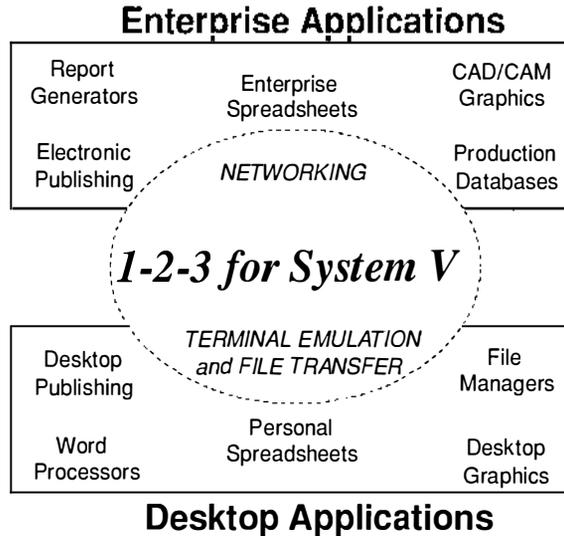
Figure 4-2. *Applications in the work group*

Four features recommend *1-2-3 for System V* as a powerful work-group application:

- **Industry-standard file formats**: *1-2-3 for System V* supports worksheet, graphics, and text file formats common to both PC and enterprise applications: .WK3, .WK1, .WRK, .WR1, .PIC, .CGM, and ASCII.

- **File sharing**: *1-2-3 for System V* offers file security and concurrency features that allow many users to access a library of shared worksheets without contention for write-privileges.

- **DataLens drivers**: *1-2-3 for System V* supports the Lotus DataLens interface that allows users to access relational database files stored on the UNIX/386 file system or on a remote filesystem mounted on UNIX/386.

- **Work-group development tools**: *1-2-3 for System V* can use all the shell programming and data management tools supported in UNIX System V.

Designing Work Group Applications

Work groups connected to a UNIX/386 system do not differ
from individual PC users so much by the kinds of applications
that they run, but by how they coordinate and share the
resources that they develop. A worksheet library is one exam-
ple of this. A worksheet library consists of a collection of 1-2-3
worksheets that have been organized to support a 1-2-3 work
group.

Assume that you have installed *1-2-3 for System V* on a
UNIX/386 system and that eight PCs have serial line or Ether-
net connections to the UNIX system. The eight PCs may be
running PC versions of 1-2-3, such as 1-2-3 Release 2.2 and
using the UNIX system as a file server for worksheet or
database files for three teams of users: accounting, sales, and
marketing.

The most important asset in any work group is the data
shared by its members. Work-group members can store
worksheet files anywhere on the UNIX file system; however,
it is more efficient to store commonly used files in a shared
directory structure.

1-2-3 for System V

/wklib

/wklib/acct   */wklib/sales*   */wklib/mkt*

PC PC PC   PC PC PC   PC PC PC
Accounting   *Sales*   *Marketing*
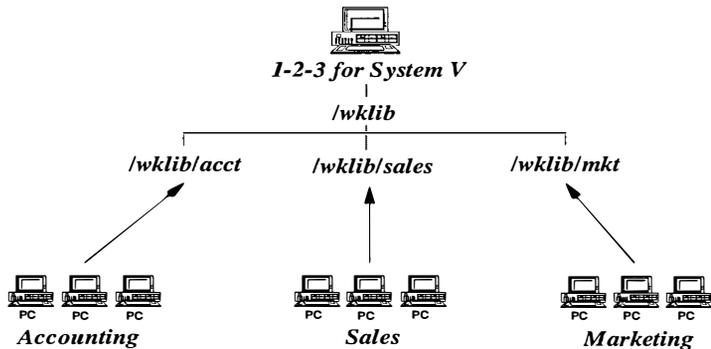
Figure 4-3.   *1-2-3 files in a worksheet library*

Using the development tools in *1-2-3 for System V* and the UNIX shell, you can build work-group applications that serve the needs of the work-group members connected to your UNIX system.

1-2-3 Tools for Work Groups

1-2-3 for System V supports work-group computing in the following ways:

- **File reservations**: 1-2-3 provides a file reservation system that allows no more than one user write-access to a shared worksheet file at one time. You can store worksheets in a shared UNIX directory on your system and feel confident that two users will not be modifying the file simultaneously. Many users, however, can read the file simultaneously.

- **File compatibility**: *1-2-3 for System V* can read and write the Lotus .WK1 and .WK3 worksheet files that are compatible with versions of 1-2-3 running on MS-DOS and OS/2 PCs in the work group.

- **Macro compatibility**: *1-2-3 for System V* can interpret MS-DOS file names contained in worksheet files created on MS-DOS PCs and can execute any macro that does not call MS-DOS system services or devices directly.

UNIX Tools for Work Groups

UNIX supports work-group computing with the following set of features and tools:

- **File security**: UNIX maintains a set of permissions for each directory and file in the file system. If you do not want the members of the accounting team to write worksheet files to the sales or marketing directories, you can use UNIX commands such as `chmod` and `chgrp` to specify who has write privileges to the directories `/wklib/sales` and `/wklib/mkt`. *1-2-3 for System V* respects UNIX file security in its own file reservation system.

- **Programming services**: The UNIX shell is a powerful tool for managing work-group resources and in complementing 1-2-3 programming tools. The shell procedures described in the next section illustrate how UNIX can access data stored in 1-2-3 .WK3 and .WK1 files.

- **Shared devices and network services**: The work-group resources shared by all members can be updated and modified using resources stored on larger network systems running *1-2-3 for Sun*, *1-2-3 for VAX/VMS*, or 1-2-3/M. Access to resources beyond the immediate work group is essential if your organization maintains central database files compatible with the Lotus DataLens architecture.

Work Group Programming

Access to shared directories is in itself useful for a work group, but you can enhance ease-of-use and productivity by programming UNIX *and* 1-2-3 to work in conjunction.

The following three examples illustrate how UNIX and 1-2-3 tools can work together to make 1-2-3 files more accessible to work-group members.

UNIX Worksheet Filter

Lotus .WK3 and .WK1 worksheet files stored in your work-group directories are binary (not ASCII) files that contain formulas, labels, and file links. If you have installed all the supplemental UNIX utilities on your system, you can use a utility called **strings** to extract all labels from .WK3 and .WK1 files and build a catalog of the keywords and fields used in your work group. The following UNIX command extracts all labels beginning with an arbitrary tag such as **%%** from one worksheet file and redirects the list of labels to a text file called **master_list**:

```
$ strings /wklib/acct/budget.wk3 | grep %% > \
/wklib/master_list
```

If members of your work group use a tag such as **%%** to annotate important information in worksheet files, the output file **master_list** would contain information like the following:

```
$ cat /wklib/master_list
'%%FILE: budget.wk3
'%%AUTHOR: Robert Plant
'%%DATA: Quarterly budget for the accounting team
'%%UPDATED: July 15, 1990
'%%GRAPHS: line chart of budget per quarter
```

Using **strings** in this manner lets you abstract key words and descriptors from worksheet files without running 1-2-3 and retrieving worksheets at random.

The following example illustrates how a UNIX shell script can build a series of catalog files from the worksheet files stored in the shared worksheet library.

UNIX Worksheet Cataloger

As a multitasking system, UNIX can periodically run applications or shell scripts that update information about the worksheet files in your worksheet library. The following Bourne shell script builds a listing of all tagged annotations in worksheet files stored in the directories **/wklib/acct**, **/wklib/ sales**, and **/wklib/mkt**:

```
# Work group cataloger -- updated every night by
# /etc/cron

# Remove old listings
rm -f /wklib/master_*
rm -f /wklib/acct_*
rm -f /wklib/sales_* mkt_*
rm -f /wklib/mkt_*

# Build file name lists
ls /wklib/acct/*wk* > /wklib/acct_files
ls /wklib/sales/*wk* > /wklib/sales_files
ls /wklib/mkt/*wk* > /wklib/mkt_files

# For each worksheet file, build a catalog
# of annotations tagged with the characters %%

for dept in acct sales mkt
 do
   for file in `cat /wklib/${dept}_list`
     do
     strings $file | grep %% >>/wklib/${dept}_list
     echo "" >> /wklib/${dept}_list
     done
  cat /wklib/${dept}_list >> /wklib/master_list
 done
```

Members in the work group then have immediate access to a catalog of information about the 1-2-3 worksheet files stored in the work-group directory tree. Although this is useful information that you can display or print out from UNIX, catalog information of this sort is more useful to 1-2-3 users when they are actually running the spreadsheet. To use these catalog files in 1-2-3, you can use 1-2-3 macros such as those illustrated in the next example.

1-2-3 Macros for Work Groups

If you have had some experience with basic programming tools in the UNIX Bourne or C shell, 1-2-3 advanced macro commands should be familiar in form and function. Macros let you develop menu-driven 1-2-3 applications that can access UNIX files and services as easily as the many functions built into 1-2-3 itself.

After you develop or collect information that is relevant to your work-group members, you can use 1-2-3 macro commands to build a front-end (or user interface) that makes work-group resources more accessible to users who may not use UNIX regularly. As work-group members discover new techniques for using 1-2-3, they can add to the macros contained in a macro library. Whenever a work-group member wants to run one of these macros, he or she can execute a shell script that contains the following UNIX command line:

```
$ 123 -w /wklib/workgrp.wk3
```

1-2-3 retrieves this macro library file and displays a menu of tasks relevant to work group members:

```
A:C2: [W28] ^WORKSHEET LIBRARIAN                                        READY

     A   A     B              C              D         E           F
     1
     2         Macro      WORKSHEET LIBRARIAN              Catalogs
     3
     4         ALT-A    Browse master catalog        /wklib/master_list
     5         ALT-B    Browse ACCOUNTING catalog    /wklib/acct_list
     6         ALT-C    Browse SALES catalog         /wklib/sales_list
     7         ALT-D    Browse MARKETING catalog     /wklib/mkt_list
     8         ALT-E    Review DATA summaries        'grep DATA master_list'
     9         ALT-F    Review GRAPH summaries       'grep GRAPH master_list'
    10         ALT-G    Review MACRO summaries       'grep MACRO master_list'
    11         ALT-H    Exit to UNIX
    12
    13    -------------------------------------------------------------------
    14                  Work group macros
    15    -------------------------------------------------------------------
    16         \a       /wisa1                        Add a blank sheet
    17                  /fit{CE}/wklib/master_list    Import master_list
    18
    19         \b       /wisa1                        Add a blank sheet
    WORKGRP.WK3
```

Figure 4-4.   *A 1-2-3 front-end to worksheet catalogs*

Each menu option has an associated macro keystroke such as
ALT-A, ALT-B, and so on. When a work-group member presses
the ALT key and then the appropriate character A-Z, the macro
instructions associated with that macro name are executed. In
this example, pressing ALT-A executes the commands listed
beside the macro \a, creates a blank sheet in the current file,
and imports the master catalog of annotations.

```
B:A1: '   MASTER LISTING OF ANNOTATIONS                                          READY

  B      A        B        C        D        E       F       G       H
  1      MASTER LISTING OF ANNOTATIONS
  2    '/wklib/acct directory
  3    '%%NAME: ----------------------------------------------------------------
  4    '%%NAME: /wklib/acct/budget1.wk3
  5    '%%NAME: ----------------------------------------------------------------
  6    '%%DATA: This worksheet contains the current budget for the accounting
  7    '%%DATA: department.
  8    '%%GRAPH: SLIDE1    budget breakdown by quarter (bar chart)
  9    '%%GRAPH: SLIDE2    budget breakdown by major item (pie chart)
 10    '%%MACRO: \c    recalculate overhead figures
 11    '%%UPDATE: July 15, 1990
 12    '%%NAME: ----------------------------------------------------------------
 13    '%%NAME: /wklib/acct/project.wk3
 14    '%%NAME: ----------------------------------------------------------------
 15    '%%DATA: This worksheet contains projected efficiency goals for
 16    '%%DATA: the accounting department
 17    '%%DATA: Kyle    should be updated on August 1
 18    '%%GRAPH: OVERVIEW    current and projected efficiency milestones
 19    '%%NAME: ----------------------------------------------------------------
WORKGRP.WK3
```

Figure 4-5.   *A listing of keywords extracted from 1-2-3 work-
sheets*

Pressing ALT-F executes the following macro:

```
/wisa1~
{SYSTEM "grep GRAPH /wklib/master_list > /wklib/tmp"}
/fit/wklib/tmp~
```

1-2-3 imports the output from the UNIX command contained
in the {SYSTEM} macro and displays it in the worksheet.

```
C:A1:                                                                    READY

   C    A      B       C       D        E      F       G       H
1
2    File master_list
3    '%%GR PH: SLIDE1 -- budget breakdown by quarter (bar chart)
4    '%%GR PH: SLIDE2 -- budget breakdown by major item (pie chart)
5    '%%GRAPH: OVERVIEW -- current and projected efficiency milestones
6    '%%GRAPH: SAL_PROD -- Sales forecasts by product
7    '%%GR PH: SAL_STATE -- Sales forecasts by state
8    '%%GRAPH: SAL_VOL -- Sales volumes to date
9
10
11
12
13
14
15
16
17
18
19
WORKGRP.WK3
```

Figure 4-6. *Output from a UNIX command displayed on the worksheet*

Note that 1-2-3 functions as a front-end for the catalog files already created in UNIX and for any other programming tools you want to build with UNIX shell commands or 1-2-3 macros. You can use brief macro commands such as ALT-A or ALT-B to manage the options available to work-group members or you can automate the entire process with the interactive and menu commands available in 1-2-3. In either case, work-group members can browse catalogs of worksheet annotations and then retrieve relevant files directly into their 1-2-3 session.

For more information about 1-2-3 macro commands and how you can build interactive macros for work groups, see Chapter 4 of *User Reference* and Appendix B "Sample Macros."

Sharing 1-2-3 Files in a Work Group

Another benefit of running 1-2-3 in a UNIX/386 environment is the ease with which you can integrate your 1-2-3 worksheet files with other applications running on enterprise and desktop systems. As the following illustration indicates, *1-2-3 for System V* can read the .WK1 files created on PC versions of 1-2-3, consolidate them into three-dimensional .WK3 files,

share them with other enterprise versions of 1-2-3, and then export the final worksheet and graph files back to PC users in the work group.
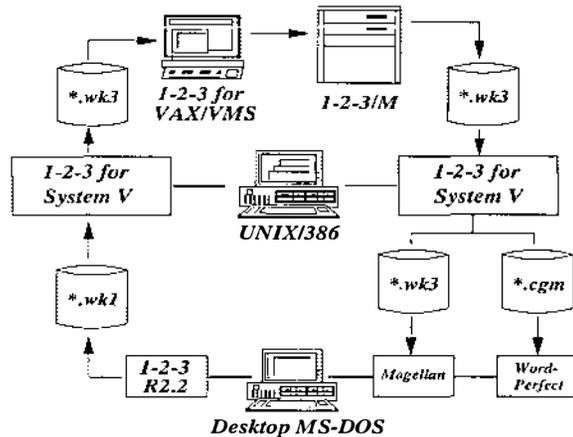
Figure 4-7.   *Sharing 1-2-3 files in an extended work group*

Even if PC users are not running 1-2-3/G or 1-2-3 Release 3, they can use applications such as Lotus *Magellan* or *WordPerfect* to browse or import the three-dimensional worksheet files created in *1-2-3 for System V*.

The key to sharing 1-2-3 files in such an extended work group is to understand the variety of file formats supported by *1-2-3 for System V*.

1-2-3 File Formats

1-2-3 for System V supports several types of worksheet, graph, and text file formats. The following list of file formats is not all-inclusive, but it does indicate the formats most frequently exchanged in a work group.

WK1 worksheet files: *1-2-3 for System V* can retrieve and save worksheet files used by 1-2-3 Release 2.01 and Release 2.2 running on MS-DOS PCs. Word processing packages such as Lotus *Manuscript* and *WordPerfect* can import named ranges in these .WK1 files and format them for presentations. Lotus *Magellan* can index all the data in .WK1 files and make them available for browsing and text searches.

WK3 worksheet files: By default, *1-2-3 for System V* retrieves and saves worksheet files compatible with 1-2-3 Release 3, *1-2-3 for Sun*, *1-2-3 for VAX/VMS*, and 1-2-3/M. 1-2-3/G, the graphical version of 1-2-3 for OS/2 Presentation Manager, can import and export .WK3 files created in *1-2-3 for System V*. Word processing packages such as Lotus *Manuscript* and *WordPerfect* can import named ranges in these .WK3 files and format them for presentations. If your PCs are running Lotus *Notes*, you can extract ranges from .WK1 and .WK3 worksheet files and insert the information into the work-group files running on your PC local area networks. The .WK1 and .WK3 files in this case serve as a bridge between PC and UNIX work groups.

CGM and PIC graphics files: *1-2-3 for System V* can save the graphs that you create in either the .CGM graphics metafile format or in the more traditional .PIC format. PC graphics packages, such as Lotus *Freelance* and some Macintosh packages can read these graph formats and provide additional tools for creating presentation graphics. Workstation graphics and CAD packages also offer filters to import .CGM and .PIC files for advanced formatting and analysis. PC word processors and desktop publishing packages such as WordPerfect, *Ventura Publisher*, or Aldus *Pagemaker* can integrate .CGM and .PIC files from *1-2-3 for System V* with PC reports.

ASCII text files: *1-2-3 for System V* can export worksheet data to ASCII text files with the /Print File command and import ASCII text files with the /File Import Text command. These text files are useful in transferring data via electronic mail or in formatting the data with UNIX text processors such as `nroff` or `troff`. Further, workstation publishing systems such as Interleaf *Technical Publishing System*, Digital Equipment Corporation's *DECwrite*, or Frame Technology's *FrameMaker* can import these text files into structured documents for publication and electronic distribution.

DataLens file formats: If you have installed one or more DataLens drivers for use with *1-2-3 for System V*, you can exchange data between 1-2-3 and database management systems compatible with your DataLens drivers. If a central UNIX minicomputer is running a version of Sybase, for example, and you want to distribute your most recent worksheet data to Sybase users on the minicomputer, you can use a Sybase DataLens driver to convert .WK3 worksheet data into a

Sybase database table. In this way DataLens drivers significantly enhance your ability to share data between *1-2-3 for System V* and systems dedicated to database management.
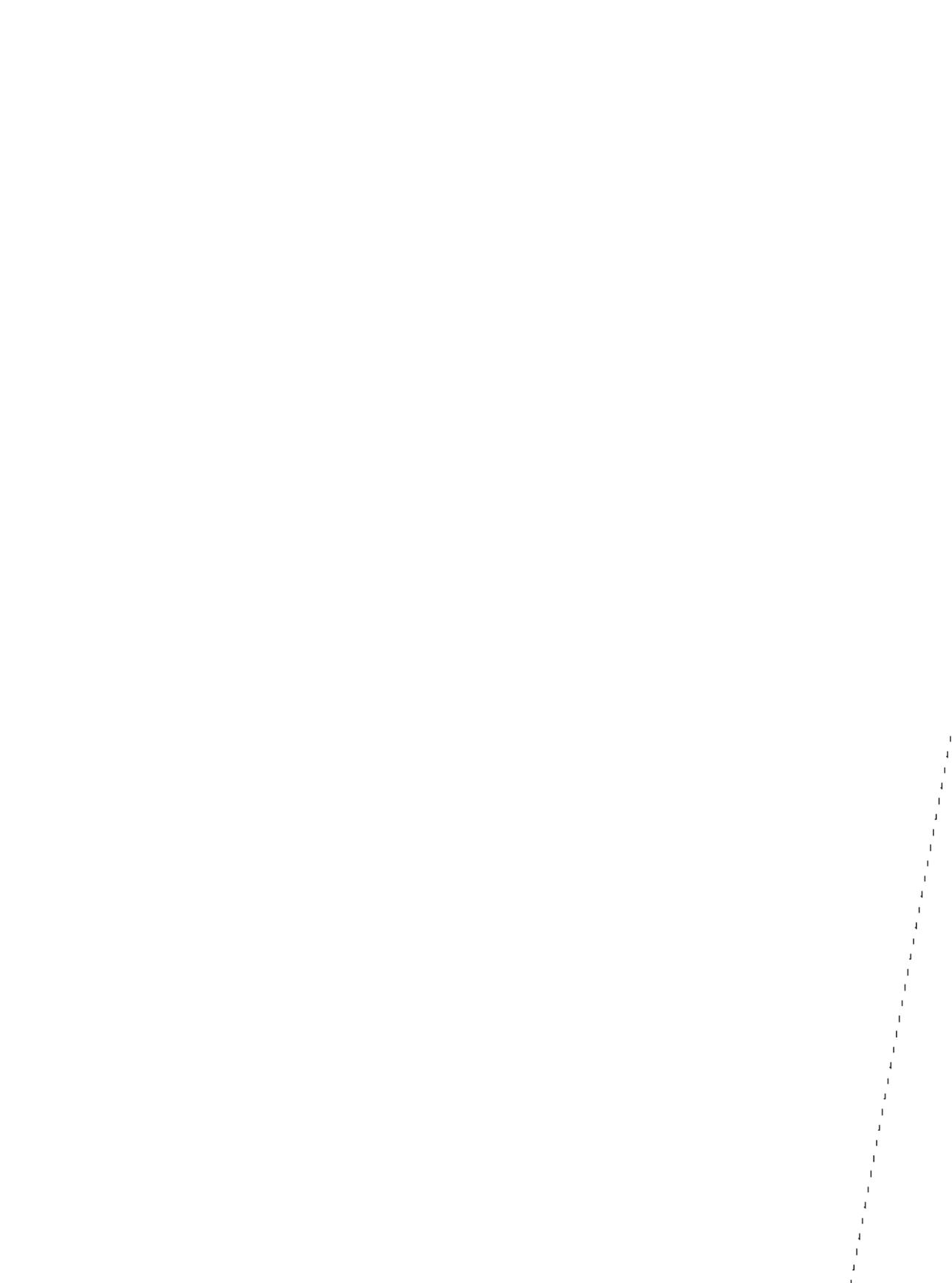
Quick Start for PC Users

In designing *1-2-3 for System V*, Lotus has placed great emphasis upon the compatibility of the product with the other versions of 1-2-3 designed for personal computers, minicomputers, workstations, and mainframes. If you have run 1-2-3 Release 2.01, Release 2.2, or Release 3 on personal computers, the skills that you have acquired are a strong foundation for using all the enhancements available in *1-2-3 for System V*.

This manual provides a frame of reference for moving from PC versions of 1-2-3 (Release 2.2 or Release 3) to *1-2-3 for System V*. It introduces issues that are relevant to running 1-2-3 in a multiuser and multitasking environment, as well as many of the new features in *1-2-3 for System V* that take advantage of capabilities available in the UNIX environment. If you are new to versions of 1-2-3 running on minicomputers or workstations, the cross references to more detailed sections of the user documentation should be useful. If you know in what areas *1-2-3 for System V* offers enhancements beyond Release 2.2 or Release 3, you can be selective in reading about the workstation enhancements and pace yourself in learning new features.

Reading Path

*Quick Start for PC User*s contains the following sections:

- "Running 1-2-3 in a UNIX Environment" explains what you need to quickly become productive with *1-2-3 for System V*: keyboard templates, system accounts, and support information.

- "Overview of 1-2-3 Enhancements" explains in general terms what enhancements are available in each version of 1-2-3: Release 2.2, Release 3, and *1-2-3 for System V*.

- "Compatibility" explains how all versions of 1-2-3 are compatible in terms of user interface, basic commands, file formats, and macros.

- "Display Features" explains how each version of 1-2-3 displays your worksheet data and graphs.

- "Worksheet Features" explains how each version of 1-2-3 manages one or more worksheets and worksheet files.

- "Database Features" explains how each version of 1-2-3 manages basic database tables, relational tables, or external databases files.

- "Graph Features" explains how each version of 1-2-3 builds, prints, and exports graphs based upon your worksheet data.

- "File Features" explains the extent to which each version of 1-2-3 supports worksheet files on disk, multiple files in memory, and files stored on a network.

- "Development Features" explains the macro and operating system tools that are available with each version of 1-2-3.

- "Maintaining Macro Compatibility" suggests how you can design 1-2-3 macro applications that will work across several operating environments.

For more detailed discussions of how *1-2-3 for System V* takes advantage of resources in the UNIX environment, see *Introducing 1-2-3 for System V* in this volume.

Running 1-2-3 in a UNIX Environment

If you have worked with a version of 1-2-3 under MS-DOS or OS/2, you have some familiarity with the PC operating environment: monitor types, graphics boards, keyboard layouts, file systems, and installation options. *1-2-3 for System V* introduces only those changes to the basic product that are required for operation under a different operating system and hardware environment. The challenges in making the transition from PC versions of 1-2-3 to *1-2-3 for System V* have much less to do with the basic product than the different operating requirements and conventions surrounding the products.

System Accounts

The following notes explain some of the issues that you must consider when running 1-2-3 on a multiuser system. If you do not routinely run applications on your multiuser system, you should contact your system administrator and verify that you have a current, active system account. Usually the system administrator will provide you with a login name, a default password (if appropriate), and general information relevant to all users on the system.

Display Devices

1-2-3 for System V requires that you run the spreadsheet from a terminal, workstation, or PC (using appropriate emulation and networking.) If you plan to run *1-2-3 for System V* from your PC, for example, you will need some of the following hardware and software:

- A serial port and null modem cable connected to a terminal server

- Terminal emulation software to allow your PC to imitate the behavior of a terminal such as a VT100 or Wyse 50

- An Ethernet communications card if you plan to use high-speed emulation and file transfer software such as Sun's PC-NFS

Installation Defaults

Unlike PCs, multiuser systems require that shared devices such as printers or disks be defined for each application. When your system administrator installed *1-2-3 for System V*, he or she configured 1-2-3 to work with the devices that all users can share. Before you can print to a network printer or exchange 1-2-3 files over the network, you need to know how the system administrator has configured the printers and networks for 1-2-3.

If you do not have a copy of the configuration notes from your system administrator, ask about the following installation options:

- Printers

  How many printers are available to 1-2-3? Where are they located? Are there restrictions on their use?

- Sample files

  In what directory are the 1-2-3 sample files and tutorial files installed? You will need to know where these files are before you can work with tutorial lessons and advanced exercises.

- Network file servers

  What file servers are accessible to you in your 1-2-3 sessions? If shared directories have restricted privileges, you need to determine whether you have sufficient privileges.

- DataLens drivers

  1-2-3 for System V can use Data External commands to communicate with DataLens drivers. If your system has database files compatible with DataLens drivers available for 1-2-3, you may need to ask your system administrator to add your name to the list of users with database privileges.

- File modes

  1-2-3 for System V supports three file-naming conventions: UNIX mode (all files displayed in UNIX format), DOS-upper mode (DOS-style file names in uppercase), and DOS-lower mode (DOS-style names in lowercase). System administrators have the option to install one of these three modes as the default for all users. You can override the default with command-line options.

Keyboard Templates

Unlike PCs, multiuser systems are designed to work with a variety of terminal and workstation keyboards. Before you can use 1-2-3 functions like HELP or GRAPH, you need to know how those 1-2-3 functions are assigned on your keyboard. Lotus ships with *1-2-3 for System V* several keyboard templates for the most popular keyboards compatible with your system. If you do not have a keyboard template or if the templates included with *Quick Reference* are inappropriate, check with your system administrator.

Command-line Options

Multiuser systems generally let users specify options for application programs at the operating system command prompt. PC versions of 1-2-3 let you select the spreadsheet program from the Lotus Access System or start it directly from the operating system with the command **123**. Command-line options in *1-2-3 for System V* provide additional flexibility in specifying startup files, alternate device drivers, the number of perspective windows, autoexecute files, and other run-time options. See *Introducing 1-2-3 for System V* or *Quick Reference* for more detailed discussion of what each of these command-line options signify:

```
$ 123 [-cfknpw specifiers]
```

Command-line options significantly enhance your ability to customize each session of 1-2-3 without altering your default configurations. Furthermore, these command-line options can be incorporated into command scripts so you can run specific configurations of 1-2-3 automatically.

For More Information

See *Introducing 1-2-3 for System V* and *Configuration Guide* for more information about installation defaults, configuration procedures, and run-time options.

Overview of 1-2-3 Enhancements

Since Lotus first shipped 1-2-3 Release 1 in 1982, each version of 1-2-3 has been designed to take advantage of the services available in each new operating environment. As 1-2-3 moves from personal computers to workstations to minicomputers and on to mainframes, the range of services that it can utilize increases accordingly.

Just as people select hardware and networks to support a variety of tasks, you can run several different versions of 1-2-3 that have features suited to your immediate needs. PC versions of 1-2-3, for example, provide a level of convenience and responsiveness that is suitable for data entry and analysis. Workstation versions of 1-2-3 provide excellent support for transparent access to network services and integration with other applications on the desktop. Minicomputer and mainframe versions of 1-2-3 offer a degree of integration with corporate data and services that make them ideal for large

scale consolidation and development tasks. File compatibility between versions of 1-2-3 means that you can develop your work sheets in one environment and move them to other environments with a suite of new capabilities and resources.

- Single-user PC enhancements

  Each release of 1-2-3 for the Intel family of MS-DOS PCs has enhanced the basic set of worksheet, database, and graphics features. The latest enhancements to the single-user version of 1-2-3 are in Release 2.2: file linking, settings sheets, improved add-in support, optimal recalculation, and macro recording. Release 2.2 retrieves and saves worksheet files in the .WK1 file format.

- Work group PC enhancements

  With the network versions of Release 2.2 and 1-2-3 Release 3, users working with Intel PCs can take advantage of enhancements designed for office work groups. The network version of 1-2-3 Release 2.2 supports file sharing, print management, and other work group enhancements. 1-2-3 Release 3 adds network support, file reservations, 3-dimensional worksheet files, multiple worksheets in memory, support for high-resolution displays, live graphs, and external database integration. DataLens drivers also support work groups using relational databases because you can access data stored in external database files while working in 1-2-3 Release 3. 1-2-3 Release 3 runs under MS-DOS and OS/2 and supports both the .WK3 and .WK1 file formats.

- Workstation and multiuser enhancements

  Building upon the Release 3 set of features, Lotus has released versions of 1-2-3 with enhancements for UNIX and VMS graphical workstations: dynamic worksheet resizing under SunView, DECwindows, and OSF/Motif, pop-up graph windows, NFS and DECnet networking support, pop-up Help windows, and cut-and-paste between desktop applications. *1-2-3 for System V* provides Release 3 capabilities for cost-effective desktop and departmental UNIX/386 systems. The workstation versions of 1-2-3 run under SunOS and VAX/VMS and support both the .WK3 and .WK1 file formats.

- Enterprise System enhancements

  For large organizations, Lotus offers enhanced versions of 1-2-3 Release 3 for IBM and Digital multiuser systems. *1-2-3 for VAX/VMS* runs on any midrange or mainframe VAX supporting VMS 5.2. 1-2-3/M runs on any midrange or mainframe system supporting versions of VM and MVS. *1-2-3 for VAX/VMS* and 1-2-3/M are strategic spreadsheet products in that they can consolidate worksheet and database information developed anywhere on an enterprise network. The enterprise versions of 1-2-3 support both the .WK3 and .WK1 file formats.

Compatibility

Although 1-2-3 operates in very different environments, each version of the product maintains compatibility at four levels:

- User interface compatibility

  All versions of 1-2-3 share a common user interface. The menus, Help screens, status indicators, function key names, and prompts familiar to a Release 2.2 user appear in all versions of 1-2-3. If you work regularly with 1-2-3 Release 2.2 or Release 3 on a PC, you can sit down with 1-2-3 running on a Sun workstation or UNIX/386 system and feel at home. A common user interface also lets you work on the version of 1-2-3 most convenient for you without sacrificing upward or downward compatibility when you run your worksheets on another version of 1-2-3.

- Basic command compatibility

  Menu commands in 1-2-3 Release 2.2 are present in the Release 3 family of spreadsheets. If you know how to build a worksheet in Release 2.2, you can use all the same commands to build a worksheet in any version of 1-2-3 running on work group PCs, workstations, or enterprise systems. In terms of training and support, this compatibility ensures that your users' familiarity with any version of 1-2-3 is an asset in your organization.

- File compatibility

  All versions of 1-2-3 can retrieve and save worksheet data in the .WK1 file format. Versions of 1-2-3 based upon 1-2-3 Release 3 can exchange .WK3 worksheet files without conversion or loss of data. Whether you share PC worksheets with other users on a local area network or on a high-performance enterprise network, the worksheets you spend time developing can be an asset for all users.

- Macro compatibility

  Macro commands and @functions in 1-2-3 Release 2.2 are available in all versions of 1-2-3. A Release 2.2 macro that does not control PC display or print devices will work without modification on an IBM mainframe, Sun workstation, or VAX minicomputer. Release 3 macros that do not call system-dependent devices or services work without modification on 1-2-3 Release 3, *1-2-3 for System V*, *1-2-3 for Sun*, *1-2-3 for VAX/VMS*, and 1-2-3/M.

The skills you have acquired in learning a version of 1-2-3 on personal computers are sufficient to use *1-2-3 for System V* productively. All the advanced work group, windowing, and network enhancements in *1-2-3 for System V* are simply extensions of the commands and features familiar to you in Release 2.2 or Release 3.

The following sections explain the enhancements available in versions of 1-2-3 running in the PC and UNIX environments.

Display Features

All versions of 1-2-3 share some basic display features: status indicators, menus, a highlighted cell pointer, and the inverted "L" for worksheet borders.

Release 2.2

The 1-2-3 Release 2 screen is the foundation for all display enhancements. If you have developed worksheets with Release 2, you will recognize the Release 2 screen in all other versions of 1-2-3. With Release 2.2 you can also take advantage of high-resolution display drivers designed for EGA and VGA monitors.
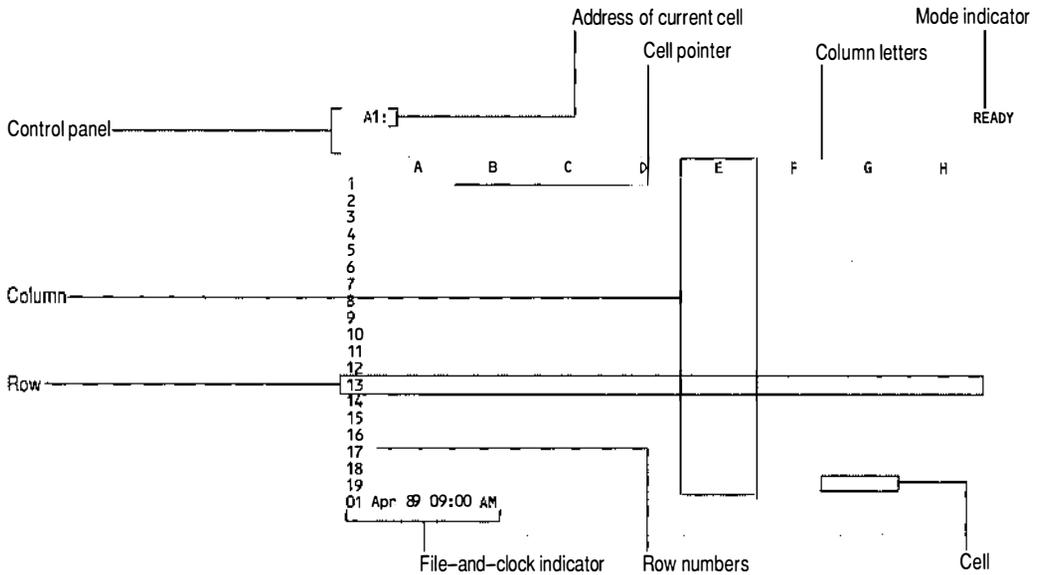
Figure 1.   *Release 2 screen*

Release 3 enhances Release 2 display features in two ways. First, Release 3 supports character-based bit-mapped screen drivers and lets you change drivers while in your 1-2-3 session. If you are using an EGA-compatible or VGA-compatible monitor with Release 3, you can display up to 55 worksheet rows and numerous on-screen fonts for graph labels. Second, Release 3 enhances the basic worksheet display by adding shaded sheet, row, and column indicators.

```
A:A1:  'INCOME SUMMARY 1988: Sloane Camera and Video                    READY

    B      A        B          C          D          E          F
    1    INCOME STATEMENT 1989: Sloane Camera and Video, Boston
    2
    3              Q1         Q2         Q3         Q4         YTD
    4
  · 5    Net Sales  $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
    A      A        B          C          D          E          F
    1    INCOME STATEMENT 1989: Sloane Camera and Video
    2
    3              Q1         Q2         Q3         Q4         YTD
    4
    5    Net Sales  $22,000.00 $32,000.00 $32,000.00 $41,000.00 $127,000.00
    6
    A      A        B          C          D          E          F
    1    INCOME SUMMARY 1988: Sloane Camera and Video
    2
    3              Q1         Q2         Q3         Q4         YTD
    4
    5    Net Sales  $10,000.00 $13,000.00 $16,000.00 $19,000.00 $58,000.00
    6
    SUM1988S.WK3
```

Figure 2.   *Release 3 screen*

System V

1-2-3 for System V preserves all the Release 3 enhancements
and adds two new display features. First, you can run *1-2-3 for
System V* from many PCs equipped with EGA or VGA
monitors and have all these users benefit from the same
high-resolution graphs and worksheets available on
single-user versions of 1-2-3. Second, you can run 1-2-3 from
ASCII terminals or graphics terminals. This provides very
low-cost access to 1-2-3 Release 3 features.

```
A:D12: (C0) [W11] @SUM(D6..D10)                                    READY

   A  A     B        C        D        E        F     G     H
   1
   2      CONSOLIDATION MASTER WORKSHEET: MARCH 1990          REF
   3      =======================================            =======
   4      Region              Current Sales    Projected      NODE
   5      ------------------------------------------------    ---------
   6      New England Sales    $1,427,322      $2,327,098     <<MOE::>>
   7
   8      New York Sales       $4,122,366      $7,100,000     <<LARRY::>>
   9
  10      Chicago Sales         $444,103        $620,000      <<CURLEY::>>
  11                           -----------     -----------
  12                           $5,993,791      $10,047,098
  13
  14
  15
  16
  17
  18
  19
CONSOL.WK3
```

Figure 3.   *1-2-3 for System V on an ASCII terminal*

For more information on	See
Worksheet screen components	"The 1-2-3 Screen" in Chapter 1 of *User Reference*

Worksheet Features

The design and functionality of the 1-2-3 worksheet have been enhanced significantly without abandoning the basic components familiar to Release 2 users.

Release 2.2

The basic 1-2-3 worksheet consists of 256 vertical columns (A — IV) and 8192 horizontal rows (1 — 8192). The 1-2-3 worksheet cell is a rectangle representing the intersection of a column and a row. A 1-2-3 range consists of any rectangular block of cells in the worksheet (A1..H27). To navigate the highlighted cell pointer in the worksheet, you use pointer-movement keys such as ↑ ↓ → ←, PGUP, PGDN, and HOME. With the introduction of video drivers for EGA and VGA monitors, you can display additional worksheet columns and rows.

Single-cell range

Figure 4. *The worksheet grid in 1-2-3*

Release 3 introduces three-dimensional worksheets, ranges, and database tables. You can develop multiple-sheet files in Release 3 that contain up to 256 worksheets with the same dimensions as the Release 2 worksheet. Each worksheet in Release 3 is identified by a worksheet letter in the top left corner of the worksheet border. If your file contains five worksheets, the first worksheet is referenced as A, the second as B, and so on. In Release 3, a basic two-dimensional range can be extended across multiple worksheets to form a three-dimensional range (A:A1..E:H27). Macros or @functions that reference single-worksheet cells or ranges in Release 2 can now reference cells in other worksheets or multiple-sheet ranges in memory or on disk. To display three consecutive worksheets, you can select the command /Worksheet Window Perspective.
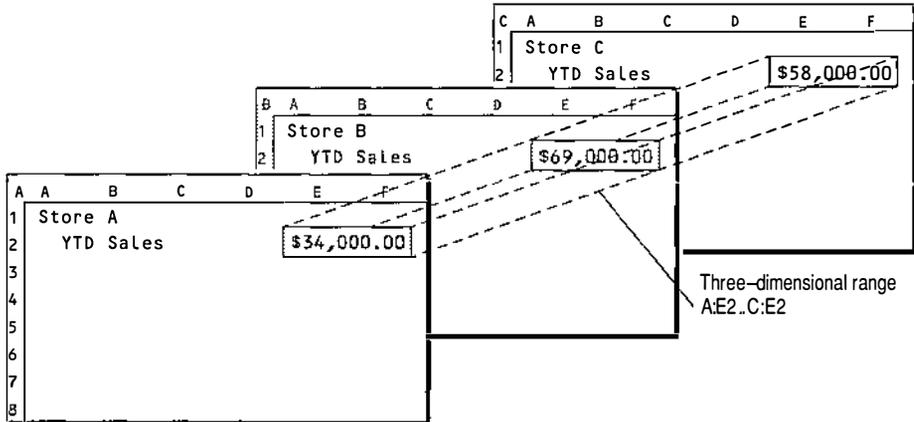
Figure 5.   *Three-dimensional worksheets in Release 3*

Release 3 also provides a new set of pointer-movement keys designed for navigating multiple-sheet files: NEXT SHEET, PREV SHEET, FIRST CELL, and LAST CELL.

1-2-3 for System V enhances the three-dimensional worksheet by supporting more than three displayed worksheets in perspective mode. Whether you are running *1-2-3 for System V* from an ASCII terminal or on a PC console, you can specify as many as twenty-six displayed windows in perspective mode. The UNIX command line $ `123` `-p` `6` tells *1-2-3 for System V* to display six windows when you select the /Worksheet Window Perspective command.

B:B5:   READY

```
           F       A       B       C       D       E       F       G
         4
         5
           E       A       B       C       D       E       F       G
         4
         5
           D       A       B       C       D       E       F       G
         4
         5
           C       A       B       C       D       E       F       G
         4                                 DEPT_NAME  Q1     Q2      Q3
         5
           B       A       B       C       D       E       F       G
         4                             DEPT_NAME  Q1     Q2      Q3      Q4
         5
         6                             DEPT1   $45,000 $91,000 $85,000 $67,000
           A       A       B       C       D       E       F       G
         4                     DEPT_NAME  Q1     Q2      Q3      Q4    SUMMARY
         5
         6                     DEPT1    45000  $91,000 $85,000 $67,000 $288,000
         BUDGET.WK3                            GROUP
```
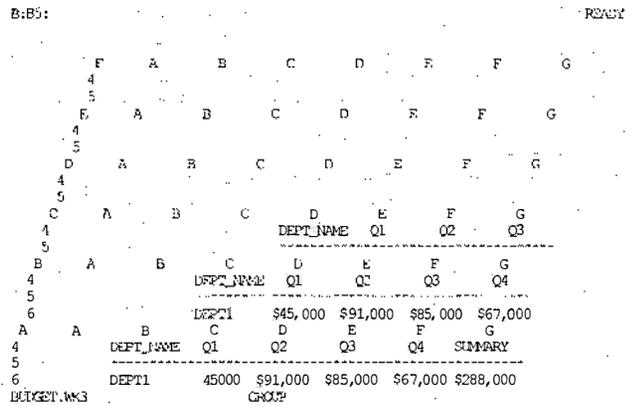
Figure 6.   *6-sheet perspective mode in 1-2-3 for System V*

For more information on	*See*
Perspective mode	"Viewing Your Data" in Chapter 1 and /Worksheet Window Perspective in "Worksheet Commands" in Chapter 2 of *User Reference*
Perspective mode options	"Command-line Options" in *Quick Reference*
Adding worksheets	/Worksheet Insert Sheet [After | Before] in "Worksheet Commands" in Chapter 2 of *User Reference*
Shared worksheet formats	"Using GROUP Mode for a File" in Chapter 1 of *User Reference*
Multiple worksheets	"Using Multiple-Sheet Files" in Chapter 1 of *User Reference*
Moving between worksheets	"Moving Around Multiple-Sheet Files" in Chapter 1 of *User Reference*

Database Features

The basic worksheet matrix of horizontal rows and vertical columns also functions as records (rows) and fields (columns) for 1-2-3 database tables. If you import a database table from an external database table, 1-2-3 automatically arranges the records and fields from the external table into 1-2-3 rows and columns.

Release 2.2

Any range of cells in the Release 2 worksheet can serve as a database table suitable for such functions as sorting, searching, and extraction. The first row of labels in the database range tells 1-2-3 what the names of the fields are. Subsequent rows contain the values in each of these fields. Several Release 2.2 add-in packages also provide transparent access to database files stored on disk.

```
A:A1: [W14] 'PERSONNEL DATA: Sloane Camera and Video                      READY

         A              B              C              D              E
1    PERSONNEL DATA: Sloane Camera and Video
2
3    EMPLOYEE#      LASTNAME       FIRSTNAME      LOCATION       DATE_HIRED
4    000281         Adamson        Joy            Boston             21 Oct 87
5    000262         Bird           Lance          Boston             13 Aug 87
6    000307         Bjorkman       Robert         Chicago            24 Feb 88
7    000159         Caulfield      Sherry         Boston             19 Mar 84
8    000139         Cobb           William        Boston             28 May 82
9    000141         Dickinson      Angela         Detroit            13 Nov 86
10   000220         Edwards        Jack           Atlanta            14 Feb 87
11   000174         Edwards        Cindy          San Francisco      15 Aug 85
12   000367         Fletcher       Amanda         Boston             03 Jan 89
13   000315         Grogan         Dave           Seattle            03 Apr 88
14   000211         Johnson        Stuart         Seattle            29 Dec 86
15   000185         Johnson        Rebecca        Boston             04 Feb 86
16   000118         Kaplan         Janet          Boston             22 Jun 81
17   000222         King           Mary           Detroit            10 Mar 87
18   000146         Krauss         Edward         Chicago            13 Jul 83
19   000162         Lerner         Kimberly       Chicago            28 Jun 84
```

Figure 7. *A basic database table in Release 2*

Release 3

With the introduction of three-dimensional worksheets and DataLens drivers, Release 3 considerably enhances the database capabilities of 1-2-3. Your 1-2-3 database tables can include up to 256 fields for each record and up to 256 sort keys. Multiple-sheet files enhance database features by providing separate worksheets for multiple queries and sorts.

Any database query can reference a table located in another worksheet on disk or in memory. Queries can even be relational to the extent that you can define database joins spanning multiple tables in a file. DataLens drivers connect 1-2-3 worksheet tables to external database files and tables. If you have data stored in a dBase or Sybase table on disk, the Release 3 DataLens drivers for dBase and Sybase let you retrieve and save database records from these external files. This significantly enhances the role of 1-2-3 as a front end or user interface to database files shared on a local area network.

```
C:A1: [W14] 'EMPLOYEE#                                              READY

     C       A            B            C           D             E
    1    EMPLOYEE#    LASTNAME     FIRSTNAME    LOCATION.      DATE_HIRED
    2    000185       Johnson      Rebecca      Boston        04 Feb 86
    3    000174       Edwards      Cindy        San Francisco 15 Aug 85
    4
    5
     B       A            B            C           D             E
    1    EMPLOYEE#    LASTNAME     FIRSTNAME    LOCATION      DATE_HIRED
    2                                           atlanta
    3
    4
    5
    6
     A       A            B            C           D             E
    1    PERSONNEL DATA: Sloane Camera and Video
    2
    3    000220       Edwards      Jack         Atlanta       14 Feb 87
    4    000297       Percival     James        Atlanta       18 Dec 87
    5    000348       Reese        Carl         Atlanta       13 Sep 88
    6    000190       Santos       Elizabeth    Atlanta       17 Jul 86
    DBT14.WK3                      GROUP
```

Figure 8.   *Multiple database tables in Release 3*

1-2-3 for System V enhances Release 3 database capabilities with virtual memory and transparent network database access. With the virtual memory of UNIX, you can work with very large external tables without running out of memory. Similarly, the basic networking capabilities of TCP/IP or NFS let you connect transparently to corporate databases stored anywhere on your network. In effect, *1-2-3 for System V* can function as a link between all the worksheet files and database tables stored at your site. *1-2-3 for System V* also shares with 1-2-3 Release 2.2 and Release 3 the ability to import and parse ASCII files so you can analyze the information as a 1-2-3 database table.

For more information on	See
Database functions	"Data Commands" in Chapter 2 of *User Reference*
External database access	/Data External in "Data Commands" in Chapter 2 of *User Reference*
Importing text files	/File Import Text in "File Commands" in Chapter 2 of *User Reference*

Graph Features

All versions of 1-2-3 provide tools for displaying worksheet values as graphs. Often a pie chart or bar graph can capture critical relationships between data that are submerged in a worksheet range or database table.

Release 2.2

Any set of values or ranges in a Release 2 worksheet or database table can be displayed, printed, or exported to a file as a line graph, bar graph, XY graph, stack bar graph, or pie chart. These basic graph types can then be enhanced with titles, legends, data labels, and scales. Release 2.2 adds support for high-resolution monitors and PostScript laser printers. Furthermore, many add-in programs for Release 2.2 extend the variety of graph types and graphic analysis available to you.

Release 3

Release 3 offers numerous enhancements to 1-2-3 graph capabilities: six new graph types, automatic graphs, split-screen data and graphs, advanced font control, graph printing from within 1-2-3, and graph grouping. On a graphics monitor, 1-2-3 can display your worksheet data and current graph simultaneously with the command /Worksheet Window Graph. This capability enhances your ability to perform "what-if" analyses and to see the changes to your data automatically reflected in the graph displayed in the graph window.   Release 3 also enhances the ease with which you can create graphs. Commands such as /Graph View, and /Graph Group use default ranges and range sets to graph worksheet data automatically. The best way to test all the new graph features in Release 3 is to select the command /Print Printer Sample and review all the fonts and graphs on the sample printout.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                    READY

  A      A            B          C          D          E         F
  1   INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3                    Q1         Q2         Q3
  4
  5   Net Sales    $12,000.00 $19,000.00 $16,000.00  Q2(44.7%)      Q1(16.7%)
  6
  7
  8   Costs and Expenses:
  9     Salary       2,000.00   2,000.00   2,000.00
 10     Int          1,200.00   1,400.00   1,600.00
 11     Rent           600.00     600.00     600.00
 12     Ads            900.00   2,000.00   4,000.00
 13     COG          4,000.00   4,200.00   5,000.00
 14                                                                Q4(24.4%)
 15     Op Exp       8,700.00  10,200.00  13,200.00
 16                                              Q3(14.2%)
 17   Op Income     $3,300.00  $8,800.00  $2,800.00
 18
 19
INC9.WK3
```

Figure 9. *Release 3 simultaneous display of worksheet data and current graph*

1-2-3 for System V preserves the Release 3 graphics set and provides access to Release 3 graphics from any PC or terminal supporting EGA or VGA adaptors. Further, you can save these graphs as .CGM or .PIC files compatible with publishing systems like PageMaker, Interleaf Publisher, or WordPerfect running under MS-DOS.

For more information on	See
Graphics drivers	*1-2-3 Configuration Guide*
Graphics files	/Graph Save in "Graph Commands" in Chapter 2 of *User Reference*
Hot graphs	/Worksheet Window Graph in "Worksheet Commands" in Chapter 2 of *User Reference*

File Features

File management and security options illustrate the evolution of 1-2-3 from a single-user application to an enterprise spreadsheet.

Release 2.2

1-2-3 Release 2.01 defines the basic file features that are enhanced in Release 3 and *1-2-3 for System V*. Release 2.01 can work with single-worksheet files in the .WK1 format, ASCII text files, and graph files (.PIC). Release 2.2 adds the feature of external file links. With this enhancement you can specify that the contents of a cell in your current worksheet are to be linked to the value of a cell or named range in an external file. One worksheet file can then serve as a control file, reflecting the current values of many other worksheets stored on your system. Many Release 2.2 add-in programs let you exchange data with a variety of file formats stored on PCs.

Release 3

In Release 3 you can retrieve one worksheet file consisting of 256 worksheets, up to 256 worksheet files each consisting of one or more worksheets, or any combination of files and worksheets totaling 256. This ability to work with multiple-sheet files simultaneously makes Release 3 a tool for worksheet consolidation and the analysis of any data stored in multiple files. Furthermore, Release 3 extends file linking so that you can include references to external values and ranges in @functions and macros. The formula @SUM(<<f1.wk1>>oldsales,<<f2.wk3>>newsales,<<f3>>out) links the value of the current cell to three external files. Another enhancement to file handling in Release 3 is support for file reservations on networks. The network versions of 1-2-3 Release 3 enhance your ability to access worksheet and database files stored anywhere on your local area network.
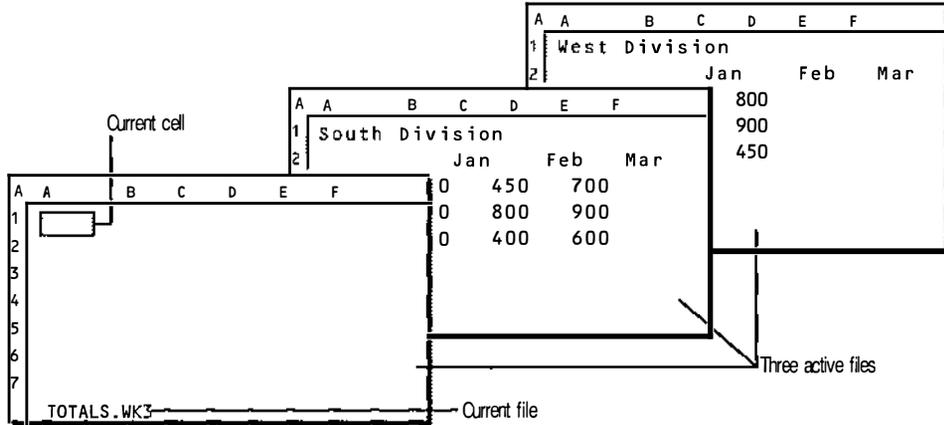
Figure 10. *Multiple files in Release 3*

1-2-3 for System V is designed to support workgroups exchanging files on a network. Any file that you can access via TCP/IP or NFS can be retrieved into your *1-2-3 for System V* session with its native UNIX filename. To the extent that many users on a UNIX network are exchanging files with personal computers running Release 2 or Release 3, *1-2-3 for System V* also supports multiple file-naming conventions. In UNIX file mode, you can retrieve any file stored in any case (upper or lower) on the UNIX filesystem. In DOS-upper and DOS-lower file modes, you can work with files and macro file references named in the familiar MS-DOS conventions. You can specify UNIX file mode or one of the DOS file modes in `setup123` or with the command line options **-f** and **-c**.

For more information on	See
Multiple files in memory	"Using Multiple-Sheet Files" in Chapter 1 of *User Reference*
File reservations and security	/File Admin in Chapter 2 of *User Reference*

(continued)

For more information on	See
UNIX and MS-DOS file modes	"Working with Files" in Chapter 1 of *User Reference*
Linking to files on disk	"Specifying Cells and Ranges in Other Files" in Chapter 1 of *User Reference*

```
A:F2:                                                          MENU
Fill  Table  Sort  Query  Distribution  Matrix  Regression  Parse  External
Work with an external table in an external database
   A     A      B        C       D        E       F       G       H
   1  <<CURLEY::...>>
   2          ACCOUNTS LISTING BY DEPARTMENT
   3
   4          DEPT1     $8,900  $1,200   $3,330  $1,000
   5          DEPT2     $4,500  $1,100   $1,090  $4,500
   A     A      B        C       D        E       F       G       H
   1  <<LARRY::...>>
   2          SALES REPORTS BY DEPARTMENT
   3
   4          DEPT1     $4,500  $4,611   $4,722  $4,833  $4,944
   5          DEPT2     $4,537  $4,648   $4,759  $4,870  $4,981
   6          DEPT3     $4,574  $4,685   $4,796  $4,907  $5,018
   A     A      B        C       D        E       F       G       H
   1  <<MOE::...>>
   2          BUDGET PROJECTIONS BY DEPARTMENT
   3
   4          DEPT_NAME  Q1      Q2       Q3      Q4      SUMMARY
   5          ----------------------------------------------------
   6          DEPT1     $45,000 $91,000 $85,000 $67,000 $288,000
ACCOUNTS.WK3
```

Figure 11. *Worksheet and data files stored across a UNIX network*

Development Features

To a large extent, the versatility of 1-2-3 in both small and large businesses can be attributed to the development features available in each version of the product. Any task that can be performed in 1-2-3 can be automated with macros. Many tasks that were never designed for 1-2-3 can be developed as add-in programs or Lotus Programming Language (LPL) applications.

Release 2.2

Keystroke and advanced macro commands in 1-2-3 have evolved from a set of Release 1 debugging tools to a versatile programming language in Release 2.2. For more advanced tasks such as project management, accounting, real-time testing, and inventory control, Release 2 users can purchase or develop add-in applications written with the add-in toolkit.

Release 3

Release 3 enhances macro programming with a set of new commands supporting three-dimensional worksheets, relational database queries, external database queries, and operating system tasks. With the Lotus Programming Language (LPL), Release 3 users can run add-in applications similar to those available in Release 2.   Under OS/2, Release 3 can also support multitasking and other network development utilities.

System V

1-2-3 for System V supports all Release 2 and Release 3 macros in an environment supporting multitasking and interprocess communications. Whereas a Release 2 or Release 3 macro can communicate with MS-DOS on an exclusive, one-task-at-a-time basis, *1-2-3 for System V* macros can communicate with many UNIX tasks via intermediate files. The development tools available in 1-2-3 (macros) and the tools available in UNIX (shell, C) complement one another.

```
A:D17: [W9] '/wir                                           READY

  A  AB   C         D        E   F   G      H    I   J    K
  1                    SAMPLE PROJECT MANAGEMENT MACRO
  2  ─── ───── ─── ─── ───
  3  TASK LIST      RESOURCE START  WKS END      STAT  WK# 01 Apr  08 Apr
  4  ───────────────────────────────────────────────────────────────
  5  MAJOR TASK #1 SUMMARY  01-Apr  5  06 May Begun  0 XXXXXXXXXXXXXXXXXXXXXX
  6   SUBTASK #1A  SUMMARY  01-Apr  4  29-Apr Begun  0 +++++++++++++++++++++++
  7    Task 1      Cynthia  01-Apr  1  08-Apr Begun  0 >>>>>>>>
  8    Task 2      Jan      08-Apr  1  15 Apr Begun  1          >>>>>>>>
  9    Task 3      Jim      08-Apr  3  29 Apr Begun  1          >>>>>>>>>>>>>>
 10   SUBTASK #1B  SUMMARY  08-Apr  4  06-May Next   1          ++++++++++++++
 11    Task 1      John     08-Apr  1  15-Apr Next   1          >>>>>>>>
 12  · Task 2      Kyle     15-Apr  3  06-May Next   2              >>>>>>·
 13    Task 3      Millie   08-Apr  4  06-May Next   1          >>>>>>>>>>>>>>
 14  ────────────────────────────────────────────────────────────────
 15   new_task     Name      start  wks********stat  ***    ERR
 16
 17   \I          /wir              Insert new row
 18               /cnew_task        Copy range new_task to new row
 19               {R 2}             Move pointer to task name
 SMPSCHED.WK3
```

Figure 12.   *Work group applications in 1-2-3 for System V*

For more information on	See
Macro commands	Chapter 4 of *User Reference*
Sample macros	Appendix B "Sample Macros" in *User Reference*
Command-line options	"Command-line Options" in *Quick Reference*

Maintaining Macro Compatibility

The vast majority of all 1-2-3 commands work identically in all operating environments: MS-DOS, OS/2, UNIX, VMS, VM, and MVS. Because the same .WK1 or .WK3 file can be exchanged across your network and retrieved into versions of 1-2-3 running on other operating systems, it is possible that the macro that worked flawlessly on your VMS or UNIX workstation may not execute correctly on a PC or System/370 mainframe. If there is any possibility that your worksheets will be used by other members of your work group running 1-2-3 on a different operating system, you should anticipate compatibility issues when developing your worksheet macros.

This section highlights 1-2-3 commands and conventions that are platform-specific and explains how you can anticipate these dependencies in developing portable macro applications.

Platform Dependencies

When Lotus develops a version of 1-2-3 for an operating environment, it integrates the basic commands and capabilities of 1-2-3 with the services available to any application running in that environment. 1-2-3 Release 3 under MS-DOS uses PC keyboard interrupts, dynamic loading of drivers, and direct control of printer ports. *1-2-3 for Sun* uses the SunView windowing system common on most workstations running SunOS. *1-2-3 for System V* uses native UNIX file names and UNIX print services. *1-2-3 for VAX/VMS* uses VMS file names, DECwindows, and common VMS print queue services. 1-2-3/M uses GDDM mainframe graphics, the IBM Interactive Chart Utility, and DataLens drivers for DB2, SQL/DS, and IXF.

Each version of 1-2-3, therefore, integrates a certain number of services and capabilities that are not available on other platforms: print services, networks, display attributes, file-naming conventions, and DataLens drivers.

Printers

Although the 1-2-3 commands that you use to print worksheet data or graphs are consistent across platforms, the way each version of 1-2-3 communicates with printers differs. Single-user systems like MS-DOS PCs can communicate with a printer directly, making commands like /Print Suspend, /Print Resume, or /Print Wait possible. Multitasking systems like OS/2, UNIX, VMS, and some PC local area networks must assume that more than one application may want to use a printer simultaneously, so they use print spoolers or print queues to schedule print jobs to the printer. 1-2-3 commands like /Print Suspend, /Print Resume, or /Print Wait cannot communicate with the printer directly, so these commands do not work on multitasking or LAN versions of 1-2-3.

Portability Tips

- If you want a portable macro application to print a report, use general print commands that do not depend upon a locally-controlled printer: /Print Go, /Print Quit.

- Do not use macro commands that select a particular type of printer or print interface because the printers available to 1-2-3 will differ from platform to platform just as they do from PC to PC.

- Avoid advanced print options in portable macros. The font and type size options available to your local laser printer may not be available to a user sending data to a networked line printer.

- Avoid storing site-specific information in your configuration file because these files may be used on different machines on the network with very different capabilities.

Networks

Networks bring locally-stored and remotely-stored worksheet files to your desktop. Unfortunately networks require a considerable amount of local configuration and maintenance. You may be connected to remote network disks without knowing who connected you (perhaps a network administrator) or how you are connected (possible automounting programs). A macro that refers to a file in a certain network

directory may, in fact, be routed through several intermediate network paths. The file path in your macro may not contain all the information that another user needs to reconstruct the physical location of the file being referenced.

Portability Tips

- If few users on your network share directories, assume that other users will not be connected to the same network that you are and that they cannot reconstruct the network path to the files you reference. Document in your macro where the network files are stored and how other users may access them from another operating system or network.

- If several work groups using different operating systems share access to common file directories on a network server, define common file-path names so that all work groups can write macros pointing to the same directory. MS-DOS communications programs such as Digital's PCSA and Sun's PC-NFS provide support for referring to shared directories on a network server.

Display Devices

Versions of 1-2-3 run on a variety of desktop display devices: PCs with EGA/VGA graphics, 3270-class terminals, SunView workstations, VT22x character terminals, VT34x graphics terminals, and X Windows display terminals. How many worksheet rows and columns are displayed in 1-2-3 depends upon the resolution and configuration of the display drivers selected for your session. Even in a relatively homogeneous environment like Intel-based PCs, 1-2-3 can display 20 worksheet rows (CGA, MDA, Hercules), 43 or 55 worksheet rows (EGA, VGA), or many more rows (DECwindows or SunView). If your macros make assumptions about the number of rows and columns displayed, they possibly will not display your data as you would expect.

Portability Tips

- Do not use macro commands that move the cell pointer by screens: {PGUP}, {PGDN}, {BIG RIGHT}, {BIG LEFT}. Assume that the screen dimensions of other display devices will differ from yours. Use specific cell and range references to ensure compatibility.

- Design input screens, Help screens, and data screens with a border of empty cells. If other users with display devices supporting more rows and columns than yours run your macro, they will distinguish your data with its border from other data on the screen.

File Systems

Each version of 1-2-3 provides both system-dependent and system-independent ways to specify worksheet files.

System-dependent references to files usually include local file paths like `c:\123r3` (MS-DOS and OS/2), `[LOTUS123.WORKSHEETS]` (VAX/VMS), or `alcuin:/local/user/worksheets` (UNIX). Similarly, macros that depend upon a particular file path in /Worksheet Global Default Dir will not succeed when run on a system with a different default directory.

System-independent file references generally refer to files by their file name and file extension only: FILE0001.WK3, SUMMARY.WK1, or OUTPUT.PRN. Document in your macros where the worksheet file resides on your network or how or where other users can get a copy.

Macros that perform file operations such as /File Retrieve or /File Import Text require additional planning on the part of the other user running your macro on another operating system. Similarly, you should review advanced macro commands that access files on disk: {OPEN}, {CLOSE}, {WRITE}, {WRITELN}, {READ}, {GETPOS}, {SETPOS}, and {READLN}.

Portability Tip

- If your macro works with several sources of data on disk, consider merging the worksheets in these dependent files into one master worksheet file. Any user running your macro in this master worksheet file will have access to all the data that would otherwise be available only on your system. This increases file storage overhead, but ensures that the successful macro applications developed in one department will work in another department running another version of 1-2-3.

External Databases

DataLens drivers are system-dependent. An MS-DOS macro that successfully connects to a dBase III file will certainly fail on all other platforms because the names and configuration of DataLens drivers on each platform will vary. For all practical purposes, macros that use /Data External commands are not portable across operating systems.

Chapter 1
Introduction

Overview

This chapter provides information about configuring *1-2-3 for System V*. It provides detailed information about using `setup123` and `keyedit.`

The `setup123` utility is a configuration utility that you or the system administrator must run before you can use 1-2-3. When you run `setup123`, you can accept the system defaults that are specified by your system administrator or you can create your own user defaults to meet your needs. Your user defaults override the system defaults.

Use `keyedit` to customize the keyboard you use with 1-2-3. You can use 1-2-3 without running `keyedit.` Your default keyboard map (layout) is determined by the keyboard you or the system administrator select when you run `setup123`. When you run 1-2-3, you use the initial defaults for a keyboard layout that are provided by Lotus. If you find that the default keyboard layout is inconvenient or inadequate for your needs, you can run `keyedit` to redefine the keyboard layout. Your keyboard layout overrides the default keyboard layout.   .

How To Proceed

Before you use 1-2-3, complete the tasks below. Use the information in this guide to help you accomplish these tasks.

- Ask the system administrator for the following information:

  - Is 1-2-3 installed? In what directory? Before you can use 1-2-3, it must be installed.

  - What are the system default settings that were specified with **setup123**? You need this information to determine whether you need to run **setup123** before you run 1-2-3.

- Complete the configuration chart provided in this chapter.

- Compare your completed configuration chart to the system default settings for **setup123**. Determine whether you need to change configuration settings.

- Use **setup123** to configure 1-2-3. Chapter 2 provides instructions for using **setup123**.

- Review the layout for your keyboard that is provided in the Release Notes. If your keyboard is not included, you need to use **keyedit** to display the layout. Instructions for using **keyedit** are included in Chapter 3. Determine whether you want to use the default keyboard layout for your keyboard with 1-2-3.

- Use **keyedit** to change the layout of your keyboard if you determine that you want to customize your keyboard. Chapter 3 provides instructions for using **keyedit**.

Configuration Chart

Keyboard:

_____Default (defined with TERM variable)

_____PC-NFS (if using PC-NFS to run 1-2-3)

_____sco386-101 (standard pc-101 keyboard for SCO systems)

_____sun (Sun-type3 or Sun-type4)

_____sysV386-101 (standard pc-101 keyboard for System V systems)

_____vt100 (only DEC model)

_____vtxxx (for VT2xx, VT3xx, or Wyse 85)

_____wyse-pce (Wyse 350 or 60 with pce keyboard)

_____wyse50 (Wyse 50 or 150 terminals with Wyse 60 keyboards)

_____Other, specify _____

Base directory for 1-2-3:

_____System default specified by system administrator

_____Other, specify _____

Print spooler:

_____System default specified by system administrator

_____Other, specify _____

Spooler options:

_____System default specified by system administrator

_____Other, specify _____

Printers:

_____System defaults specified by system administrator

Other, specify one or more (up to 16) of the following:

_____Apple LaserWriter

_____Apple LaserWriter Plus
_____Times/Helvetica_____ITC

Epson series, as follows:

_____Epson FX

_____Epson MX

_____LQ 800/1000 with proportional text

_____LQ 800/1000 with monospace text

_____LQ 1500 with proportional text

_____LQ 2500 with proportional text

_____LQ 2500 with monospace text

_____Color option
_____Proportional _____Monospaced

Hewlett-Packard printers, as follows:

_____Hewlett-Packard LaserJet

_____Hewlett-Packard LaserJet+ or 500+
_____with added memory

_____Hewlett-Packard LaserJet Series II
_____with added memory

_____Hewlett-Packard PaintJet
_____paper_____transparency

Hewlett-Packard font cartridges for LaserJet series, as follows:

_____None

_____92286Z Microsoft 1A cartridge

_____92286J Math Elite cartridge

_____92286F TmsRmn2 cartridge

Sun printers, as follows:

_____Sun LaserWriter

_____Sun LaserWriter Plus
    _____Times/Helvetica _____ITC

Generic line printer, as follows:

_____Generic printer (only text not graphics)
        _____backspacing____no backspacing

Graphics driver:

_____Enhanced Graphics Adapter (EGA)
        _____80 x 25 ____color ___plasma ____monochrome
        _____80 x 43 ____color ___plasma ____monochrome

_____SunRiver Fiber Optic Station with EGA
        _____80 x 25 ____color ___plasma ____monochrome
        _____80 x 43 ____color ___plasma ____monochrome

_____64K Color EGA Adapter

_____Hercules Graphics Card
        _____80 x 25
        _____90 x 43

_____Video Graphics Array (VGA)
        _____80 x 25 ____color ____monochrome
        _____80 x 34 ____color
        _____80 x 43 ____monochrome
        _____80 x 60 ____color

_____SunRiver Fiber Optic Station with VGA
        _____80 x 25 ____color ____monochrome
        _____80 x 34 ____color
        _____80 x 43 ____monochrome
        _____80 x 60 ____color

Display Character Set:

_____US ASCII

_____ISO Latin 1

_____Other, specify _____

Country Driver:

_____System default specified by system administrator

_____USA English

_____Other, specify _____

Country Driver (Sort Order:)

_____System default specified by system administrator

_____Numbers first

_____Numbers last

_____ASCII

File System Character Set:

_____US ASCII

_____ISO Latin 1

_____Other, specify _____

Language for menus and prompts:

_____System default specified by system administrator

_____USA English

_____Other, specify _____

Language for Help text:

_____System default specified by system administrator

_____USA English

_____Other, specify _____

File mode:

_____System default specified by system administrator

_____UNIX file name mode

_____DOS Uppercase file name mode

_____DOS Lowercase file name mode

Chapter 2
Customizing 1-2-3 with setup123

Before you can use 1-2-3, the system administrator must install 1-2-3 and configure it with **setup123**. If your system administrator runs **setup123 -s** to specify the system defaults, you do not need to run **setup123** to create your configuration file. You use the system defaults. To set personal options, you can run the **setup123** utility. 1-2-3 uses your configuration file each time you run 1-2-3. This chapter describes **setup123** and guides you through the steps to use it.

When the system administrator runs **setup123**, he or she specifies the system defaults for the printers, equipment, drivers, and languages to use with 1-2-3. The system default values are the configuration settings recommended by your system administrator or that are required by your hardware. Lotus recommends that you use the defaults that your system administrator set for those items that are not hardware-specific. This provides consistent configurations for all users of 1-2-3 at your site and simplifies support for all users. The system administrator usually sets up defaults for the most common user hardware configuration. If your configuration differs from the system defaults, you may want to run **setup123.**

setup123 and Command-Line Options

Use command-line options with **setup123** to specify a different configuration for that 1-2-3 session or to customize configuration settings. Complete details about using command-line options to configure 1-2-3 are provided in Chapter 2 of *Introducing 1-2-3 for System V*. Any user can specify the following options with **setup123** (except for the **-s** and **-u** options).

- Use **-b** to specify a different base directory

- Use **-k** to specify a different keyboard database

- Use **-p** to select the printer spooler

- Use **-s** to configure system defaults (only root)

- Use **-u** to create or modify **.1123set** file for a specified user

What's Next?

Follow the instructions on your screen to complete **setup123**. Usually, **setup123** displays all the information you need. If you need more information about a specific screen, try one of the following:

- Press **?** (question mark) to see a Help screen related to the step you are completing in **setup123**.

- Read the sections that follow in this manual. Each section heading corresponds to a screen title in **setup123**. The sections appear in the same order as the **setup123** screens.

Selecting All the setup123 Options

This section describes the options that you specify when you run **setup123.** The following table briefly describes the available options.

Setup Option	Explanation
Printer	Specifies the printers, fonts, print interfaces, and print options available to 1-2-3.
Graph driver	Specifies the display driver for graphs, if you choose to display graphs with 1-2-3.
Display Character Set	Specifies the character set for your selected language.
Country driver	Specifies the driver that formats dates, times, different numeric separators, currency symbols, and collation sequences used with 1-2-3.
Sort Order	Specifies the order that the system sorts information with 1-2-3.
File System Character Set	Specifies the file system format for input or output of data.
Resource Language	Specifies the language for 1-2-3 menus and prompts.
Help Language	Specifies the language for 1-2-3 Help text.
File name mode	Specifies the file naming convention for 1-2-3.
Keyboard	Specifies the keyboard you use with 1-2-3.

To specify your configuration settings, you select items from menus. Before you begin making selections, read the following table to become acquainted with the keys you use in the **setup123** screens. If the **TERM** environment variable is properly set, the arrow keys (**DOWN** and **UP**) move the cursor, otherwise, use **d** or **u** to move the cursor.

Key	Action
Space bar	Returns to the previous screen.
d or **DOWN**	Moves menu pointer down one line.
u or **UP**	Moves menu pointer up one line.
?	Shows a Help screen.
*	Shows current configuration selections.
RETURN	Selects a highlighted choice.
CTRL-C	Returns to main menu.

Starting setup123

To start **setup123**, do the following:

1. Type the following at the shell prompt and press **RETURN**.

   # setup123

   If you are a system administrator and want to configure system-wide defaults for all 1-2-3 users on a multiuser system, use the **-s** option with the **setup123** command.

   If your **PATH** variable is defined to include the path for **setup123,** the utility begins by displaying an introductory screen. The default destination directory (**<dest>**) is **/usr.**

   If your **PATH** environment variable does not include the path for **setup123**, start **setup123** by specifying the full path name for **setup123**. Your system administrator can tell you the path name for **setup123** and how to define your **PATH** variable correctly, for example:

   # <dest>/lotus/123.v10/sysV386/bin/setup123

   If you select an alternate path for **setup123** during the installation procedure and the alternate path is in your search path, type the following at the shell prompt and press **RETURN:**

   # setup123

2. Press **RETURN** to execute **setup123.**

```
                              Setup123
                   Setup Program for 1-2-3 for System V
     Lotus

                        Lotus Development Corporation
     Setup                    Copyright 1990


                  The setup123 program specifies equipment, file directories,
                  and languages that you can use with 1 2 3 for System V.

                  Specify choices by highlighting displayed opti  s and
                  pressing RETURN.

                  When you highlight an option, a description that
                  corresponds to that option appears. You can display
                  Help at any time by pressing the question mark (?).



                            Press RETURN to continue
```

Figure 2-1. *The setup123 startup screen*

3. Press RETURN to display the Main Menu.

```
                            M A I N   M E N U

     Use u, d, or arrow keys to move cursor

            Select All Setup123 Options        Choose Select All Setup123
            Change Selected Options             Options for a guided path
                                                through the setup procedure.
            End Setup Program                   Use this option to specify all
                                                the setup123 options.



        u, d, or arrow keys   Move cursor    ?    Show a Help screen

        RETURN   Select a highlighted choice *    Show currrent selections
```

Figure 2-2. *The setup123 Main Menu*

Main Menu

You can choose from one of three options in the Main Menu:
Select All Setup123 Options, Change Selected Options,
and **End Setup Program.**

- Choose **Select All Setup123 Options.** A series of
  screens are displayed. Make your selections on each screen
  and press RETURN to continue.

The following sections correspond to the screens you use to complete **Select All Setup123 Options**.

Viewing Current Selections

While you are using **setup123**, you can display a screen that lists the current configuration settings by pressing * (asterisk). You might want to begin your session with **setup123** by displaying the current settings.

The overview screen shows the selected sample configuration settings for printers, graph driver, country driver, resource language, help language, file name mode, and keyboard. The following sample configuration may be displayed on this screen:

- Printers, such as **Apple LaserWriter Plus** and **HP LaserJet**

- Graph driver, such as **VGA color 80 x 25**

- Country driver, resource language, and help language, such as **USA-English**

- Display character set for system and file system, such as **US ASCII**

- Default file name mode, such as **UNIX file name mode**

- Default keyboard, such as **sco386-101.**

The default printer interface, **lp -c -d{dest} {file}**, is displayed when you run **setup123** with the **-p** option. Printer selections are numbered. The numbers correspond to the order in which you select the equipment, with number 1 indicating your default.

If you have not completed making your selections, **setup123** displays **None** or **Default** next to each option for which no selection has been made.

None   appears next to those options that you or the system administrator did not select. Usually, **None** appears next to graphics driver and printer because the system administrator cannot make a selection that is correct for all users.

`Default`   appears next to an option for which `setup123` can substitute the value of a System V environment variable. For example, if you make no selection for keyboard, `setup123` can use the keyboard that is defined by **TERM** as the default keyboard selection.

Printer Selection Screen

This screen asks if you want to use a printer with 1-2-3. If you select **Yes**, `setup123` continues to the next Printer Selection screen. If you select **No**, `setup123` continues with Graph Driver Selection.

If you decide to change your printer models after you have finished selecting them, press SPACE BAR until the screen described above is displayed and choose **No**. (Press SPACE BAR to redisplay the previous option screen, for example, the Printer Selection or Graph Driver Selection screens, in `setup123`.) When you choose **No**, `setup123` clears any printer selections you have made and continues to the Graph Driver Selection screen. You can then press SPACE BAR again to return to the Printer Selection screen, select **Yes** and select the printers you want to use.

Printer Selection (Manufacturer)

You need to select a printer manufacturer, for example, **Apple** or a class of printers (**Generic** line printers) When you select a printer manufacturer, `setup123` may display additional screens that ask you to select a printer model, model series, font cartridge, or printer capability. Select the printer you use most often first because 1-2-3 uses your first selection as your default printer. Before you can select additional printers, you must complete the selection of each printer model. See the configuration chart in Chapter 1 for a complete list of information.

To select a printer manufacturer, highlight your choice and press RETURN.

If your printer is not listed, select **Generic** or the manufacturer of the printer your printer emulates. If you are not sure what manufacturer or model your printer emulates, check your printer manual or ask your system administrator.

NOTE   If you select **Generic**, you cannot print graphs.

Printer Selection (Model)

This screen prompts you to select your printer model series or printer model. To select a printer model, highlight your choice and press RETURN.

- A printer model series is the group in which a printer belongs. For example, **Epson** manufactures many different styles of LQ printers.

- A printer model is a specific type of printer. For example, the **Epson LQ 800/1000 with proportional text** is a specific model of a printer within the LQ series.

Printer Selection (Font Cartridge)

This screen is displayed when you select the **Apple Laser-Writer Plus** or **Sun LaserWriter Plus** printer. You select the font that you want to use for your selected printer. To select a font, highlight your choice and press RETURN. When you select other printers, for example, **HP LaserJet** series printer, you may be prompted for more information such as different fonts or paper.

Printer Selection (Printer Capability)

This screen is displayed after you select **Generic** and **Generic Printer**. You can indicate whether your selected printer supports backspacing. To select a printer capability, highlight your choice and press RETURN.

A final Printer Selection screen is displayed and you can select another printer by selecting **YES** and pressing RETURN. You can select up to sixteen printers. The default answer is **NO**. Press RETURN to continue to the Graph Driver Selection screen.

| NOTE | Press CTRL-D to delete a selected printer. Press SPACE BAR to return to the first Printer Selection screen. Remember to save your changes before you exit **setup123**.

Graph Driver Selection

The first screen asks if you want to display graphs with 1-2-3. If you select **Yes**, **setup123** continues to the next Graph Driver Selection screen. If you select **No**, **setup123** continues with Display Character Set Selection screen.

If you decide to change your graph driver model after you select it, press SPACE BAR until the above screen is displayed and choose **No**. Select **Yes** to complete your graph driver selection procedure.

Graph Driver Selection (Manufacturer and Model)

The graph driver selection determines the device that allows your terminal to display graphs. Press RETURN to select the highlighted graph driver. To select a different graph driver, highlight your choice, for example, **Video Graphics Array**, and press RETURN.

Depending on the driver that you selected, you may specify additional settings, such as the size of the screen, for example, **80 x 25**, or the display style, for example, **color** or **plasma**.

Display Character Set

You can indicate the character set that you want to use with 1-2-3. Press RETURN to select the highlighted display character set, for example, **US ASCII** if you use a 7-bit character set for your system and terminal.

Country Driver

The country driver selection determines the international settings 1-2-3 uses, including the collating or sorting sequence. Press RETURN to select the highlighted country driver, for example, **USA-English**. To select a different country driver, highlight your choice and press RETURN.

In the next Country Driver screen, press RETURN to select the highlighted sorting order, for example, **Numbers First**. To select a different sorting order, highlight your choice and press RETURN.

File System Character Set

You indicate the character set that you want to use to import data from external files (non-1-2-3 files) and to print to text files. Press RETURN to select the highlighted display character set, for example, **US ASCII** if you use a 7-bit character set for your file system and printer.

Resource Language

The resource language selection determines the language used to display menus and prompts. Press RETURN to select the highlighted resource language. To select a different resource language, press SPACE BAR to highlight your choice and press RETURN.

Help Language

The Help language selection determines the language used to display Help text. Press RETURN to select the highlighted Help language. To select a different Help language, highlight your choice and press RETURN.

File Name Mode

The file name mode selection determines whether the files that you work with in 1-2-3 must adhere to UNIX file specifications or to DOS file specifications. Additionally, you can select all uppercase letters or all lowercase letters for DOS file mode. Press RETURN to select the highlighted file mode. A complete discussion of file mode selection is provided in Chapter 1 of *User Reference*.

To select a different file mode, highlight your choice and press RETURN.

Keyboard

The keyboard selection determines how pointer-movement and function keys work. Lotus recommends choosing the keyboard you use most often with 1-2-3. The keyboard you specify must exist in your keyboard database before you start 1-2-3. Enter your keyboard selection and press RETURN.

For example, select `sco386-101` if you are running SCO UNIX or XENIX on your system and using a pc–101 keyboard.

Check the Release Notes for the latest changes.

Setup Successful

After you complete your configuration selections, `setup123` displays this screen. When you press RETURN, `setup123` displays an Exit screen. You can then choose to end the utility or return to the Main Menu screen. Unless you need to make any changes, end `setup123`. As you end the utility, `setup123` saves your selections in a file called `.l123set`. If you run `setup123` with the `-s` option as a system administrator, this configuration file is saved in the `<dest>/lotus/123.v10` directory on a single or a multiuser system. When an individual user runs `setup123`, it is saved in the user's home directory. 1-2-3 uses this file every time you start 1-2-3. The `.l123set` file in a user's home directory overrides any system version of this file.

To change specific configuration settings, select `Return to Main Menu`. The main menu displays the list of configuration options and allows you to save your changes.

You are now finished with the configuration procedure and you are ready to start using 1-2-3. If you want to change your keyboard layout, read Chapter 3, which describes how to use `keyedit`.

The Setup Successful screen also indicates that you need to define several shell variables correctly before you begin to use 1-2-3. Define the **TERM**, the **PATH** and the **MANPATH** environment variables in your **.login** or **.profile** file.

Changing Your setup123 Selection

After you run **setup123, setup123** uses your selections to configure 1-2-3. For example, you specified the drivers, the keyboard, and the file mode you want to use with 1-2-3. After making these selections, **setup123** saves them in a file called **.1123set** in your home directory, which 1-2-3 uses every time you start 1-2-3.

You can use **setup123** as many times as you need to change the selections you use with 1-2-3. For example, you can change a printer selection or change the keyboard that you previously selected.

When you run **setup123** (specifically, the first time) and do not complete all your selections or save your selections, the file **.1123set** file is created and saved in your (the user's) **$HOME** directory. If system defaults are available, they are copied to the file in your home directory. If system defaults are not available, the defaults (the first option on each **setup123** screen) are copied to the file in your home directory.

Before you change your selections, make sure that you complete your configuration chart in Chapter 1. When you change hardware, remember to make the appropriate changes to the chart.

Main Menu

To change **setup123** selections, you can select either **Change Selected Options** or **Select All Setup123 Options** in the main menu.

- If you want to make only a minor change to your **.1123set** file, select **Change Selected Options**. You can then select the option that you want to change from a list, save the current options, or return to the main menu.

- If you need to change all or most of the selections in your `.1123set` file, use `Select All Setup123 Options`. For complete information about choosing this option, read the section "Selecting All setup123 Options" found earlier in this chapter.

Change Selected Options

Use the `Change Selected Options` menu to choose the selection you want to modify and then save the changes to the `.1123set` file. You can select from the following options:

`Return to Main Menu`	lets you return to Main Menu.
`Save Changes`	lets you save all the changes that you made to `.1123set` file.
`Change Selected Printer`	lets you add or delete a selected printer.
`Change Selected Display`	lets you choose a different graphics driver or to display a different character set.
`Change Selected Country`	lets you choose a country driver, sorting order, resource language, or help language.
`Change Selected File Name Mode`	lets you choose a different file name mode.
`Change Selected Keyboard`	lets you choose a different keyboard to use with 1-2-3.

Remember that you can press ＊ (asterisk) to view the current selections. The procedure to change a selected option is the same as making a selection for it the first time. For details about changing a selection, read the section that corresponds to that option in "Selecting All setup123 Options."

Exit

If you have not saved your changes, `setup123` prompts you to do so. Select `Yes` if you want to save your changes or select `No` if you want to end `setup123` without saving your changes.

The `setup123` utility asks you to confirm that you want to end `setup123`. Select `No` to return to the Main Menu or select `Yes` to end the `setup123` utility.

Chapter 3
Customizing Your Keyboard with keyedit

You can use 1-2-3 without first using `keyedit`, but you must run `setup123` before you run `keyedit`. As you use 1-2-3, you may discover that the initial definitions of pointer-movement, function, and named macro keys specified by Lotus for your keyboard are inconvenient or are inadequate for your needs. Use `keyedit` to change the definition for these keys and customize the keyboard layout for the keyboard you use with 1-2-3.

Default Keyboard Definitions

If you use a PC to run *1-2-3 for System V*, you are most likely using a version of the 101-key PC AT keyboard (for example, specify `sco386-101` in `setup123` utility). Lotus distributes default definitions for pointer-movement, function, and named macro keys for each of these keyboards listed in `setup123` keyboard selection screen.

If you are using a different keyboard with 1-2-3, you can run `keyedit` to display and review the default definitions of keys for your keyboard.

Starting keyedit

To start `keyedit`, do the following:

1. Type the following at the shell prompt and press RETURN.

   # keyedit

   If your PATH system variable is defined to include the path for `keyedit`, the keyedit Editor screen is displayed.

If you did not update your **PATH** variable, do so now or reissue the command to start **keyedit** and specify the full path name for **keyedit**. Your system administrator can tell you the path name for **keyedit** and how to define the **PATH** variable correctly in your **.login** or **.profile** file. The **keyedit** file is located in the following directory:

```
<dest>/lotus/123.v10/sysV386/bin
```

2. Press RETURN (or some other control key that you want to use as RETURN) to begin the program.

   The **keyedit** utility displays the **keyedit** screen for your selected keyboard. The sample screens in this chapter are the screens that display when you selected **sco386-101** in the **setup123** utility.

The key information that is listed in **keyedit** is determined by the keyboard that you specified in **setup123**. If you do not want to use the specified keyboard and its corresponding keymap, you can use a keyedit command-line option to redefine the directory or keyboard. You can use the following options on the command line as you start the **keyedit** utility to specify:

- Use **-d** to indicate an alternate keymaps directory that you want to edit during the current **keyedit** session.

- Use **-k** to indicate the keyboard type that you want to use during the current **keyedit** session.

When you do not specify an option on the command line, **keyedit** uses the default keyboard and default keymap database selected during **setup123**.

The keyedit Screen

Each time you start **keyedit,** a screen similar to the one shown in the following figure appears. The specific keyboard database that appears depends on the keyboard you selected with **setup123.** or if you made no selection, on the terminal defined with your **TERM** system variable. The **keyedit** utility allows you to select the keyboard that you want to work with. The keyboard displayed on the **keyedit** screen is called the selected or current keyboard. Before you go any further, become acquainted with the parts of the **keyedit** screen.

Figure 3-1. *The keyedit screen*

1-2-3 Function

A **1-2-3 function** is a 1-2-3 function key assignment or pointer-movement key direction for which you can define a different key or combination of keys. Defining a different key for a 1-2-3 function changes the key you press to invoke that 1-2-3 function. For example, for an **sco386–101** keyboard, the 1-2-3 HOME function is defined as the HOME key. Whenever you press HOME while you are using 1-2-3, you invoke the 1-2-3 HOME function, which moves the cell pointer to cell A1.

1-2-3 functions are arranged in logical groups. Pointer-movement keys (for example, HOME and NEXT SHEET) appear first, special keys (such as ESC. RETURN, and SCROLL LOCK) appear second, function keys (such as CALC and GRAPH) appear third, and keys for named macros (for example, MAC-A for the macro named \A) appear last.

The first column of the keyboard display area displays the 1-2-3 functions for the selected keyboard. You cannot edit this column.

1-2-3 Key

A **1-2-3 key** is the legend for the key on an IBM PC-style keyboard that invokes a specific 1-2-3 function. For example, **F1** is the 1-2-3 key for the 1-2-3 function **HELP**; **CTRL-A/PG UP** are the 1-2-3 keys for the 1-2-3 function **NEXT SHEET**.

The second column of the keyboard display area displays the 1-2-3 keys for the selected keyboard. You cannot edit this column.

Cell Pointer

The cell pointer is the highlighted rectangle currently in the Key Name cell for the first 1-2-3 function listed for the selected keyboard. You move the cell pointer to the cell that you want to copy, edit, or delete. The cell that contains the cell pointer is called the current cell.

Control Panel

The control panel is located at the top of the screen, above the keyboard database display area. It displays cell information, commands, descriptions of commands, prompts, and the mode in which **keyedit** is operating.

Currently, the control panel displays two items. On the left are the contents of the current cell, which is the Key Name definition (**HOME**) of the 1-2-3 function (**HOME**) for the selected keyboard (**sco386–101**). When you move the cell pointer, the contents change to reflect the cell pointer's new location.

On the right is the mode indicator, which describes the current 1-2-3 mode of operation. As you work, the mode indicator changes to show, for example, that you are editing a definition or making an error. The mode indicator now displays **READY**, showing that **keyedit** is ready for you to select a command or enter data.

Key Name

Usually, a key name is the key legend on a terminal or work-station keyboard that invokes a specific 1-2-3 function. Key name can be any text that describes the keys you press to invoke a 1-2-3 function.

The third column of the keyboard display area displays the key names for the selected keyboard. When you change the definition of a 1-2-3 function, you change the key name for that function.

Key Output

The key output column indicates the escape codes generated by the keyboard when you press the key (or combination of keys) that invokes a specific 1-2-3 function. When you press a key, 1-2-3 reads the key output to determine the specific 1-2-3 function to perform.

The fourth column of the keyboard display area displays the key output for the selected keyboard. When you change the definition of a 1-2-3 function, you change the key output for that function. The \E symbol represents the ESCAPE character and the ^ (caret) character represents a control character, such as ^N (CONTROL-N).

Key Summary

To change the definitions of 1-2-3 functions for a selected keyboard, you select items from menus. Before you begin editing definitions, read the following table to become acquainted with the keys you can use. Depending on the type of keyboard that you are using, you can also use the cursor keys to move the menu pointer on the screen.

Key	Action
Space Bar	Moves menu pointer among menu options and erase an error message.
?	Displays a Help screen.
e	Edits the definition of the highlighted line (same as /Edit)
d	Moves menu pointer down one line.
u	Moves menu pointer up one line.
n	Shows next screen for the selected keyboard.
p	Shows previous screen for the selected keyboard.

Key	Action
RETURN	Selects a highlighted menu option or enters a typed entry.
CTRL-C (SIGINT)	Interrupts current activity and returns to previous activity. Note that the SIGINT function may be assigned to another key on your terminal.
/ (slash)	Displays the keyedit menu.

keyedit Commands

The **keyedit** commands modify the definitions of 1-2-3 functions for a selected keyboard.   1-2-3 functions are function key assignments and pointer-movement key directions. By changing the definitions of these functions, you can change the layout of the selected keyboard.

The **keyedit** commands perform the following tasks:

Command	Task
/Copy	Creates an additional definition of the highlighted 1-2-3 key.
/Delete	Erases the definition of the highlighted 1-2-3 key.
/Edit	Changes the definition of the highlighted 1-2-3 key.
/Goto	Moves the cell pointer to the specified row number.
/Open	Retrieves the specified keyboard map.
/Print	Prints the selected keyboard map to a text file.
/Quit	Returns to the shell prompt.
/Redo	Changes the definitions of several 1-2-3 keys for the selected keyboard.
/Save	Saves the current definitions for the selected keyboard.
/Zap	Erases all the definitions for the selected keyboard.

Common Uses for Keyedit Commands

The `keyedit` commands let you customize the keyboard layout for a selected keyboard. For example, you can do any of the following:

- Edit the definition of one key at a time for the selected keyboard (/Edit).

- Edit the definitions of several keys continuously for the selected keyboard (/Redo).

- Create all new definitions for the selected keyboard (/Zap followed by /Redo).

- Create multiple definitions of a 1-2-3 function (/Copy).

/Copy

/Copy creates a duplicate definition of the highlighted 1-2-3 function. You can then change this definition of the 1-2-3 function. Use /Copy to have different keys perform the same 1-2-3 function. For example, you can define the 1-2-3 function **GRAPH** to the keys **F10** and **ALT-F10**. Then, when you use 1-2-3, you can press either **F10** or **ALT-F10** to display a graph.

You can make as many copies as you need of a 1-2-3 function.

Procedure

1. Highlight the 1-2-3 function whose definition you want to duplicate.

   The 1-2-3 function and Key Name appear in line two of the control panel.

```
{PG LEFT}: Ctrl F Tab                                    Line 10 of 95 READY

      1-2-3 Function  1-2-3 Key      Key Name             Key Output
 1    {HOME}          Home           Home                 \ECH
 2    {END}           End            End.                 \ECF
 3    {UP}            Up Arrow       Up Arrow             \ECA
 4    {DOWN}          Down Arrow     Down Arrow           \ECB
 5    {LEFT}          Left Arrow     Left Arrow           \ECD
 6    {RIGHT}         Right Arrow    Right Arrow          \ECC
 7    {PG UP}         Pg Up          PgUp                 \ECI
 8    {PG DN}         Pg Dn          PgDn                 \ECG
 9    {PG LEFT}       Ctrl-Left      Ctrl-A Left Arrow    ^A\ECD
10    {PG LEFT}       Ctrl-Left      Ctrl-F Tab           ^F\t
11    {PG RIGHT}      Ctrl-Right     Ctrl-A Right Arrow   ^A\ECC
12    {NEXT SHEET}    Ctrl-Pg Up     Ctrl-A Pg Up         ^A\ECI
13    {PREV SHEET}    Ctrl-Pg Dn     Ctrl-A Pg Dn         ^A\ECG
14    {FIRST CELL}    Ctrl-Home      Ctrl-A Home          ^A\ECH
15    {FILE}          Ctrl-End       Ctrl-A End           ^A\ECF
16    {TAB}           Tab            Tab                  \t
17    {BACKSPACE}     Backspace      Backspace            \b
                      d=Down  u=Up  n=Next page  p=Previous page  e=Edit  /=Menu
      sco386-101                                                           ?=Help
```

Figure 3-2.   *Use /Copy to duplicate a definition*

2. Choose /Copy.

   The duplicate definition appears immediately below the
   original definition and appears highlighted.

```
{PG LEFT}: Ctrl-F Tab                                    Line 11 of 96 READY

      1-2-3 Function  1-2-3 Key      Key Name             Key Output
 1    {HOME}          Home           Home                 \ECH
 2    {END}           End            End                  \ECF
 3    {UP}            Up Arrow       Up Arrow             \ECA
 4    {DOWN}          Down Arrow     Down Arrow           \ECB
 5    {LEFT}          Left Arrow     Left Arrow           \ECD
 6    {RIGHT}         Right Arrow    Right Arrow          \ECC
 7    {PG UP}         Pg Up          PgUp                 \ECI
 8    {PG DN}         Pg Dn          PgDn                 \ECG
 9    {PG LEFT}       Ctrl-Left      Ctrl-A Left Arrow    ^A\ECD
10    {PG LEFT}       Ctrl-Left      Ctrl-F Tab           ^F\t
11    {PG LEFT}       Ctrl-Left      Ctrl-F Tab           ^F\t
12    {PG RIGHT}      Ctrl-Right     Ctrl-A Right Arrow   ^A\ECC
13    {NEXT SHEET}    Ctrl-Pg Up     Ctrl-A Pg Up         ^A\ECI
14    {PREV SHEET}    Ctrl-Pg Dn     Ctrl-A Pg Dn         ^A\ECG
15    {FIRST CELL}    Ctrl-Home      Ctrl-A Home          ^A\ECH
16    {FILE}          Ctrl-End       Ctrl-A End           ^A\ECF
17    {TAB}           Tab            Tab                  \t
                      d=Down  u=Up  n=Next page  p=Previous page  e=Edit  /=Menu
      sco386 101                                                           ?=Help
```

Figure 3-3.   *With /Copy, you can have different keys perform
the same 1-2-3 function*

You can now enter the definition for the highlighted function.

/Delete

/Delete erases the definition of the highlighted 1-2-3 function. Use /Delete to erase the definition of a 1-2-3 function for one function at a time. If you want to erase the definition of another 1-2-3 function, you must choose /Delete again.

If you want to delete all the definitions for the selected keyboard, use /Zap.

Procedure

1. Highlight the 1-2-3 function whose definition you want to delete.

   The 1-2-3 function and Key Name appear in line two of the control panel.

2. Choose /Delete.

   The **keyedit** utility removes the highlighted 1-2-3 definition from the selected keyboard database and renumbers subsequent definitions.

/Edit

/Edit changes the definition of the highlighted 1-2-3 function. Use /Edit to change the definition of a 1-2-3 function one function at a time. If you want to change the definition of another 1-2-3 function, you must highlight that function and choose /Edit again.

If you need to change several definitions and those definitions are listed contiguously, you can make your changes faster if you use /Redo.

Procedure

1. Highlight the 1-2-3 function whose definition you want to change.

   The 1-2-3 function and key name appear in line two of the control panel.

```
{PG LEFT}: Ctrl-F Tab                                    Line 10 of 95 READY

        1-2-3 Function  1-2-3 Key     Key Name           Key Output
   1    {HOME}          Home          Home               \ECH
   2    {END}           End           End                \ECF
   3    {UP}            Up Arrow      Up Arrow            \ECA
   4    {DOWN}          Down Arrow    Down Arrow          \ECB
   5    {LEFT}          Left Arrow    Left Arrow          \ECD
   6    {RIGHT}         Right Arrow   Right Arrow         \ECC
   7    {PG UP}         Pg Up         PgUp                \ECI
   8    {PG DN}         Pg Dn         PgDn                \ECG
   9    {PG LEFT}       Ctrl-Left     Ctrl-A Left Arrow   ^A\ECD
  10    {PG LEFT}       Ctrl-Left     Ctrl-F Tab          ^F\t
  11    {PG RIGHT}      Ctrl-Right    Ctrl-A Right Arrow  ^A\ECC
  12    {NEXT SHEET}    Ctrl-Pg Up    Ctrl-A Pg Up        ^A\ECI
  13    {PREV SHEET}    Ctrl-Pg Dn    Ctrl-A Pg Dn        ^A\ECG
  14    {FIRST CELL}    Ctrl-Home     Ctrl-A Home         ^A\ECH
  15    {FILE}          Ctrl-End      Ctrl-A End          ^A\ECF
  16    {TAB}           Tab           Tab                 \t
  17    {BACKSPACE}     Backspace     Backspace           \b
                        d=Down  u=Up  n=Next page  p=Previous page  e=Edit  /=Menu
   sco386-101                                                               ?=Help
```

Figure 3-4. *Use /Edit to change the definition of a 1-2-3 function one function at a time*

2. Choose /Edit.

   The cursor appears under the first character of the key name in line two and the mode indicator changes to EDIT.

```
{PG LEFT}: Ctrl-F Tab                                    Line 10 of 95 EDIT

        1-2-3 Function  1-2-3 Key     Key Name           Key Output
   1    {HOME}          Home          Home               \ECH
   2    {END}           End           End                \ECF
   3    {UP}            Up Arrow      Up Arrow            \ECA
   4    {DOWN}          Down Arrow    Down Arrow          \ECB
   5    {LEFT}          Left Arrow    Left Arrow          \ECD
   6    {RIGHT}         Right Arrow   Right Arrow         \ECC
   7    {PG UP}         Pg Up         PgUp                \ECI
   8    {PG DN}         Pg Dn         PgDn                \ECG
   9    {PG LEFT}       Ctrl-Left     Ctrl-A Left Arrow   ^A\ECD
  10    {PG LEFT}       Ctrl-Left     Ctrl-F Tab          ^F\t
  11    {PG RIGHT}      Ctrl-Right    Ctrl-A Right Arrow  ^A\ECC
  12    {NEXT SHEET}    Ctrl-Pg Up    Ctrl-A Pg Up        ^A\ECI
  13    {PREV SHEET}    Ctrl-Pg Dn    Ctrl-A Pg Dn        ^A\ECG
  14    {FIRST CELL}    Ctrl-Home     Ctrl-A Home         ^A\ECH
  15    {FILE}          Ctrl-End      Ctrl-A End          ^A\ECF
  16    {TAB}           Tab           Tab                 \t
  17    {BACKSPACE}     Backspace     Backspace           \b
                        d=Down  u=Up  n=Next page  p=Previous page  e=Edit  /=Menu
   sco386 101                                                               ?=Help
```

Figure 3-5. *The current definition of a key name appears in the control panel.*

3. Enter the new key name for the function you are editing and press RETURN. To keep the current key name, press RETURN.

To enter a key name, type the entry as you do for any text entry. For example, if you want the key name to be Help, type Help.

When you press RETURN. the current definition of key output appears next to the key name in line 2 of the control panel.

```
{PG LEFT}: Ctrl-F Left Arrow                              Line 10 of 95 EDIT
Key Output: ^F\ECD_

         1-2-3 Function  1-2-3 Key      Key Name            Key Output
  1      {HOME}          Home           Home                \ECH
  2      {END}           End            End                 \ECF
  3      {UP}            Up Arrow       Up Arrow            \ECA
  4      {DOWN}          Down Arrow     Down Arrow          \ECB
  5      {LEFT}          Left Arrow     Left Arrow          \ECD
  6      {RIGHT}         Right Arrow    Right Arrow         \ECC
  7      {PG UP}         Pg Up          PgUp                \ECI
  8      {PG DN}         Pg Dn          PgDn                \ECG
  9      {PG LEFT}       Ctrl-Left      Ctrl-A Left Arrow   ^A\ECD
 10      {PG LEFT}       Ctrl-Left      Ctrl-F Tab          ^F\t
 11      {PG RIGHT}      Ctrl-Right     Ctrl-A Right Arrow  ^A\ECC
 12      {NEXT SHEET}    Ctrl-Pg Up     Ctrl-A Pg Up        ^A\ECI
 13      {PREV SHEET}    Ctrl-Pg Dn     Ctrl-A Pg Dn        ^A\ECG
 14      {FIRST CELL}    Ctrl-Home      Ctrl-A Home         ^A\ECH
 15      {FILE}          Ctrl-End       Ctrl-A End          ^A\ECF
 16      {TAB}           Tab            Tab                 \t
 17      {BACKSPACE}     Backspace      Backspace           \b
                         d=Down  u=Up  n=Next page  p=Previous page  e=Edit  /=Menu
  sco386 101                                                                  ?=Help
```

Figure 3-6. *The current definition of a key output also appears in the control panel*

4. Enter the new key output for the function you are editing and press RETURN. To keep the current key output, press RETURN.

To enter a key output, press the key or combination of keys that you want to press to invoke the 1-2-3 function. For example, if you want to press F1 to invoke HELP, press F1 as the key output entry.

When you press RETURN, the new definitions for key name and key output (or the originals if you did not change them) are entered to the keyboard database, line two of the control panel displays the highlighted 1-2-3 function and key name, and the mode indicator changes to READY.

```
{PG LEFT}: Ctrl F Left Arrow                              Line 10 of 95 EDIT

         1-2-3 Function  1-2-3 Key      Key Name           Key Output
     1   {HOME}          Home           Home               \ECH
     2   {END}           End            End                \ECF
     3   {UP}            Up Arrow       Up Arrow            \ECA
     4   {DOWN}          Down Arrow     Down Arrow          \ECB
     5   {LEFT}          Left Arrow     Left Arrow          \ECD
     6   {RIGHT}         Right Arrow    Right Arrow         \ECC
     7   {PG UP}         Pg Up          PgUp               \ECI
     8   {PG DN}         Pg Dn          PgDn               \ECG
     9   {PG LEFT}       Ctrl-Left      Ctrl-A Left Arrow   ^A\ECD
    10   {PG LEFT}       Ctrl-Left      Ctrl-F Left Arrow   ^F\ECD
    11   {PG RIGHT}      Ctrl-Right     Ctrl-A Right Arrow  ^A\ECC
    12   {NEXT SHEET}    Ctrl-Pg Up     Ctrl-A Pg Up        ^A\ECI
    13   {PREV SHEET}    Ctrl-Pg Dn     Ctrl-A Pg Dn        ^A\ECG
    14   {FIRST CELL}    Ctrl-Home      Ctrl-A Home         ^A\ECH
    15   {FILE}          Ctrl-End       Ctrl-A End          ^A\ECF
    16   {TAB}           Tab            Tab                 \t
    17   {BACKSPACE}     Backspace      Backspace           \b
                          d=Down  u=Up  n=Next page  p=Previous page  e=Edit  /=Menu
    sco386-101                                                              ?=Help
```

Figure 3-7. *The keyboard database is updated with your new definition*

You can move to the next 1-2-3 function that you want to work with or save your work and exit **keyedit**.

All definitions for a selected keyboard must be unique. You cannot use the same definition for more than one 1-2-3 function. 1-2-3 would not be able to determine which 1-2-3 function to perform when you invoked a nonunique definition. For example, if you defined the 1-2-3 functions HELP and GRAPH to the key F1, 1-2-3 would not be able to determine whether to display Help text or a graph when you press F1. If you inadvertently define a duplicate definition, **keyedit** displays an error message.

/Goto

/Goto moves the cell pointer directly to the specified row number. Use /Goto to highlight the 1-2-3 function that you want to edit, copy, or delete. Row numbers appear vertically along the left-hand side of your screen.

The top right-hand corner of the screen indicates the row number of the highlighted row (where you are now) and total number of rows for the selected keyboard (the last row number).

Alternatively, you can use the pointer-movement keys to move the cell pointer. These keys are described earlier in this chapter.

Procedure

1. Choose /Goto.

   The **keyedit** utility prompts you for the row number to
   move to.

2. Enter the appropriate row number.

   The cell pointer moves directly to the specified row.

You can now edit, copy, or delete the highlighted 1-2-3
function.

/Open

/Open retrieves the specified keyboard database. Use /Open
to select the keyboard whose layout you want to change.
/Open replaces the current keyboard with the keyboard you
specify with /Open.

When you start **keyedit**, the keyboard database that appears
is the keyboard you selected with **setup123**, or if you made
no selection, it is the keyboard equivalent to the terminal
defined with the **TERM** shell variable. The name of the current
keyboard database appears in the bottom left-hand corner of
the screen.

You can also use /Open to reset the definitions for the selected
keyboard to the default definitions for that keyboard. For
example, if you change many definitions and realize those
changes are incorrect, or if you inadvertently use /Zap to
delete all the definitions, you can start over by choosing
/Open and specifying the same keyboard again.

Procedure

1. Choose /Open.

   The **keyedit** utility prompts you to specify the keyboard
   database to open and displays the name of the current
   keyboard database.

2. Enter the name of the keyboard database that you want to
   edit and press RETURN.

   The **keyedit** utility replaces the current keyboard data-
   base with the one you selected. The name of the selected
   keyboard appears in the bottom left-hand corner of the
   screen.

You can begin editing the selected keyboard as appropriate.

/Print

/Print allows you to save the definitions for the keyboard map that are displayed in a specified file. Use /Print to compare printed copies of the key definitions for different keyboard maps.

You can also use /Print when you want to reset the definitions for your keyboard to a previous definition. For example, print the default definitions before you make any changes to a key map, then you can change as many definitions as you want. Refer to the printed copy when you need to change a key or make a multiple definitions for a key.

Procedure

1. Choose /Print.

   The **keyedit** utility prompts you to specify the name of the print file.

2. Enter the name of the print file and press RETURN.

   The **keyedit** utility saves the key definition to the specified file.

/Quit

/Quit returns to the UNIX shell prompt. Use /Quit when you have completed your work with **keyedit.**

| CAUTION | Before you use /Quit, use /Save if you want to save your work.

Procedure

1. Choose /Quit.

   If you have saved your work, you return to the UNIX shell prompt.

2. Choose **No** to abandon the changes you made to the selected keyboard and exit **keyedit** or choose **Yes** to save your work before exiting **keyedit.**

   If you choose **No,** you return to the UNIX shell prompt.

   If you choose **Yes, keyedit** prompts you for the name of the keyboard map in which to save your changes and displays the name of the selected keyboard.

3. Press RETURN to save the changes with the displayed keyboard map name. You can also edit the displayed name or enter a new name and press RETURN to save the changes with a different keyboard map.

   When you press RETURN, your changes are saved and you return to the UNIX shell prompt.

/Redo

/Redo changes the definitions of several 1-2-3 functions for the selected keyboard. Use /Redo when you want to change the definitions of several 1-2-3 functions and those functions are listed contiguously. If the 1-2-3 functions that you want to change are interspersed with functions whose definitions that you want to keep, choose /Edit and make those changes one at a time. To complete all your changes, you may need to alternate between using /Redo and /Edit.

Procedure

1. Highlight the 1-2-3 function whose definition you want to change.

   The 1-2-3 function and key name appear in line two of the control panel.

2. Choose /Redo.

   The cursor appears under the first character of the key name in line two and the mode indicator changes to EDIT.

3. Enter the new key name for the function you are editing and press RETURN. To keep the current key name, press RETURN.

   To enter a key name, type the entry as you do for any text entry. For example, if you want the key name to be Help, type Help.

   When you press RETURN, the current definition of key output appears next to the key name in line 2 of the control panel.

4. Enter the new key output for the function you are editing and press RETURN. To keep the current key output, press RETURN.

   To enter a key output, press the key or combination of keys that you want to press to invoke the 1-2-3 function.

.

For example, if you want to press F1 to invoke HELP, press F1 as the key output entry.

When you press RETURN, the new definitions for key name and key output (or the originals if you did not change them) are entered to the keyboard map. Line two of the control panel displays the highlighted 1-2-3 function and key name, and the cell pointer moves to the next 1-2-3 function.

5. To edit the highlighted 1-2-3 function, repeat steps 3 and 4. To keep the current definition of the highlighted function and end /Redo, press CTRL-C.

The mode indicator changes to **READY**.

You can move to the next 1-2-3 function that you want to work with or save your work and exit **keyedit** .

All definitions for a selected keyboard must be unique. You cannot use the same definition for more than one 1-2-3 function. 1-2-3 would not be able to determine which 1-2-3 function to perform when you invoked a nonunique definition. For example, if you defined the 1-2-3 functions HELP and GRAPH to the key F1, 1-2-3 cannot determine whether to display Help text or a graph when you press F1. If you inadvertently define a duplicate definition, **keyedit** displays an error message.

/Save

/Save saves the current definitions for the selected keyboard. Use /Save both to create new databases and to update existing databases.

Since **keyedit** does not automatically save your work, you must use /Save to make a permanent copy of your work before you end a **keyedit** session. Also, you should save your work frequently so you do not lose work in the case of a power failure.

You can save your modified keymap file to a local directory or to a system default directory (assuming that you have write-access to it). To save your keymap file to a system default directory, name the file such that the first letter is a capital U and the remaining characters indicate your login name. For example, if your login name is marymartin, save your modified keymap file with the name **U_marymartin**.

Procedure

1. Choose /Save.

2. Press RETURN to save the changes with the displayed keyboard map name, or edit the displayed name or enter a new name and press RETURN to save the changes with a different keyboard map.

   When you press RETURN, your changes are saved with the specified name.

You can continue editing the selected keyboard database, open another keyboard database to edit, or exit **keyedit**.

/Zap

/Zap erases all the definitions for the selected keyboard. Use /Zap when you want to redefine all the 1-2-3 functions for the selected keyboard.

| CAUTION | Before using /Zap, you may want to use /Save to save the current definitions for the selected keyboard. You can use /Save to create a backup keyboard map.

Procedure

1. Choose /Zap.

2. Choose whether you want to save the keyboard database before you erase all the definitions.

   Choose **Yes** to save the keyboard map and then enter a name for the map you want to save.

   Choose **No** if you do not need to save the keyboard map.

   When you press RETURN, **keyedit** deletes the definitions of all the 1-2-3 functions for the selected keyboard. After you use /ZAP, you can redefine the 1-2-3 functions for the keyboard.

```
{HOME}: Home                                            Line 1 of 95  READY

        1-2-3 Function   1-2-3 Key       Key Name        Key Output
   1    {HOME}           Home
   2    {END}            End
   3    {UP}             Up Arrow
   4    {DOWN}           Down Arrow
   5    {LEFT}           Left Arrow
   6    {RIGHT}          Right Arrow
   7    {PG UP}          Pg Up
   8    {PG DN}          Pg Dn
   9    {PG LEFT}        Ctrl-Left
  10    {PG LEFT}        Ctrl-Left
  11    {PG RIGHT}       Ctrl-Right
  12    {NEXT SHEET}     Ctrl-Pg Up
  13    {PREV SHEET}     Ctrl-Pg Dn
  14    {FIRST CELL}     Ctrl-Home
  15    {FILE}           Ctrl-End
  16    {TAB}            Tab
  17    {BACKSPACE}      Backspace
                    d=Down  u=Up  n=Next page  p=Previous page  e=Edit  /=Menu
     sco386-101                                                          ?=Help
```

Figure 3-8.   *Use /Zap to erase all the definitions of the
selected keyboard*

Chapter 1
Building a 1-2-3 Worksheet

This chapter teaches you the basic skills you need to use 1-2-3. You will learn how to start 1-2-3, select commands, enter data, perform calculations with the data, format a worksheet, and print your work. Soon you will begin building your first **worksheet**, a grid that provides a structure for entering and calculating data, and storing and organizing information.

The worksheet you are going to build is an income statement for a company called Sloane Camera and Video. Using 1-2-3, you will enter net sales, costs, and expenses figures, and then you will calculate operating expenses and income for the store. When you have completed the chapter, the resulting worksheet will look like this:

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                          READY

  A        A           B           C           D           E           F
  1    INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3                    Q1          Q2          Q3          Q4          YTD
  4    ------------------------------------------------------------------------
  5    Net Sales   $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
  6    ------------------------------------------------------------------------
  7
  8    Costs and Expenses:
  9      Salary     2,000.00    2,000.00    2,000.00    2,500.00    8,500.00
 10      Int        1,200.00    1,400.00    1,600.00    1,600.00    5,800.00
 11      Rent         600.00      600.00      600.00      600.00    2,400.00
 12      Ads          900.00    2,000.00    4,000.00    4,500.00   11,400.00
 13      COG        4,000.00    4,200.00    5,000.00    8,000.00   21,200.00
 14    ------------------------------------------------------------------------
 15      Op Exp     8,700.00   10,200.00   13,200.00   17,200.00   49,300.00
 16    ------------------------------------------------------------------------
 17    Op Income   $3,300.00   $8,800.00   $2,800.00   $4,800.00  $19,700.00
 18
 19
  INC7.WK3
```

Lesson 1 Learning About 1-2-3

To use 1-2-3 effectively, you need to master some basic worksheet concepts and skills. In this lesson you will

- Start 1-2-3
- Identify the parts of a worksheet
- Move around a worksheet
- Use the 1-2-3 Help system

Starting 1-2-3

To start 1-2-3 with a blank worksheet, complete the following steps:

Type   123

Press   **ENTER**   *(The* **ENTER** *key on your terminal keyboard may be labeled* **ENTER, RETURN,** *or some other name.)*

NOTE   This tutorial is designed for 1-2-3 UNIX file mode, a feature that lets you specify and work with files according to UNIX file-naming conventions. If you selected DOS-upper or DOS-lower file mode as your default mode in **setup123**, use the following command line option to specify UNIX file mode:
$ 123 -f unix

NOTE   If you type 123 to start 1-2-3 and your system reports that it cannot find the 1-2-3 program, you should first check that your startup file (**.login**, **.profile**, or **.cshrc**) contains the correct search path for the 1-2-3 files. If you are not able to run 1-2-3 after modifying your search path, contact your system administrator.

An introductory screen then appears, followed by a blank 1-2-3 worksheet.

Identifying the Parts of a Worksheet

Each time you start 1-2-3, a blank worksheet appears that looks like the following screen. Before you go any further, get acquainted with the parts of a worksheet.
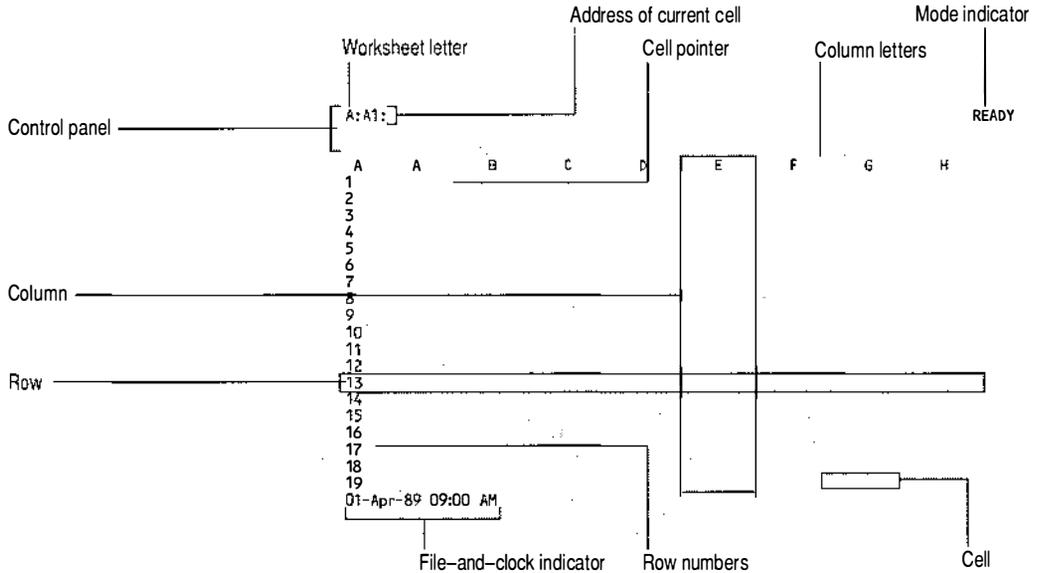
Worksheet Letter

You can use up to 256 worksheets at once. 1-2-3 assigns a different letter to each worksheet you are using and displays the letter in the upper left corner of the worksheet frame. Worksheets are labeled A through Z, AA through AZ, BA through BZ, and so on through IV. (You will learn about using multiple worksheets in Chapter 3.)

Columns and Rows

The letters along the worksheet frame designate **columns,** and the numbers along the worksheet frame designate **rows**. You can see only a small portion of a worksheet's columns and rows on the screen at one time. Altogether a worksheet has 256 columns and 8,192 rows. Columns are labeled A through Z, AA through AZ, BA through BZ, and so on through IV. Rows are numbered 1 through 8192.

Cells

The intersection of a column and a row forms a **cell**, the smallest unit of the worksheet in which you can enter and store data. A worksheet letter followed by a column letter and a row number make up a cell's location, or **cell address**. For example, the cell address A:A1 refers to the cell located in worksheet A at the intersection of column A and row 1.

Cell Pointer

The **cell pointer** is the highlighted rectangle currently in cell A:A1. You move the cell pointer to the cell in which you want to enter data, make a calculation, or begin a command. The cell that contains the cell pointer is called the **current cell**. The worksheet that contains the cell pointer is called the **current worksheet**.

Control Panel

The control panel is located at the top of the screen, above the column letters. It displays cell information, commands, descriptions of commands, and the mode in which 1-2-3 is operating.

In the screen displayed above, the control panel displays two items. On the left is the address of the current cell, A:A1. When you move the cell pointer, the address changes to reflect the cell pointer's new location. On the right is the **mode indicator**, which describes the current 1-2-3 mode of operation. As you work, the mode indicator changes to show, for example, that you are entering a value or label, editing an entry, or making an error. The indicator now displays **READY**, showing that 1-2-3 is ready for you to select a command or enter data.

File-and-Clock Indicator

The **file-and-clock indicator** is located in the lower left corner of the screen. If you have saved the current worksheet in a file on disk, the indicator displays the file name. If, however, you have not yet saved the current worksheet in a file, the indicator displays the current date and time.

Using the Keyboard

1-2-3 makes extensive use of the function keys, cursor keys, and the numeric keypad on your terminal or workstation keyboard. Before you can enter commands in 1-2-3 or move the cell pointer around, you need to be familiar with the keyboard template appropriate for your keyboard. A 1-2-3 keyboard template specifies how 1-2-3 function and pointer-movement keys are assigned to your particular keyboard.

If you are using an AT-style 101-key keyboard, for example, you have several keyboard templates in *Quick Reference* that show how the 1-2-3 functions HELP through GRAPH are assigned to function keys F1-F10.

Regardless of what keyboard template you are using, note that 1-2-3 uses the following four categories of keys on your terminal or workstation keyboard:

- **Keyboard keys** produce the standard ASCII letters, numbers, and symbols found on a typewriter keyboard: A-Z, a-z, 0-9, and !-/.

- **Control keys** serve many functions. Keys such as TAB, BACKTAB, ESCAPE, or ENTER can complete commands or move the cursor from field to field on your screen. Keys such as CONTROL or ALT are used in conjunction with other keys to produce special functions. Even if your keyboard has a key labeled CONTROL or ALT, you should verify on the 1-2-3 keyboard template that this key has been assigned to the function ALT or CONTROL.

- **Pointer-movement keys** are dedicated to moving the cell pointer around the screen or to editing characters in 1-2-3 command fields.

- **Function keys** produce 1-2-3 commands like HELP, GRAPH, NAME, or COMPOSE.

Before you continue with this tutorial, you should have a copy of the 1-2-3 keyboard template appropriate for your keyboard. If you do not find an appropriate template in *Quick Reference*, contact your system administrator.

| NOTE | 1-2-3 will not operate properly if you attempt to run it from a keyboard that is different than the one you selected in **setup123**. |

Moving Around a Worksheet

Working in 1-2-3 involves moving from cell to cell as you enter, change, and calculate data or use 1-2-3 commands. There are a number of ways to move around a worksheet quickly and efficiently. For example, you can move the cell pointer by cell, screen, or worksheet, using one or more **pointer-movement keys**. Before you try the following exercise, check that the cell address in the control panel is in cell A:A1.

| NOTE | Although the control panel always displays the current worksheet letter (such as A:A4 or B:J36), the *Tutorial* refers to cells in the current worksheet by just their column and row location (such as A4 or D12). When you work with more than one worksheet in Chapter 3, however, the *Tutorial* refers to cells by their worksheet, column, and row location.

Press   HOME *to move to A1 if the cell pointer is not there*

Press   → *to move to B1*

Press   ↓ *to move to B2*

Notice that the cell address in the upper left corner of the control panel has changed to reflect the new location of the cell pointer.

The pointer-movement keys you just used moved the cell pointer one cell at a time. Now try some keys that move it in larger jumps. Watch the row numbers change when you do the following:

Press   PGDN *to move down the length of the screen*

Several pointer-movement keys are actually key combinations. Try it:

Press   BIG RIGHT *to move right the width of the screen*

You can also use the END key with other pointer-movement keys to move the cell pointer. Press END first, release it, and then press a pointer-movement key. Notice as you complete the following exercise that the END indicator appears in the bottom right corner of your screen when you press END and disappears when you press the second key:

Press   END ↓ *to move to the last row of the worksheet (row 8192)*

Press   END → *to move to the last column of the worksheet (column IV)*

Press	HOME	*to move back to A1*

Press	←	*(1-2-3 will beep if your terminal permits it.)*

1-2-3 beeps when you press ← because you cannot move the cell pointer beyond the worksheet frame.

You have tried a small sample of the 1-2-3 pointer-movement keys. See "The 1-2-3 Screen" in Chapter 1 of *User Reference* for a complete list of pointer-movement keys.

> NOTE   From now on in the *Tutorial*, the keystroke instructions simply tell you to "Move" the cell pointer to a specific cell. You can use any of the pointer-movement keys to move the cell pointer, as well as special keys you will learn about in later lessons.

Using the 1-2-3 Help System

When you make a mistake in the program, 1-2-3 beeps, goes into ERROR mode, and, in certain cases, displays an error message. Whenever 1-2-3 displays an error message, you can press HELP to get information about how to fix the error. You can also press HELP at any time in a 1-2-3 session to see a screen of information about the part of the program you are using.

When you press HELP, the worksheet temporarily disappears and a Help screen appears. To see how Help works from READY mode do the following:

Press	HELP	*to use Help*

When you press HELP in READY mode, the Help Index appears. From there, you can view a Help screen on any topic you choose. To select a topic from the Help Index, use the pointer-movement keys to move the highlight to the topic you want and then press ENTER.

Highlight	a topic you want to read about

Press	ENTER	*to select the topic*

Notice the words that appear in a contrasting color or a brighter intensity within the current Help screen and at the bottom of the screen. These words represent related topics on which you can also get Help. To select one of these topics, use the pointer-movement keys to move to the topic you want and press ENTER.

Spend some time now experimenting with the Help system. When you are ready to leave Help and return to your worksheet, do the following:

Press   ESC *to leave Help*

| NOTE | On some keyboards, 1-2-3 offers two versions of the ESC key that produce the same result. The 1-2-3 ESC key that is associated with a function key (such as F11) reacts immediately. The terminal ESC key has a 2 second pause between pressing the key and executing the ESC function.

Lesson 2 Using 1-2-3

Many of the tasks you do in 1-2-3 require you to use 1-2-3 menus. In this lesson you will

- Move around a menu

- Select commands from menus

- Cancel commands

- Select commands using a shortcut

- Retrieve a file

Moving Around a Worksheet

To perform tasks such as saving a file, copying data, and printing a worksheet, you use 1-2-3 commands. You select commands from menus, which are sets of related commands that 1-2-3 displays in the second line of the control panel. To begin any command, you display the main 1-2-3 menu by pressing / (slash) when 1-2-3 is in READY mode. Try it now:

Press   / *to display the 1-2-3 main menu*

Menu pointer

MENU mode

Main menu

MENU

```
A:A1:
Worksheet Range  Copy  Move  File  Print Graph  Data  System  Quit
Global  Insert  Delete  Column  Erase  Titles Window Status  Page  Hide
  A       A      B       C       D       E      F     G       H
  1
  2
  3
  4
  5
  6
```

Menu or description
of command
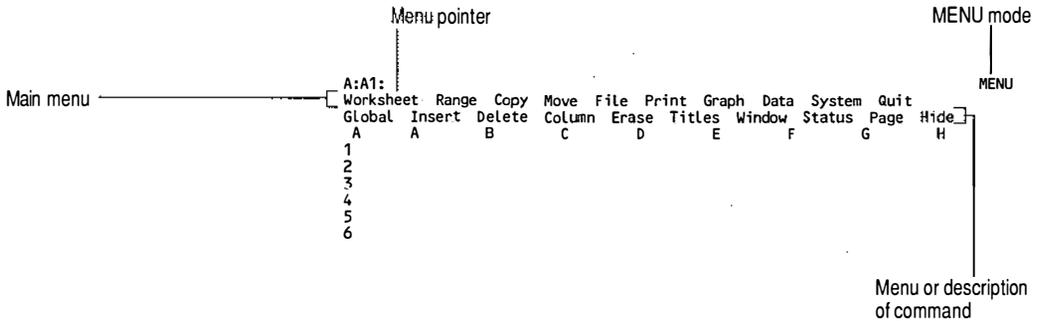
Notice that 1-2-3 changes the mode indicator from **READY** to
MENU. The 1-2-3 main menu commands now appear in the
second line of the control panel. The highlighted rectangle
positioned on the Worksheet command is the **menu pointer**.
The third line of the control panel displays information about
the highlighted command. This information changes each time
you move the menu pointer to highlight a different command.

1-2-3 commands are organized in a hierarchical structure.
Many main menu commands lead to sets of lower level
commands that offer further options. When you position the
menu pointer on such a command, you will see that com-
mand's menu listed in the third line of the control panel. For
example, when Worksheet is highlighted, the third line of the
control panel lists the /Worksheet menu (Global, Insert,
Delete, and so on). If the highlighted command does not lead
to a menu, 1-2-3 displays a description of the command.

To explore other commands on the main menu, try moving the
menu pointer. Before you begin, make sure the menu pointer
is on Worksheet:

Press   HOME   *to highlight Worksheet if the menu pointer is
              not already located there*

Press   → four times   *to highlight File and display the
              /File menu*

Menu pointer on File

/File menu

MENU

```
A:A1:
Worksheet Range  Copy  Move  File  Print Graph  Data  System  Quit
Retrieve Save  Combine  Xtract  Erase  List  Import  Dir  New  Open  Admin
```
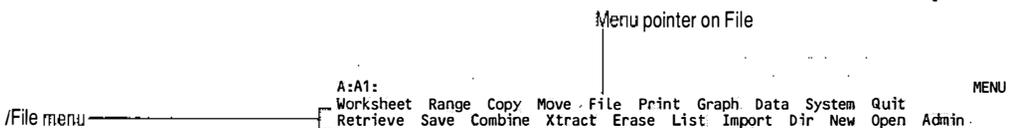
Now the third line of the control panel displays the /File menu. Move the menu pointer again:

Press   ← two times *to highlight Copy*

Since the Copy command does not have a menu, the third line of the control panel displays a description of the command.

```
                          Menu pointer on Copy
                                  |
                                  |
   A:A1:                          |                                                    MENU
   Worksheet  Range  Copy  Move  File  Print  Graph  Data  System  Quit
   Copy a cell or range of cells |
                                                  |
                                                  |
                          Description of Copy command
```
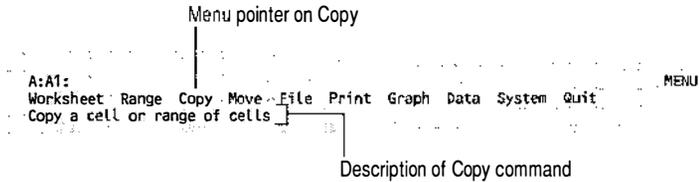
In addition to using → and ← to move the menu pointer one command at a time, you can use HOME and END to move the menu pointer to the first and last command in the menu, respectively. Try it:

Press   END *to highlight Quit*

Press   HOME *to highlight Worksheet*

The menu pointer moves in a circular pattern. Pressing → when the last command in the menu is highlighted moves the menu pointer back to the first command in the menu. Similarly, pressing ← when the first command in the menu is highlighted moves the menu pointer to the last command in the menu:

Press   ← *to highlight Quit*

Press   → *to highlight Worksheet*

Selecting Commands from Menus

To select a command, highlight the command and then press ENTER. For example, to select the Range command, do the following:

Press   → *to highlight Range*

Press   ENTER *to select the Range command*

The main menu is gone and instead the second line of the control panel displays the Range commands. Format is highlighted and the third line of the control panel displays the /Range Format menu.

Range commands ──────────
```
                         ┌ A:A1:                                                MENU
                         ⌐ Format Label Erase Name Justify Prot Unprot Input Value Trans Search ┐
                           Fixed Sci Currency , General +/- Percent Date Text Hidden Other Reset┐
```
/Range Format menu
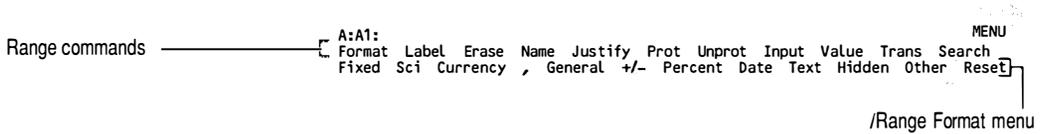
Press   → three times   *to highlight Name*

Each time you press →, the third line of the control panel changes to reflect the command highlighted on the second line.

Press   ENTER   *to select Name*

Now the second line of the control panel shows the Range Name commands. Create is highlighted and the third line of the control panel displays a description of the Range Name Create command. You can use this command, Range Name Create, by pressing Enter.

Range Name commands

```
   A:A1:                                                     MENU
   Create Delete Labels Reset Table Note Undefine
   Create or modify a range name
```

Range Name Create description
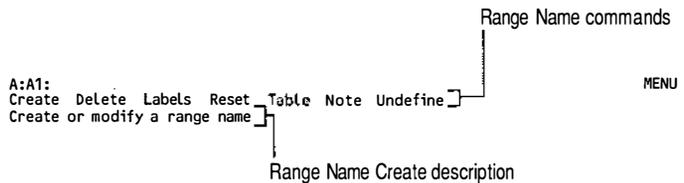
As you can see, the 1-2-3 menus are structured to let you choose a very specific procedure by selecting commands from successive menus.

Canceling Commands

It is not uncommon to select a command by mistake or to decide not to complete a command after you have started making selections from menus. For example, you are now in the middle of the /Range Name menu, but in this case you don't really want to complete the command. Now you will learn how to back out of menus. Before you complete the last step in any sequence of commands you can move backwards through the sequence, one menu level at a time, by pressing ESC. The ESC key lets you back out of any menu until 1-2-3 returns to READY mode.

Press   ESC   *to return to the menu from which you selected*
Name

Press   ESC   *to return to the menu from which you selected*
Range

Press   ESC   *to return 1-2-3 to* **READY** *mode*

The menu is no longer displayed in the control panel and 1-2-3
is in **READY** mode.

Selecting Commands: A Shortcut

Now you know how to select a command by moving the
menu pointer to a command and then pressing ENTER.

This method is very useful when you are learning to use 1-2-3
because you can see the commands you are selecting as well
as information about each highlighted command. As you
become more proficient with 1-2-3, however, you may want to
use a faster method of selecting commands. After pressing the
/ (slash) key to display the main menu, you can just press the
first character of the command you want to select. With this
method, you do not move the menu pointer or press ENTER;
1-2-3 automatically selects the command and displays the next
menu as soon as you press the character. Try this method:

Press   /   *to display the main menu*

Press   r   *to select Range*

The main menu commands are gone and the second line of the
control panel now displays the Range commands. Format is
highlighted and the third line of the control panel displays the
/Range Format menu. Again, notice that each command in
this menu begins with a different letter.

Press   n   *to select Name*

Now the second line of the control panel shows the Range
Name commands. Create is highlighted and the third line of
the control panel displays a description of the Range Name
Create command.

Press   ESC three times   *to return 1-2-3 to* **READY** *mode*

Using Sample Files

Throughout this tutorial you will be asked to retrieve and save
the sample worksheets that are distributed with 1-2-3. If your
system administrator has not copied these files to one of your
working directories, you need to copy them before proceeding
with the tutorial.

Lotus distributes the sample worksheet files with uppercase file names. All versions of UNIX are case-sensitive and discriminate between a file stored in uppercase from one stored in lowercase; for example, inc2s.wk3 is a different file than INC2S.WK3. To retrieve the sample files into 1-2-3, you must specify the file names in the case used throughout this tutorial, which is uppercase. If you decide subsequently to save a modified version of the tutorial files in lowercase, be aware that you must use these lowercase file names when you want to retrieve the files.

Lotus recommends that you create a new directory to store a copy of the tutorial files distributed with 1-2-3. If your login name is mmartin, for example, create a new directory called smpfiles in your home directory: Enter commands similar to the following at the UNIX prompt:

```
$ cd
$ mkdir smpfiles
$ cd smpfiles
$ cp /usr/lotus/123.v10/smpfiles/* .
```

The directory **/usr/lotus/123.v10/smpfiles** is the default installation directory for the tutorial files. If your system administrator has installed 1-2-3 in a directory other than **/usr**, you need to modify the **cp** command line accordingly.

To retrieve these sample files into your 1-2-3 session, you must first tell 1-2-3 that the directory containing the sample files should be your default file directory.

Press	/ *to display the main menu*
Press	W *to select Worksheet*
Press	G *to select Global*
Press	D *to select Default*
Press	D *to select Dir*
Type	*the name of the working directory containing the sample files (/usr/login_name/smpfiles)*
Press	ENTER *to accept the tutorial directory as your default file directory*

Retrieving a File

You have learned the two methods of selecting commands from menus. Now you are going to use the first method (highlighting a command and pressing ENTER) to retrieve a sample file named INC2S.WK3. You can instruct 1-2-3 to retrieve a file by specifying its full path or by selecting the name of the file from a list of file displayed in 1-2-3. To list the worksheet files in the directory containing the tutorial files, complete the following steps:

Press	E *to select Ext*
Press	ENTER
Press	ESC *to clear the current extension in the control panel*
Type	[Wk][Kk]* *to specify that 1-2-3 should display files with either an uppercase or lowercase extension.*
Type	ENTER *to complete the entry*
Press	U *to select Update and save your preferences to disk*
Press	Q *to quit the Worksheet Global Default menu and return to READY mode*

Complete the following steps to retreive the file:

Press	/ *to display the 1-2-3 main menu*
Press	→ four times *to highlight File*
Press	ENTER *to select File*
Press	ENTER *to select Retrieve*

Notice that the mode indicator changed from **MENU** to **FILES**. The names of worksheet files saved in the directory appear across the third line of the control panel. 1-2-3 lists the files alphabetically.

When there are more files than you can see in the control panel, you can press ↓ to display the next row of file names. Alternatively, you can press NAME to display the names of all the files in the directory at once.

To specify the file to retrieve, you can highlight the file name using →, ←, ↑, ↓, HOME, or END, and then press ENTER to select it, or you can type the file name and press ENTER. In this case, you will highlight the file name:

Highlight	INC2S.WK3
Press	ENTER *to retrieve INC2S.WK3*

The mode indicator very briefly displays **WAIT** as 1-2-3 retrieves the file. You can see the file name INC2S.WK3 in the file-and-clock indicator in the bottom left corner of your screen. This sample file contains some data that has already been entered for you. In the next lesson, you will learn how to enter data on your own as you continue building this worksheet.

```
A:A1:                                                              READY

    A     A        B       C       D       E       F       G       H
    1
    2
    3
    4
    5
    6
    7     Costs and Expenses:
    8        Salary
    9        Int
   10        Rent
   11        Ads
   12        COG
   13
   14        Op Exp
   15
   16     Op Income
   17
   18
   19
       [ INC2S.WK3
```

File name ————————————— INC2S.WK3

| NOTE | This lesson has taught you the two methods of selecting commands (highlighting the command and pressing **ENTER** and pressing the first character of the command). From now on in this *Tutorial*, whenever an exercise involves using a command, the keystroke instructions simply tell you to "Select" a command. You can use either method, but you may want to use the highlighting method until you become more familiar with the 1-2-3 menu structure. |

A / (slash) preceding the name of a command means that the command is in the main menu and you must press / to display the main menu in order to select the command. For example, the instruction "Select /File" means press / to display the main menu and then select File from that menu.

Lesson 3 Entering Labels in a Worksheet

A cell can store two types of data: labels and values. **Labels** are text, such as Sales or Inventory. You can use labels to identify and organize the values you enter in a worksheet. **Values** are numbers, such as 5 or 339500, or they are the results of formulas.

Because labels give meaning to the values in a worksheet, creating labels is a logical place to begin building the income statement for Sloane Camera and Video. In this lesson, you will

- Enter labels

- Correct typing errors

- Use the GOTO key

- Use the pointer-movement keys to enter data

- Save your work

Entering Labels

First you will enter a title for the worksheet in cell A1. As you type, your entry will appear in the second line of the control panel.

Press	HOME *to move to A1 if the cell pointer is not there*
Type	INCOME STATEMENT 1988: Sloane Camera and Video

The mode indicator has changed from **READY** to **LABEL**. 1-2-3 distinguishes between a label and a value by the first character of the entry. Because labels are usually text, 1-2-3 assumes that any entry beginning with a letter is a label.

Press	ENTER *to enter the label in the worksheet*

When you press ENTER, 1-2-3 stores the entry in the current cell. The following screen shows the cell contents in the control panel and the label in the worksheet. Notice the ' (apostrophe) at the beginning of the label in the control panel. This is a **label prefix**, a character that controls the label's position in a cell. 1-2-3 automatically inserts the ' (apostrophe) to align labels with the left edge of a cell. (In Lesson 6 you will learn how to enter other label prefixes to align labels differently in cells.)

```
Label prefix                                              Label in worksheet

                              .       ..        .

A:A1: 'INCOME STATEMENT 1988: Sloane Camera and Video                    READY


  A      A      B      C      D      E      F       G      H
  1   INCOME  STATEMENT 1988: Sloane Camera and Video
  2
  3
  4
  5
  6
```
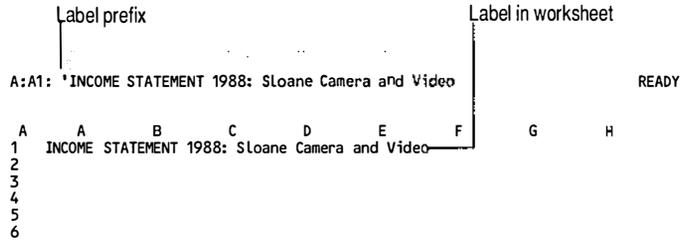
Even though you entered the label in A1, it overflows into the blank cells to the right of it (B1 through E1). A label that contains more characters than the width of the column is called a **long label**. Although the label appears to occupy more than one cell, 1-2-3 stores it entirely in A1. Verify this by moving the cell pointer to B1:

Move   the cell pointer to B1

The first line of the control panel shows that B1 contains no entry.

Move   the cell pointer back to A1

The complete text of the label reappears in the control panel. This illustrates that a cell can contain more information than can fit within the width of the column. In fact, a cell can hold up to 512 characters. If you enter data in the cell to the right of a long label, 1-2-3 truncates the label on the screen, but still stores the entire label.

Correcting Typing Errors

If you make an error while typing an entry and you have not yet pressed ENTER, press BACKSPACE to erase incorrect character(s) to the left of the **cursor** (which underscores the current character) and then continue typing the entry.

If, however, you notice a typing error after you press ENTER, you can correct it in the following ways:

- Use the cell pointer to move to the cell that contains the incorrect entry, then type a new entry, and press ENTER. This method is the best choice for replacing an entire entry.

- Use the EDIT key to put 1-2-3 in **EDIT** mode, then edit the entry in the second line of the control panel, and press ENTER. This is the best method for making a minor change in a long entry.

- In **EDIT** mode you use the pointer-movement keys to move the cursor to the mistake in the entry. To delete characters, use **BACKSPACE** to erase the character to the left of the cursor or **DEL** to delete the current character (positioned over the cursor).

> NOTE   The 1-2-3 functions called **BACKSPACE** and **DEL** erase the previous and current character respectively. You may use the Lotus **keyedit** utility to associate the **BACKSPACE** and **DEL** functions with similarly labeled keys on your keyboard. There may be several terminal keys that delete characters on the screen, but only keys directly associated with the **BACKSPACE** and **DEL** functions will perform identically.

> CAUTION   The key labeled Del on many UNIX/386 console keyboards does not (by default) delete characters at the cursor. Frequently this key issues a SIGINT (software interrupt) function that may interrupt your 1-2-3 session. If you press this Del key and it interrupts your session, you must use UNIX to assign a delete-character function to Del or avoid using the Del key in this *Tutorial*. Whenever the *Tutorial* recommends that you use **DEL**, use a combination of → and **BACKSPACE** to perform the function.

To insert characters, use the pointer-movement keys to move the cursor to the place in the entry where you want to insert the new text and then type the text. Once you correct the mistake, press **ENTER** to store the correction in the current cell. Try changing 1988 to 1989:

Press   EDIT   *to put 1-2-3 in* ***EDIT*** *mode*

The label you previously entered appears in the second line of the control panel. The cursor appears just after the last character in the label.

Press   BIG LEFT   five times   *to move the cursor to the colon in the label.*

Press   BACKSPACE   *to erase the last 8 in 1988*

Type   9   *to change the year to 1989*

Press   ENTER   *to enter the correction in the worksheet*

1-2-3 returns to **READY** mode.

| NOTE | If you want to leave **EDIT** mode without entering any change in the worksheet, press ESC instead of ENTER. This leaves the entry as it was before editing.

Using the GOTO Key

Now you are going to enter more labels, beginning in A5. Rather than using the pointer-movement keys to move the cell pointer to A5, however, you are going to use the GOTO key. The GOTO key is a shortcut for moving around a worksheet.

Press   GOTO

1-2-3 prompts you to enter the address of the cell you want to move to.

Type   a5

Press   ENTER   *to move the cell pointer to A5*

Type   Net Sales

Press   ENTER   *to enter the label in the worksheet*

Using the Pointer-Movement Keys

There is another way to enter data in a cell besides pressing ENTER when you have finished typing: you can use the pointer-movement keys. If you press one of the pointer-movement keys after you type an entry, 1-2-3 enters the data in the current cell and then moves the cell pointer in the direction indicated by the pointer-movement key you pressed. This is a useful shortcut when you are entering a series of data in a row or column. Try it now:

Move   the cell pointer to B3

Type   Q1   *(for Quarter 1)*

Press   → *to enter Q1 and move the cell pointer to C3*

Type   Q2   *(for Quarter 2)*

Press   → *to enter Q2 and move the cell pointer to D3*

Type   Q3   *(for Quarter 3)*

Press   → *to enter Q3 and move the cell pointer to E3*

Type   Q4   *(for Quarter 4)*

Press   → *to enter Q4 and move the cell pointer to F3*

Type   YTD   *(for Year-to-Date)*

Press   ENTER   *to enter YTD*

Your worksheet should look like this:

```
A:F3: 'YTD                                                        READY

A     A         B         C         D         E         F         G         H
1   INCOME STATEMENT 1989: Sloane Camera and Video
2
3             Q1        Q2        Q3        Q4        YTD
4
5   Net Sales
6
7   Costs and Expenses:
8     Salary
9     Int
10    Rent
11    Ads
12    COG
13
14    Op Exp
15
16  Op Income
```

Saving Your Work

One of the most important 1-2-3 commands is /File Save, which copies your worksheet data from system memory to a file on disk. This procedure makes the data in your worksheet permanent; if you do not save your work, your data will be lost when you retrieve a new file or end 1-2-3. Save your work frequently to minimize the risk of losing data.

To save the current worksheet, begin by doing the following:

Select /File

Select Save

1-2-3 prompts you for a file name in the second line of the control panel and displays a default response after the prompt. **Defaults** are values and settings that 1-2-3 automatically provides. In this case, the default file-naming convention is UNIX. As with other UNIX file specifications, 1-2-3 default names include: the full directory path **/local/home/smpfiles**, the name of the current file (INC2S), and the default **extension**, or three-character suffix for 1-2-3 worksheet files (.WK3).

| NOTE | 1-2-3 can retrieve and save worksheet files specified in one of three modes: native UNIX mode, upper-case-only DOS mode, and lowercase-only DOS mode. When you instruct 1-2-3 to use UNIX file mode, all file paths and names are displayed in standard UNIX format with full case sensitivity. If you have instructed 1-2-3 to use one of the DOS-compatibility modes (DOS-upper or DOS-lower), all file paths and names appear in that MS-DOS format. For more information on DOS-compatibility modes with selective case sensitivity, see "Working With Files" in Chapter 1 of *User Reference*. Throughout the *Tutorial*, all file specifications will appear in UNIX file mode. |

| NOTE | If you select /File Save when you are creating a new worksheet (one that has not already been saved in a file), 1-2-3 supplies a default file name using a sequential numbering system: FILE0001.WK3 through FILE9999.WK3 in your current file mode. |

Specifying a File Name

To finish saving the file, you must specify a file name either by accepting the default name or by typing a new one.

You have made changes to the file named INC2S.WK3, which you retrieved at the end of Lesson 2. You can either update this file with the changes by using the same file name, or you can save these changes in a new file and preserve the original file. In this case, you are going to save the file with the new file name INC3.WK3 so that INC2S.WK3 remains unchanged. This allows others to use the original file if they want to complete the *Tutorial*.

The UNIX filesystem is case-sensitive in handling file names. You can use uppercase or lowercase letters when you enter a file name, but remember that 1-2-3 discriminates between files that are named MYFILE.WK3, myfile.wk3, and Myfile.wk3. If you want to change the default file name suggested by 1-2-3, you can edit it in the following way.

Move   the cursor under the 2

Press   → twice and **BACKSPACE** twice   *to erase 2S*

Type   3

Press   **ENTER**   *to save the file with the name INC3.WK3*

Your worksheet looks the same as it did before you saved it, except that the new file name appears in the bottom left corner of your screen. A copy of the worksheet is now saved permanently in a file on disk named INC3.WK3. For more information on file names, see "Working with Files" in Chapter 1 of *User Reference*.

Lesson 4 Entering Values in a Worksheet

The labels in the worksheet form a structure for the values that will go into the income statement. In this lesson, you will

- Enter values

- Erase a range

- Enter more values

- Create a line to visually separate items in the worksheet

- Copy ranges

- Highlight a range

- Name a range

- Name another range

- Save your work

- End a 1-2-3 work session

To begin this lesson, use the following steps to retrieve the sample file INC4S.WK3. This file will replace INC3.WK3 in system memory. A copy of INC3.WK3 is still saved in a file on disk if you want to retrieve it at a later time.

Select   /File
Select   Retrieve
Highlight   INC4S.WK3
Press   **ENTER** *to retrieve INC4S.WK3*

The following worksheet appears on your screen. This worksheet contains the labels you entered in the last lesson. You will also notice that the worksheet contains some values. In this lesson, you will learn how to enter values.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                          READY

  A      A        B         C         D         E        F        G        H
  1    INCOME STATEMENT  1989:  Sloane Camera and Video
  2
  3            Q1        Q2        Q3        Q4        YTD
  4        .         .
  5    Net Sales
  6
  7    Costs and Expenses:
  8      Salary     2000      2200      2500
  9      Int        1200      1300      1300
 10      Rent        600       600       600
 11      Ads         900      1000      2500
 12      COG        4000      4000      4000
 13
 14      Op Exp
 15
 16   Op Income
 17
 18
 19
 INC4S.WK3                                              .
```

Entering Values

Now you will enter the quarterly Net Sales figures for the
income statement in row 5. As you type each figure, notice
that the mode indicator changes from **READY** to **VALUE**. 1-2-3
assumes that any entry beginning with a number is a value.
Begin entering the Net Sales figures in B5.

Move	the cell pointer to B5
Type	12000
Press	→ *to enter 12000 and move the cell pointer to C5*
Type	19000
Press	→ *to enter 19000 and move the cell pointer to D5*
Type	16000
Press	→ *to enter 16000 and move the cell pointer to E5*
Type	22000
Press	**ENTER** *to enter 22000*

Your worksheet should look like the following screen. The
values do not line up with the left-aligned labels above them.
This is because 1-2-3 automatically aligns values with the right
edge of a cell. You will change the alignment of the labels later
in this chapter.

```
A:E5: 22000                                                        READY

A      A       B       C       D       E      F      G      H
1   INCOME STATEMENT 1989: Sloane Camera and Video
2
3           Q1      Q2      Q3      Q4     YTD
4
5   Net Sales  12000   19000   16000   22000
6
```

Erasing a Range

Suppose you want to erase the contents of one or more cells in the worksheet, but you do not want to replace the cells with new entries. You can do this using /Range Erase, one of the 1-2-3 commands that works with ranges. A **range** is a single cell or rectangular group of adjoining cells that 1-2-3 treats as a unit. Ranges are useful because they let you work with cells collectively instead of individually in commands and formulas.

Ranges

Single-cell range

To specify a range, you indicate the location of that range in the worksheet. You can do this by typing its range address, highlighting the range, or using its range name. Right now, you are going to learn how to specify a range using its range address. A **range address** consists of the cell addresses of the

two most distant cells in the range separated by two periods. This address tells 1-2-3 where the range begins and ends and follows these guidelines:

- If a range is a group of adjoining cells in a single column or row, the range address consists of the cell addresses of the two opposite ends of the range. For example, J2..J7 includes the cells in rows 2 through 7 in column J.

- If a range is a group of adjoining cells that spans several columns or rows, the range address consists of the cell addresses of two diagonally opposite corners of the range. For example, A2..D5 means cells A2 through D5.

- If a range is a single cell, the range address consists of that cell address as both the starting and ending point of the range. For example, M8..M8 means cell M8.

| NOTE | Although the control panel displays the worksheet letter in range addresses, the *Tutorial* refers to ranges in the current worksheet by just their column and row location (such as B12..D12). When you work with more than one worksheet in Chapter 3, however, the *Tutorial* refers to ranges by their worksheet, column, and row location (such as A:B12..C:D12).

Suppose the Q2 and Q3 Costs and Expenses figures are not correct. Try erasing this data by selecting /Range Erase and specifying the range containing those figures:

Select   /Range

Select   Erase

Because the cell pointer is currently in E5, 1-2-3 suggests E5..E5 as the range to erase. Do not accept this default. Specify a different range by doing the following:

Type   c8..d12

What you type replaces the default range (E5..E5) in the control panel.

Press   ENTER   *to accept C8..D12 as the range to erase*

Now the cells are blank. Use /Range Erase when you want to erase the contents of any range, whether the range is one cell or several cells. In the lessons that follow, you will learn about other commands that operate on ranges (such as /Copy and /Range Format). You will also learn other methods of specifying a range.

Entering More Values

Having erased the Q2 and Q3 Costs and Expenses figures, you will need to enter new ones, beginning in C8.

Move	the cell pointer to C8
Type	2000
Press	↓ *to enter 2000 and move the cell pointer to C9*
Type	1400
Press	↓ *to enter 1400 and move the cell pointer to C10*
Type	600
Press	↓ *to enter 600 and move the cell pointer to C11*
Type	2000
Press	↓ *to enter 2000 and move the cell pointer to C12*
Type	4200
Press	ENTER *to enter 4200*

When you finish entering the numbers, your worksheet should look like this:

```
 A:C12: 4200                                              READY

 A      A        B      C      D       E       F      G      H
 1   INCOME STATEMENT 1989: Sloane Camera and Video
 2
 3            Q1      Q2      Q3      Q4      YTD
 4
 5   Net Sales  12000   19000   16000   22000
 6
 7   Costs and Expenses:
 8     Salary    2000    2000
 9     Int       1200    1400
10     Rent       600     600
11     Ads        900    2000
12     COG       4000    4200
13
14     Op Exp
15
16   Op Income
```

Creating a Line

You can make a worksheet easier to read by visually separating the various sections with lines. To create a line, you could type an ′ (apostrophe) label prefix followed by a series of dashes. But there is an easier way: Type a \ (backslash) followed by a single dash. The \ (backslash) is the **repeating label prefix;** it repeats the label that follows it until it fills the cell. You will use the repeating label prefix to create a line starting in A4.

Move   the cell pointer to A4

Type   \ *(backslash)*

Type   - *(dash)*

Press   ENTER *to enter the repeating label*

1-2-3 displays a series of dashes in cell A4. (Some terminals
display a solid line rather than a line of dashes.)

```
A:A4: \-                                                        READY

A      A         B         C         D         E        F       G        H
1      INCOME STATEMENT 1989: Sloane Camera and Video
2
3                Q1        Q2        Q3        Q4       YTD
4      ---------
5      Net Sales   12000     19000     16000     22000
6
```

Copying Ranges

To extend the line in A4 all the way through column F, you
need to copy the contents of A4 to the range B4 through F4
(B4..F4) using /Copy. Copying is a two-step process in which
you first specify the range to be copied FROM and then specify
the place you want it copied TO. Prompts on the second line of
the control panel guide you through the process. With the cell
pointer in A4, do as follows:

Select   /Copy

1-2-3 prompts you to specify the range to copy FROM and
displays the current address.

```
A:A4: \-                                                        POINT
Enter range to copy FROM: A:A4..A:A4

A      A         B         C         D         E        F       G        H
1      INCOME STATEMENT 1989: Sloane Camera and Video
2
3             Q1        Q2        Q3        Q4       YTD
4      ---------
5      Net Sales  | 12000     19000     16000     22000
6                 |
                  |
```

A4..A4 is the range to copy FROM

Press   ENTER *to accept A4..A4 as the range to copy FROM*

1-2-3 prompts you to specify the range to copy TO.

Type   b4..f4

Press   ENTER *to accept B4..F4 as the range to copy TO*

1-2-3 makes a copy of the dashes in A4 in each cell in the range B4..F4.

A:A4: \-   READY

	A	B	C	D	E	F	G	H
1	INCOME STATEMENT 1989: Sloane Camera and Video							
2								
3		Q1	Q2	Q3	Q4	YTD		
4	----							
5	Net Sales	12000	19000	16000	22000			
6								
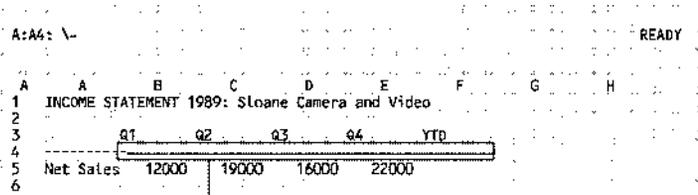
B4..F4 is the range where 1–2–3 copies the contents of A4

Highlighting a Range

So far in this lesson, you have specified ranges by typing their range address (for example, B4..F4). Now you are going to learn how to specify a range by highlighting it.

When 1-2-3 is in POINT mode, you can **highlight** a range by using the pointer-movement keys to expand the highlighted area of the worksheet to cover all the cells in the range you want to specify. Before you highlight a range, however, the cell pointer must be anchored in one corner of the range so it remains stationary.

For several commands, 1-2-3 automatically anchors the cell pointer in the current cell when it prompts you for a range. In other instances, you must anchor the cell pointer yourself. You can tell if the cell pointer is anchored by looking at the prompt in the control panel. A cell address by itself (such as A4) means the cell pointer is not anchored, while a range address (A4..A4) means it is anchored.

- If the cell pointer is on the first (or last) cell of the range you want to specify, but it is not anchored, press . (period) to anchor the cell pointer in that cell. If the cell pointer is on the wrong cell, reposition it before pressing . (period). Once the cell pointer is anchored, use the pointer-movement keys to expand the highlight to cover the range and press ENTER.

- If the cell pointer is anchored in the wrong cell, press ESC to unanchor it. Move the cell pointer to the first (or last) cell of the range and press . (period) to anchor it in that cell. Then use the pointer-movement keys to expand the highlight to cover the range and press ENTER.

Now you are going to add another line to the worksheet to separate the Net Sales figures from the rest of the data. This time when you use /Copy, you are going to make an identical copy of the dashes in range A4..F4 in range A6..F6. In addition, you are going to highlight the ranges to copy FROM and TO instead of typing their addresses. With the cell pointer in A4, do as follows:

Select   /Copy

1-2-3 prompts you to enter the range to copy FROM. Because 1-2-3 automatically anchors the cell pointer when you select /Copy, you do not have to press . (period) to anchor the cell pointer when specifying the FROM range, unless you want to highlight a range that starts in a different cell.

Press   → five times   *to highlight A4..F4*

As you expand the highlight, 1-2-3 displays the address of the highlighted area in the control panel.

Press   ENTER   *to accept A4..F4 as the range to copy FROM*

```
                                                            POINT mode
                                                                |
                                                                |
 A:F4: \-                                                     POINT
 Enter range to copy FROM: A:A4..A:F4
  A      A       B        C        D        E      F      G       H
  1   INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3            Q1       Q2       Q3       Q4      YTD
  4  ----------------------------------------------------
  5   Net Sales  12000    19000    16000    22000
  6
                                                    A4..F4 is the range
                                                    to copy FROM
```
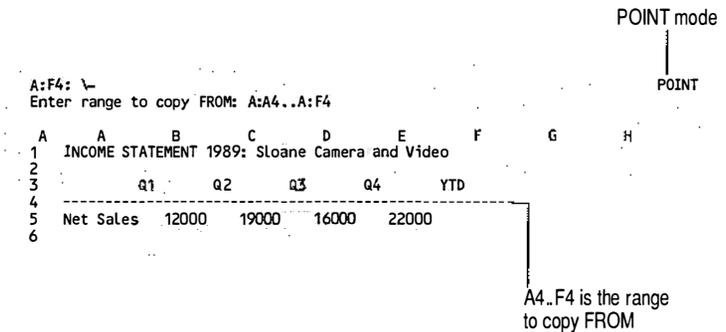
When you make an identical copy of a range, you need to specify only the first cell of the TO range. You do not need to specify the entire range as you did when you copied a single-cell range to a larger range.

Move   the cell pointer to A6

Press   ENTER   *to accept A6 as the range to copy TO*

```
A:A4: \-                                                                READY

  A     A       B       C       D       E       F       G       H
  1   INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3           Q1      Q2      Q3      Q4      YTD
  4   ----------------------------------------------
  5   Net Sales  12000   19000   16000   22000
  6   ----------------------------------------------
```

A6..F6 is the range where 1-2-3 copies the contents of A4..F4

Naming a Range

The worksheet needs two more separating lines, one below the row that contains the COG figures (A13..F13) and one below the Operating Expenses figures (A15..F15). When you used /Copy in the previous example, you specified the range to copy FROM by highlighting it. The next time you use /Copy, you will use a range name to specify the range to copy FROM.

A **range name** is a name you assign to a range in the worksheet. Naming ranges of cells often makes a worksheet much easier to work with. For example, it is easier to remember that a name like QTRLY_NETSALES refers to the range that contains the quarterly Net Sales figures than it is to remember that cells B5 through E5 comprise the range. After creating a range name, you can use the name with any command that prompts for a range, from /Copy and /Move to /Range Format and /Graph.

Range names can be almost any combination of up to 15 characters. They should not, however, include spaces, commas, semicolons, or the characters + * − / & > < @ #. Nor should they start with numbers. When typing a range name, you can use uppercase or lowercase letters. 1-2-3, however, always displays the range name in uppercase letters.

Create a range name for the first line of dashes so that you can use that range name to copy the line to any location in the worksheet:

Select	/Range
Select	Name
Select	Create
Type	LINE
Press	ENTER

Now specify the range:

Press   → five times   *to highlight A4..F4*

Range name————

```
A:F4: \-                                                    POINT
Enter range name to create: LINE        Enter range: A:A4..A:F4

    A    A        B        C        D        E        F      G       H
    1   INCOME STATEMENT 1989: Sloane Camera and Video
    2
    3          Q1       Q2       Q3       Q4       YTD
Range———— 4 ┌---------------------------------------------------------
    5   Net Sales   12000    19000    16000    22000
    6   ---------------------------------------------------------
```

Press   ENTER *to accept A4..F4 as the range to name*

Although nothing has changed on your screen, you now have
the range name LINE to represent the range A4..F4. Using this
range name will save you time when you make copies of the
line.

Select   /Copy

1-2-3 prompts you to enter the range to copy FROM. Type the
range name in either uppercase or lowercase letters.

Type   LINE

Press   ENTER *to accept LINE as the range to copy FROM*

Move   the cell pointer to A13

Press   ENTER *to accept A13 as the range to copy TO*

Dashes appear in A13..F13. Now copy the line of dashes to
row 15:

Select   /Copy

Type   LINE

Press   ENTER *to accept LINE as the range to copy FROM*

Move   the cell pointer to A15

Press   ENTER *to accept A15 as the range to copy TO*

Your worksheet should now have lines in rows 4, 6, 13, and 15.

```
A:A4: \_                                                                    READY

  A     A        B       C        D        E        F       G        H
  1   INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3          Q1       Q2       Q3       Q4       YTD
  4   ----------------------------------------------------------
  5   Net Sales  12000   19000    16000    22000
  6   ----------------------------------------------------------
  7   Costs and Expenses:
  8     Salary    2000     2000
  9     Int       1200     1400
 10     Rent       600      600
 11     Ads        900     2000
 12     COG       4000     4200
 13
 14   Op Exp
 15
 16   Op Income
```

| NOTE | If you create a number of range names in a work-sheet, you may find it easier to specify the named range you want to use by selecting it from a list rather than by typing its name. Whenever 1-2-3 prompts you to specify a range, you can press NAME to display a list of range names in the worksheet, then you highlight the range name you want to use and press ENTER to select it. You will try this in Lesson 5. |

Naming Another Range

Now that you know how to name a range, you are going to name the range that contains the Net Sales figures. In Lesson 5, you will use this range name in a formula.

Name the range containing the Net Sales figures QTRLY_NETSALES by doing the following:

Move   the cell pointer to B5

Select   /Range

Select   Name

Select   Create

Type   QTRLY_NETSALES

Press   ENTER

Now specify the range:

Move   the cell pointer to E5   *to highlight B5..E5*

Press   ENTER   *to accept B5..E5 as the range to name*

Although nothing has changed on your screen, you now have the range name QTRLY_NETSALES, which represents the range B5..E5, as well as the range name LINE, which represents A4..F4.

Saving Your Work

To save the range names and the other changes you have made to the worksheet, do the following:

Select	/File
Select	Save
Type	INC5.WK3
Press	ENTER *to save INC5.WK3*

The worksheet is now saved permanently in a file on disk named INC5.WK3. When you save a worksheet that contains range names, 1-2-3 automatically saves those range names so they are available the next time you use the worksheet.

Ending 1-2-3

If you want to go directly to the next lesson, skip this section. If you want to stop here, you can end the 1-2-3 session with the /Quit command.

Select	/Quit
Select	Yes *to end 1-2-3*

1-2-3 returns you to the operating system prompt.

Lesson 5 Calculating in a Worksheet

Until now, you have used 1-2-3 to enter labels and numbers in the worksheet just as you would on a piece of paper. With paper, however, you would have to do the arithmetic by hand or with a calculator. 1-2-3 can do it for you automatically. You are going to enter formulas in the worksheet that calculate the Operating Expenses and Operating Income for Sloane Camera and Video. In this lesson, you will

- Enter a formula

- Total numbers with @SUM

- Copy formulas

- Enter more formulas

- Save your work

If you ended 1-2-3 at the end of the last lesson, start 1-2-3 as instructed at the beginning of this chapter. Then use the following steps to retrieve INC5.WK3, the file you saved in Lesson 4. If you did not complete Lesson 4, retrieve the sample file, INC5S.WK3.

Remember that you can specify the file you want to retrieve in the following three ways:

- Use → or ← to highlight the file name and press ENTER.

- Type the file name and then press ENTER.

- Press NAME to display a list of all your 1-2-3 files in the current directory, highlight a name in that list, and then press ENTER.

For now, use the highlight method:

Select	/File
Select	Retrieve
Highlight	INC5.WK3 *(the file you saved in Lesson 4)* or INC5S.WK3 *(sample file)*
Press	ENTER *to retrieve the file*

The worksheet you created in the previous lesson appears on your screen. If you retrieved INC5.WK3, the cell pointer is in B5 because that is where it was located when you saved the file in Lesson 4.

```
A:B5: 12000                                                      READY

A     A       B       C       D       E      F      G     H
1     INCOME STATEMENT 1989: Sloane Camera and Video
2
3             Q1      Q2      Q3      Q4     YTD
4     ------------------------------------------------------
5     Net Sales  12000   19000   16000   22000
6     ------------------------------------------------------
7     Costs and Expenses:
8       Salary    2000    2000
9       Int       1200    1400
10      Rent       600     600
11      Ads        900    2000
12      COG       4000    4200
13    ------------------------------------------------------
14      Op Exp
15    ------------------------------------------------------
16    Op Income
17
18
19
INC5.WK3
```

Entering Formulas

The numeric formulas you create in 1-2-3 can include any combination of mathematical operations: addition, subtraction, multiplication, division, and/or exponentiation. They can perform any type of calculation from simple arithmetic to advanced financial and statistical analysis. Whenever you enter a formula in a cell, 1-2-3 calculates the formula's result automatically and displays the result in the cell. Try entering a formula in B14 that totals the Q1 Costs and Expenses. Note that when a formula starts with a cell address, you must type a + (plus sign) in front of the formula.

Move   the cell pointer to B14

Type   +

As soon as you type the initial + (plus sign), the mode indicator changes from **READY** to **VALUE**. This is because 1-2-3 assumes you are entering a value (actually, a formula that results in a value) when the + (plus sign) is the first character of the entry. Now continue to enter the formula:

Type   b8+b9+b10+b11+b12 (*1-2-3 does not accept spaces in formulas.*)

Press   ENTER *to enter the formula in the worksheet*

Control panel displays cell contents

```
A:B14;  +B8+B9+B10+B11+B12                                                                READY

  A      A        B        C        D        E       F        G        H
  1    INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3            Q1       Q2       Q3       Q4      YTD
  4    ----------------------------------------------------------
  5    Net Sales  12000    19000    16000    22000
  6    ----------------------------------------------------------
  7   Costs and Expenses:
  8      Salary    2000     2000
  9      Int       1200     1400
 10      Rent       600      600
 11      Ads        900     2000
 12      COG       4000     4200
 13    ----------------------------------------------------------
 14    Op Exp      8700
 15    ----------------------------------------------------------
 16   Op Income
```

Result of formula

Note that the result 8700, not the formula
(+B8+B9+B10+B11+B12), appears in B14. Although 1-2-3
stores the formula you typed in B14, it displays the result of
the calculation in the worksheet's control panel and in the
preceding screen. Also note that you used cell addresses in the
formula rather than the values in those cells. You could have
entered the values +2000+1200+600+900+4000 as the formula.
Because you used cell addresses, however, you can change the
contents of any cell referred to in the formula and 1-2-3 will
automatically recalculate the formula. To see this happen, try
changing a Q1 Costs and Expenses figure:

Move   the cell pointer to B10

Type   1000   *to change the Rent for Q1*

Press   ENTER   *to enter the change in the worksheet*

1-2-3 recalculates the formula in B14 and changes the result
from 8700 to 9100. Now change the rent back to 600:

Type   600

Press   ENTER   *to enter the change in B10*

1-2-3 changes the Rent for Q1 back to 600 and recalculates the
formula in B14.

Totaling with @SUM

You can save time when adding a range of numbers, such as Q2 Operating Expenses, by using the 1-2-3 @SUM function (pronounced "at sum function"). **@Functions** are built-in 1-2-3 formulas that perform a variety of specialized mathematical, statistical, and financial calculations. (See Chapter 3 of *User Reference* for complete information on all the 1-2-3 @functions.) Each @function is made up of three parts:

- The @ (at sign), which you must type as the first character

- The name of the @function, which you can type in upper-case or lowercase letters

- One or more arguments enclosed in parentheses (An **argument** specifies the data the @function works on, and can be anything from a single value to a range of cells, depending on the particular function.)

The @SUM function lets you add a range of values without typing each + (plus sign) and cell address. You specify the range as the @SUM argument. To use @SUM to total Q2 Operating Expenses, do the following:

Move	the cell pointer to C14
Type	@sum(
Move	the cell pointer to C8 *(the first cell of the range to total)*
Press	. (period) *to anchor the cell pointer*
Move	the cell pointer to C12 *to highlight C8..C12, the @function argument*
Type	)
Press	**ENTER** *to enter the @SUM formula in the worksheet and display the result in C14*

The resulting worksheet with the Q2 Operating Expenses is shown below. Observe that the cell displays the result of the formula (10200) and the control panel shows the cell contents @SUM(C8..C12).

Cell contents   Result of formula

```
A:C14:  @SUM(C8..C12)                                                   READY:

  A     A        B       C       D       E      F    |  G     H
  1    INCOME STATEMENT 1989: Sloane Camera and Video |
  2                                                   |
  3             Q1       Q2      Q3      Q4     YTD    |
  4    -----------------------------------------------|
  5    Net Sales  12000   19000   16000   22000       |
  6    -----------------------------------------------|
  7    Costs and Expenses:                            |
  8      Salary    2000    2000                       |
  9      Int       1200    1400                       |
 10      Rent       600     600                       |
 11      Ads        900    2000                       |
 12      COG       4000    4200                       |
 13    -----------------------------------------------|
 14     Op Exp    8700   10200 --------------------   |
 15    -----------------------------------------------|
 16   Op Income
```

Copying Formulas

Once you create a formula in one location, you can copy it to other cells in the worksheet. Rather than type the @SUM formula again for the Q3, Q4, and YTD totals, you can copy the formula in C14 to cells D14, E14, and F14.

With the cell pointer in C14, do the following:

Select   /Copy

Press   ENTER *to accept C14..C14 as the range to copy FROM*

Now highlight the TO range, which is where you want to place copies of the formula, by doing the following:

Move   the cell pointer to D14

Press   . (period) *to anchor the cell pointer in D14*

Move   the cell pointer to F14 *to highlight D14..F14*

Press   ENTER *to accept D14..F14 as the range to copy TO*

The cell pointer returns to C14. Zeros appear in D14 through F14 because although you entered formulas, you have not yet entered numbers to calculate. Later in this lesson, you will enter the Q3 and Q4 Costs and Expenses figures. When you do this, 1-2-3 will automatically recalculate the formulas and display the correct total Operating Expenses for each quarter.

Relative References

Compare the formula in C14 with the formulas in D14 through F14. In C14 the formula appears in the control panel as @SUM(C8..C12).

Move   the cell pointer to D14

In D14 the formula appears in the control panel as
@SUM(D8..D12).

Move   the cell pointer to E14   *(Notice how the formula*
               changes.)

Move   the cell pointer to F14   *(Notice how the formula*
               changes.)

```
A:F14: @SUM(F8..F12)                                           READY

      A     A        B       C       D       E      F      G      H
      1  INCOME STATEMENT 1989: Sloane Camera and Video
      2
      3         Q1      Q2      Q3      Q4      YTD
      4  --------------------------------------------------
      5  Net Sales  12000   19000   16000   22000
      6  --------------------------------------------------
      7  Costs and Expenses:
      8    Salary    2000    2000
      9    Int       1200    1400
      10   Rent       600     600
      11   Ads        900    2000
      12   COG       4000  . 4200
      13  --------------------------------------------------
      14   Op Exp    8700   10200       0       0      0
      15  --------------------------------------------------
      16  Op Income
```

Relative formulas copied
from C14

@SUM(F8..F12)

@SUM(E8..E12)

@SUM(D8..D12)

@SUM(C8..C12)
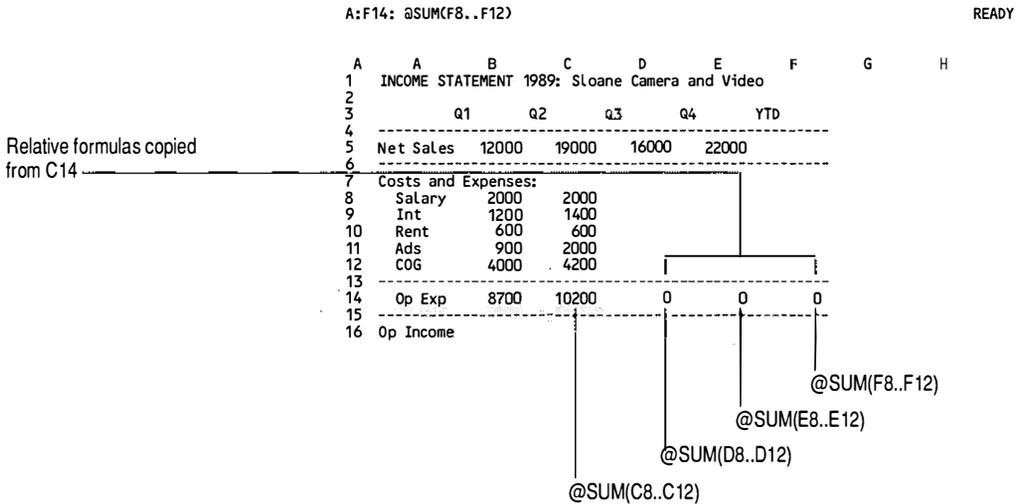
The formulas in D14, E14, and F14 are not exact copies of the
formula in C14. 1-2-3 has changed the range @SUM calculates
in each of the copied formulas. This is because the formula in
C14 uses a relative reference. A **relative reference** is a cell or
range address in a formula that 1-2-3 interprets by its location
relative to the cell that contains the formula. When you copy a
formula that contains a relative reference, you copy the rela-
tionship between the formula and the cell or range it refers to,
so 1-2-3 adjusts the addresses in the copied formulas to main-
tain that relationship.

Because the range address in the formula in C14 is relative,
1-2-3 interprets the formula as "calculate the sum of the range
that starts six rows above and ends two rows above the
current cell," not as "calculate the sum of range C8..C12." The
copied formulas in D14, E14, and F14 can be interpreted in
exactly the same way.

With relative references, you can easily create a series of formulas that operate on the same cell or range relative to each formula. Simply enter one of the formulas and then copy that formula to the remaining formula cells.

1-2-3 treats every cell or range address in a formula as a relative reference except when you precede the address's column letter(s) and/or row number(s) with a $ (dollar sign) to create an absolute or mixed reference. 1-2-3 handles absolute and mixed references differently from relative references in copied formulas. For more information on relative, absolute, and mixed references, see "Working with Formulas" in Chapter 1 of *User Reference*.

Entering More Formulas

Next, you will create a formula in B16 to calculate the Q1 Operating Income. Operating Income equals Net Sales minus Operating Expenses. The Q1 Net Sales figure is in B5 and the total Operating Expenses figure is in B14, so you will use the formula +B5-B14 to calculate the Q1 Operating Income. To enter this formula in B16, do the following:

Move   the cell pointer to B16

Type   **+b5-b14**   *(Remember to start formulas with a + (plus sign) when the first part of the formula is a cell address or range name.)*

Press   ENTER   *to enter the formula in the worksheet*

Your worksheet should look like this:

Formula to calculate Operating Income—

```
A:B16: +B5-B14                                              READY

      A     A        B       C        D       E      F      G      H
      1     INCOME STATEMENT 1989: Sloane Camera and Video
      2
      3               Q1      Q2       Q3      Q4     YTD
      4     ----------------------------------------------
      5     Net Sales  12000   19000    16000   22000
      6     ----------------------------------------------
      7     Costs and Expenses:
      8       Salary    2000    2000
      9       Int       1200    1400
      10      Rent       600     600
      11      Ads        900    2000
      12      COG       4000    4200
      13    ----------------------------------------------
      14    Op Exp      8700   10200        0       0      0
      15    ----------------------------------------------
      16    Op Income   3300
```

Now, with the cell pointer in B16, copy the Operating Income formula to C16, D16, E16, and F16:

Select	/Copy
Press	ENTER *to accept B16..B16 as the range to copy FROM*
Move	the cell pointer to C16
Press	. (period) *to anchor the cell pointer in C16*
Move	the cell pointer to F16 *to highlight C16..F16*
Press	ENTER *to accept C16..F16 as the range to copy TO*

Your worksheet should look like this:

```
A:B16: +B5-B14                                                    READY

A     A          B         C         D         E        F      G        H
1     INCOME STATEMENT 1989: Sloane Camera and Video
2
3                Q1        Q2        Q3        Q4       YTD
4     ---------------------------------------------------------------
5     Net Sales  12000     19000     16000     22000
6     ---------------------------------------------------------------
7     Costs and Expenses:
8       Salary   2000      2000
9       Int      1200      1400
10      Rent      600       600
11      Ads       900      2000
12      COG      4000      4200
13    ---------------------------------------------------------------
14    Op Exp     8700     10200         0         0        0
15    ---------------------------------------------------------------
16    Op Income  3300      8800     16000     22000        0
```

To finish the worksheet for this lesson, enter an @SUM formula to calculate the YTD Net Sales. You will use the range name you created at the end of Lesson 4 as the @SUM argument.

Move	the cell pointer to F5
Type	@sum(

After you type @sum and the opening parenthesis, you can press NAME to display all the range names in the worksheet.

| **Press** | NAME   *to display a list of range names* |

Range names available in worksheet ─────

```
A:F5:                                              NAMES
Enter name:
LINE            QTRLY_NETSALES
A      A        B        C       D       E     F    G     H
1   INCOME STATEMENT 1989: Sloane Camera and Video
2
3            Q1      Q2       Q3      Q4      YTD
4   ---------------------------------------------------
5   Net Sales  12000   19000   16000   22000
6   ---------------------------------------------------
```

Highlight   QTRLY_NETSALES   *as the range to total*

Press   ENTER   *to select QTRLY_NETSALES*

1-2-3 inserts the range name in the @function you are entering in the control panel.

Type   )

Press   ENTER   *to enter the @function in the worksheet*

Your worksheet should look like this:

```
A:F5: @SUM(QTRLY_NETSALES)                          READY
```

Range name in @function ─────

```
A      A        B        C       D       E     F    G     H
1   INCOME STATEMENT 1989: Sloane Camera and Video
2
3            Q1      Q2       Q3      Q4      YTD
4   ---------------------------------------------------
5   Net Sales  12000   19000   16000   22000   69000
6   ---------------------------------------------------
7   Costs and Expenses:
8    Salary    2000    2000
9    Int       1200    1400
10   Rent       600     600
11   Ads        900    2000
12   COG       4000    4200
13  ---------------------------------------------------
14   Op Exp    8700   10200      0       0       0
15  ---------------------------------------------------
16  Op Income  3300    8800   16000   22000   69000
```

Now use /Copy to set up YTD totals for each Costs and Expenses item (Salary, Interest, Rent, Ads, and COG) and for Operating Expenses.

Select   /Copy

Press   ENTER   *to accept F5..F5 as the range to copy FROM*

Move   the cell pointer to F8

Press   . (period)   *to anchor the cell pointer in F8*

Move   the cell pointer to F12 *to highlight F8..F12*

Press   ENTER   *to accept F8..F12 as the range to copy TO*

When you copy a formula that uses a range name, 1-2-3 treats the range name as a relative cell address. If you compare the formula in F5 with the formulas in F8 through F12, you can see how the formula changes.

Formula in F5   @SUM(B9..E9)   @SUM(B8..E8)

A:F5: @SUM(QTRLY_NETSALES)   READY

```
   A      A        B        C      D         E       F      G      H
   1   INCOME STATEMENT 1989: Sloane Camera and Video
   2
   3            Q1       Q2       Q3       Q4       YTD
   4   ----------------------------------------
   5   Net Sales   12000    19000    16000    22000    69000
   6   ----------------------------------------
   7   Costs and Expenses:
   8     Salary    2000     2000                       4000
   9     Int       1200     1400                       2600
  10     Rent       600      600                       1200
  11     Ads        900     2000                       2900
  12     COG       4000     4200                       8200
  13   ----------------------------------------
  14   Op Exp      8700    10200       0        0     18900
  15   ----------------------------------------
  16   Op Income   3300     8800    16000    22000    50100
```

@SUM(B12..E12)
@SUM(B11..E11)   Relative formulas
@SUM(B10..E10)   copied from F5

Saving Your Work

Finish this lesson by saving the file:

Select	/File
Select	Save
Type	INC6.WK3 *(to use with Lesson 6)*
Press	ENTER *to save INC6.WK3*

Lesson 6 Formatting and Printing a Worksheet

1-2-3 offers a variety of options for tailoring the appearance of your worksheet. The appearance of your worksheet is especially important if you want to print copies for others to look at. In this lesson you will

- Change cell formats to include a currency symbol

- Change the column width

- Align labels

- Insert rows and columns

- Automatically format numbers

- Print the worksheet

- Save your work and end 1-2-3

If you ended 1-2-3 at the end of the previous lesson, start 1-2-3 as described at the beginning of this chapter. Then use the following steps to retrieve INC6.WK3, the file you saved in Lesson 5. If you did not complete Lesson 5, retrieve the sample file named INC6S.WK3.

Select	/File
Select	Retrieve
Highlight	INC6.WK3 or INC6S.WK3 *(sample file)*
Press	ENTER *to retrieve the file*

```
A:F5: @SUM(QTRLY_NETSALES)                                          READY

  A      A         B        C        D        E       F       G       H
  1   INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3            Q1       Q2       Q3       Q4      YTD
  4   --------------------------------------------------------
  5   Net Sales  12000    19000    16000    22000    69000
  6   --------------------------------------------------------
  7   Costs and Expenses:
  8     Salary    2000     2000                       4000
  9     Int       1200     1400                       2600
 10     Rent       600      600                       1200
 11     Ads        900     2000                       2900
 12     COG       4000     4200                       8200
 13   --------------------------------------------------------
 14     Op Exp    8700    10200        0        0    18900
 15   --------------------------------------------------------
 16   Op Income   3300     8800    16000    22000    50100
 17
 18
 19
 INC6.WK3
```

Changing the Cell Format

1-2-3 lets you use several different cell formats and ways of displaying values and labels in worksheet cells. You might, for example, want to display some values with one decimal place (100.1) and others with a percent sign (14%).

You can specify one cell format for the entire worksheet with /Worksheet Global Format. You can also specify a variety of cell formats for individual cells and ranges with /Range Format. For this example, you will format two ranges (rows 5 and 16) using /Range Format.

In an income statement, the first and last rows of figures usually include a currency symbol, so Currency is the appropriate cell format for those rows. Format the first row of figures in the Sloane Camera and Video income statement (Net Sales) as Currency by completing the following steps.

| NOTE | The new format will make the numbers too wide to fit within the current column width, so 1-2-3 will display asterisks instead. Do not worry about the asterisks for now; you will fix them later on. |

Move   the cell pointer to B5

Select   /Range

Select   Format

Select   Currency

Press   ENTER   *to accept 2, the default number of decimal places*

Move   the cell pointer to F5   *to highlight B5..F5*

Press   ENTER   *to accept B5..F5 as the range to format*

The screen now looks like the following figure. As you can see in the control panel, even though the cell format changed and 1-2-3 is displaying asterisks in the formatted cells, the cells' contents remain the same.

```
                              Cell format (Currency, 2 decimal places)
                              ┌──┐
        A:B5:  (C2)  12000         ·   ·         ·        ·        READY
                                · ·                    ·
Cell contents ─────────────────────────────────────────────
        A      A       B       C        D      E       F     G     H
        1   INCOME  STATEMENT  1989: Sloane Camera and Video
Cell display ──────  2
        3            Q1       Q2       Q3       Q4       YTD
        4   ----------------------------------------------------------------
        5   Net Sales***********************************************
        6
```
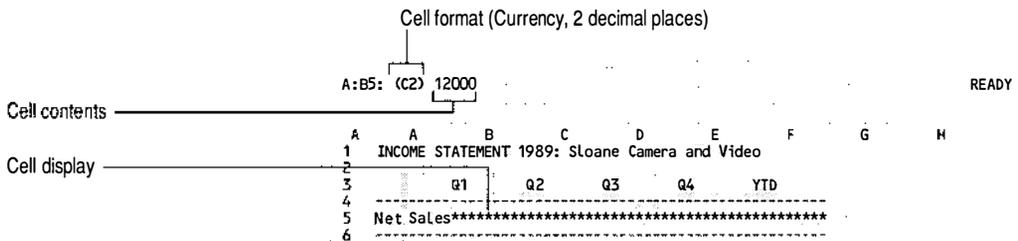
Now format the last row of figures (Operating Income) in Currency format:

Move   the cell pointer to B16

Select   /Range

Select   Format

Select   Currency

Press	ENTER *to accept 2, the default number of decimal places*
Move	the cell pointer to F16 *to highlight B16..F16*
Press	ENTER *to accept B16..F16 as the range to format*

Your worksheet should look like this:

```
A:B16: (C2) +B5-B14                                              READY

  A      A       B       C       D       E      F      G      H
  1   > INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3              Q1      Q2      Q3      Q4      YTD
  4   --------------------------------------------------------
  5   Net Sales******************************************
  6   --------------------------------------------------------
  7   Costs and Expenses:
  8     Salary    2000    2000                     4000
  9     Int       1200    1400                     2600
 10     Rent       600     600                     1200
 11     Ads        900    2000                     2900
 12     COG       4000    4200                     8200
 13   --------------------------------------------------------
 14   Op Exp     8700   10200       0       0    18900
 15   --------------------------------------------------------
 16   Op Income****************************************
```

Now display the Q1 and Q2 Costs and Expenses figures in Comma format with 2 decimal places. (Leave the Q3 and Q4 Costs and Expenses columns unformatted for use in later exercises.)

Move	the cell pointer to B8
Select	/Range
Select	Format
Select	, (Comma)
Press	ENTER *to accept 2, the default number of decimal places*
Move	the cell pointer to C14 *to highlight B8..C14*
Press	ENTER *to accept B8..C14 as the range to format*

Commas now appear in the numbers in that range. Next format the YTD Costs and Expenses figures in the same way:

Move	the cell pointer to F8
Select	/Range
Select	Format
Select	, (Comma)

Press	ENTER	*to accept 2, the default number of decimal places*
Move	the cell pointer to F14	*to highlight F8..F14*
Press	ENTER	*to accept F8..F14 as the range to format*

Changing the Column Width

The 1-2-3 default global column width (the width 1-2-3 uses for all columns unless you change it) is 9 characters. This width is not sufficient to display the numbers that you formatted as Currency with 2 decimal places, so 1-2-3 displays asterisks instead. By widening the columns that contain those figures to 12 characters, you will be able to see the actual values contained in those cells instead of asterisks. You can change the width of individual columns or ranges of adjacent columns in the worksheet using /Worksheet Column Set-Width or /Worksheet Column Column-Range Set-Width. In the following example, however, you will use a command that changes the width of *all* the columns in the worksheet:

Select	/Worksheet
Select	Global *(Global affects the entire worksheet.)*
Select	Col-Width

To change the global column width setting, you can type a new number (from 1 to 240) and press ENTER. Or, if you do not know the exact width you want, you can use → and ← to test different widths visually before you choose a width by pressing ENTER.

Press	→ three times *as you watch the worksheet*

Each time you press →, the columns grow wider. When the columns are wide enough, 1-2-3 replaces the asterisks in cells formatted as Currency with the actual entries. Until you press ENTER you can continue to press → and ← to change the column width. Try experimenting with the column sizes. When you finish, return the column width to 12 characters.

Press	ENTER *when the columns are 12 characters wide*

```
A:F8: (,2) @SUM(B8..E8)                                              READY

 A        A              B           C           D           E          F
 1   INCOME STATEMENT 1989: Sloane Camera and Video
 2
 3                       Q1          Q2          Q3          Q4         YTD
 4   ----------------------------------------------------------------------
 5   Net Sales      $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
 6   ----------------------------------------------------------------------
 7   Costs and Expenses:
 8     Salary        2,000.00    2,000.00                            4,000.00
 9     Int           1,200.00    1,400.00                            2,600.00
10     Rent            600.00      600.00                            1,200.00
11     Ads             900.00    2,000.00                            2,900.00
12     COG           4,000.00    4,200.00                            8,200.00
13   ----------------------------------------------------------------------
14     Op Exp        8,700.00   10,200.00           0           0  18,900.00
15   ----------------------------------------------------------------------
16   Op Income      $3,300.00   $8,800.00  $16,000.00  $22,000.00  $50,100.00
```

| NOTE | Remember in Lesson 2 you found that sometimes the display of long labels is cut off. You can display labels that are cut off, as well as values that are replaced by asterisks, by increasing the column width of the cells. |

Aligning Labels

The column labels in cells B3 through F3 (Q1 through YTD) do not line up with the figures in the columns. The labels are left-aligned while the columns of values below them are right-aligned. You cannot change the alignment of the values (values are always right-aligned), but you can change the alignment of the labels to make the worksheet look better.

The **label prefix**, a special character at the beginning of a label, controls the alignment of labels. The following table shows the 1-2-3 label prefixes and how they affect label alignment.

Label prefix	Cell display	Alignment
'	label	Left-aligned
^	label	Centered
"	label	Right-aligned
\	labellabellabellabellabel	Repeating

You can change the default left-alignment label prefix (') by typing an alternative label prefix when you enter a label. You can also change the alignment of a range of labels by using /Range Label. Changing the label alignment makes the worksheet easier to read. Commands that change the appearance of the worksheet, such as /Range Format and /Range Label, do

not change your data, only the way 1-2-3 displays and prints the data.

Try centering the labels in B3..F3. Start by moving the cell pointer to B3, which contains the column heading for Q1:

Move	the cell pointer to B3
Select	/Range
Select	Label
Select	Center
Move	the cell pointer to F3 *to highlight B3..F3*
Press	**ENTER** *to accept B3..F3 as the range of labels to center*

The column labels move to the center of each cell. In the control panel, the label prefix changes from the character for left-aligned labels (') to the character for centered labels (^).

Label prefix for centered labels

A:B3: ^Q1   READY

```
   A        A          B          C          D          E          F
 1    INCOME STATEMENT 1989: Sloane Camera and Video
 2
 3                     Q1         Q2         Q3         Q4         YTD
 4    -------------------------------------------------------------------
 5    Net Sales    $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
 6    -------------------------------------------------------------------
```

NOTE	Besides changing the alignment of labels, label prefixes are also used to enter labels that begin with a character other than a letter. For example, if you want to enter an address (such as 234 Eastland Drive) or a telephone number (such as 601-999-1111), you must precede the entry with a label prefix. 1-2-3 then interprets the entry as a label.

Inserting Rows and Columns

As you develop a worksheet, you may need to insert blank rows and columns either to improve the appearance of the worksheet or to make room for new data. 1-2-3 inserts rows between the current row (the row that contains the cell pointer) and the row above it, and inserts columns between the current column and the column to its left.

Inserting a blank row between the Net Sales and Costs and Expenses figures will make that part of the worksheet appear less crowded and easier to read. To insert a row, begin by moving the cell pointer to any cell in the row below where you want the new row to appear:

Move   the cell pointer to C7

Select   /Worksheet

Select   Insert

Select   Row

/Worksheet Insert Row adds an entire row that extends the length of the worksheet. You need to highlight only one cell for each row you want to insert.

Press   ENTER *to accept C7..C7 as the insert range*

1-2-3 moves the data in rows 7 through 16 down one row to open up a blank row. Your worksheet should look like this:

```
A:C7:                                                          READY

 A       A           B           C           D          E          F
 1   INCOME STATEMENT 1989: Sloane Camera and Video
 2
 3                      Q1          Q2          Q3         Q4         YTD
 4   ------------------------------------------------------------------
 5   Net Sales     $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
 6   ------------------------------------------------------------------
 7
 8   Costs and Expenses:
 9     Salary      2,000.00    2,000.00                            4,000.00
10     Int         1,200.00    1,400.00                            2,600.00
11     Rent          600.00      600.00                            1,200.00
12     Ads           900.00    2,000.00                            2,900.00
13     COG         4,000.00    4,200.00                            8,200.00
14   ------------------------------------------------------------------
15     Op Exp      8,700.00   10,200.00          0          0    18,900.00
16   ------------------------------------------------------------------
17   Op Income    $3,300.00   $8,800.00  $16,000.00  $22,000.00  $50,100.00
18
19
INC6.WK3
```

| NOTE | When a worksheet contains a formula that refers to a range and you insert a row within that range, all the cell addresses in the formulas change to reflect the new row/column relationships. You must, however, insert rows within the limits of the range. You cannot specify the first row referred to in the range as the insert range, because this moves the range down one row and inserts a row above the range. For example, if a worksheet contains the formula @SUM(B8..B12) and you specify B8..B8 as the insert range, 1-2-3 moves the data in rows 8 through 12 down one row and changes the formula to @SUM(B9..B13). |

Automatic Formatting

Normally, displaying a value in a particular cell format requires two separate operations: first you enter the value, and then you format the cell. To display $25.00 in a cell, for example, you enter 25 and then use /Range Format to format the cell as Currency, 2 decimal places. With **automatic formatting**, however, you can enter data and format the cell in the same step. When you use automatic formatting, 1-2-3 formats cells according to the way values look when you enter them. You can, for example, enter $25.00 to have 1-2-3 format the cell as Currency, 2 decimal places. Or, you can enter 35% to have 1-2-3 format the cell as Percent, 0 decimal places.

Automatic formatting is available both globally (for the entire worksheet) and for specific ranges. See /Worksheet Global Format or /Range Format in Chapter 2 of *User Reference* for more information.

Set Automatic format as the worksheet's global format by doing the following:

Select	/Worksheet
Select	Global
Select	Format
Select	Other
Select	Automatic

Any cells that have not been formatted with /Range Format are now set for automatic formatting.

To see the effect of automatic formatting, try entering the Q3 and Q4 Costs and Expenses figures as shown in the following tables. Because all the numbers contain a comma and two decimal places, 1-2-3 formats the cells in which you enter them as Comma, 2 decimal places.

| NOTE | Be sure to type the numbers exactly as they appear in the tables so that the cells will be formatted correctly. Do not leave out any commas or zeros. Notice that the cells D11 and E11 contain the value 600. In order to format these cells as Comma, you must type a 0 (as a thousands place holder) and a comma in front of the 600. |

In cell	Enter	In cell	Enter
D9	2,000.00	E9	2,500.00
D10	1,600.00	E10	1,600.00
D11	0,600.00	E11	0,600.00
D12	4,000.00	E12	4,500.00
D13	5,000.00	E13	8,000.00

Look at the resulting worksheet. 1-2-3 displays the values as you entered them, including commas and decimal points. If you move the cell pointer to any of these entries and check the control panel, you will see (, 2) displayed before the value. This means the cell is formatted for Comma, 2 decimal places. If you had entered a currency symbol with each value, 1-2-3 would have formatted the cells as Currency, 2 decimal places.

Comma format, 2 decimal places ──────────────┐   Cell contents

A:E13: (,2) 8000   READY

```
  A       A         B         C         D         E         F
  1  INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3                   Q1        Q2        Q3        Q4        YTD
  4  --------------------------------------------------------------
  5  Net Sales    $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
  6  --------------------------------------------------------------
  7
  8  Costs and Expenses:
  9    Salary     2,000.00   2,000.00   2,000.00   2,500.00   8,500.00
 10    Int        1,200.00   1,400.00   1,600.00   1,600.00   5,800.00
 11    Rent         600.00     600.00     600.00     600.00   2,400.00
 12    Ads          900.00   2,000.00   4,000.00   4,500.00  11,400.00
 13    COG        4,000.00   4,200.00   5,000.00   8,000.00  21,200.00
 14  --------------------------------------------------------------
 15  Op Exp       8,700.00  10,200.00     13200    17200     49,300.00
 16  --------------------------------------------------------------
 17  Op Income   $3,300.00  $8,800.00  $2,800.00  $4,800.00 $19,700.00
 18
 19
 INC6.WK3
```

Cell display ──────────────

Notice that 1-2-3 has recalculated the formulas you entered in Lesson 5, so there are now Operating Expenses totals for Q3 and Q4 (cells D15 and E15).

Move   the cell pointer to D15

Select   /Range

Select   Format

Select   , (Comma)

Press   ENTER   *to accept 2, the default number of decimal places*

Move   the cell pointer to E15 *to highlight D15..E15*

Press   ENTER   *to accept D15..E15 as the range to format*

Now that you have entered and formatted all the data for the income statement, your worksheet is ready to print.

Printing the Worksheet

NOTE   Before you continue with this lesson, be sure that your default printer is operative.

Print your work as follows:

Select   /Print

Select   Printer

After selecting /Print Printer, you must tell 1-2-3 which part of the worksheet you want to print by specifying a print range:

Select	Range
Press	HOME *to move to A1*
Press	. (period) *to anchor the cell pointer in A1*
Move	the cell pointer to F17 *to highlight A1..F17*
Press	ENTER *to accept A1..F17 as the print range*

When you print during a 1-2-3 session, your worksheet data goes through two steps before it reaches a network printer. First, the graph or data range is formatted for a particular type of printer like the HP LaserJet or Apple LaserWriter. Second, this formatted data is passed from 1-2-3 to standard UNIX print facilities like **lp** or **lpr**. 1-2-3 does not communicate directly with printers; the print spooler manages such options as page ejection or scrolling, number of copies, and print job priority. See the *1-2-3 Configuration Guide* for more details on selecting printers and print spoolers for 1-2-3.

Select	Align *to reset page numbers*
Select	Go *to open a print job and begin formatting the data*
Select	Page *to insert the formatting command that begins a new page*
Select	Quit *to close the print job, submit the data to the printer spooler, and return 1-2-3 to READY mode*

Once you have defined a print range, formatted the data, and closed the print job, you can begin another task immediately because 1-2-3 prints in the background. **Background printing** is a 1-2-3 feature that lets you continue to work while 1-2-3 prints. The printed worksheet should look like this:

```
INCOME STATEMENT 1989: Sloane Camera and Video

                    Q1         Q2         Q3         Q4        YTD
------------------------------------------------------------------
Net Sales    $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
------------------------------------------------------------------

Costs and Expenses:
  Salary       2,000.00   2,000.00   2,000.00   2,500.00   8,500.00
  Int          1,200.00   1,400.00   1,600.00   1,600.00   5,800.00
  Rent           600.00     600.00     600.00     600.00   2,400.00
  Ads            900.00   2,000.00   4,000.00   4,500.00  11,400.00
  COG          4,000.00   4,200.00   5,000.00   8,000.00  21,200.00
------------------------------------------------------------------
  Op Exp       8,700.00  10,200.00  13,200.00  17,200.00  49,300.00
------------------------------------------------------------------
Op Income     $3,300.00  $8,800.00  $2,800.00  $4,800.00 $19,700.00
```

This is a basic printed copy of the worksheet. If you want to enhance the appearance of a printed worksheet, you can use various 1-2-3 print options. For example, you may want to change the margins and create headers and footers that include information, such as page numbers and the current date. For more information on print options, see /Print Printer Options in Chapter 2 of *User Reference*.

Saving Your Work and Ending 1-2-3

You will finish this lesson (and the chapter) by saving the file.

Select	/File
Select	Save
Type	INC7.WK3 *(to use with Lesson 7 in Chapter 2)*
Press	ENTER *to save INC7.WK3*

If you want to continue to another chapter, skip the following steps. If you want to stop here, do the following:

Select   /Quit

Select   Yes *to end 1-2-3*

1-2-3 returns you to the operating system prompt.

Designing Worksheets Efficiently

Now that you know how to use 1-2-3 to build a worksheet, consider some essential issues. The worksheets you build become the basis for important decisions. The care you exercise in designing and building worksheets is the key to using 1-2-3 successfully. Try following these basic guidelines each time you build a new worksheet:

- Always start with a plan for your worksheet. Before you even start 1-2-3, it is a good idea to sketch out the worksheet. Consider the data you have and the questions you need to answer. Be specific at the outset about what you want to accomplish.

- Duplicate layouts with which you are familiar. If you use a particular layout in your account books or budget, use the same layout in your 1-2-3 worksheet.

- Use successful worksheets as models. Modify an existing worksheet and save it with a new file name to preserve the original.

- Arrange all worksheet data in either columns or rows, not a combination of both. A visually consistent worksheet is easier to read and reduces the possibility of mistakes.

- You have seen how frequently ranges are used in a worksheet. To make it easier to identify your data and use a worksheet, name ranges as often as possible and use those names in commands and formulas.

- Annotate formulas by including an explanatory note when you enter a formula. You can do this by typing a ; (semicolon) after the formula and then typing the note. For example, you can enter **@SUM(B8..B12);totals our**

quarterly cost and expenses. The annotation does not appear in the cell but does appear in the control panel when you move the cell pointer to that cell.

• Document your worksheets. As soon as the worksheet begins to take form, write down the logic, details, assumptions, and procedures you used to build the worksheet. If you document your worksheet, either in the worksheet itself or in another worksheet in the same file, you will find it easier to work with it later. In addition, you will make it easier for someone else to work with the worksheet.

• Check a new worksheet carefully; make sure the formulas do what you intend by testing them. Enter some sample values and check the results.

• Make a list of checks and balances, or tests that you might perform if you or someone else modifies the worksheet at a later date.

For More Information

Now that you have learned the fundamentals of 1-2-3, you have several options about what to do next. Use the reading path that suits your needs. Continuing with the *Tutorial*, choose from the following:

• Read Chapter 2 to learn about graphing worksheet data and printing graphs.

• Read Chapter 3 to learn about using several worksheets at a time, multiple-sheet files, and three-dimensional ranges.

• Read Chapter 4 to learn about database management.

• Read Chapter 5 to learn to create keystroke macros and use the record feature.

If you want to start on your own work now, rather than continue with this tutorial, read Chapter 1 of *User Reference* for a review of the fundamentals of 1-2-3. Then use Chapter 2 to learn about specific commands, Chapter 3 to learn to use @functions, and Chapter 4 to learn how to automate tasks with macros.
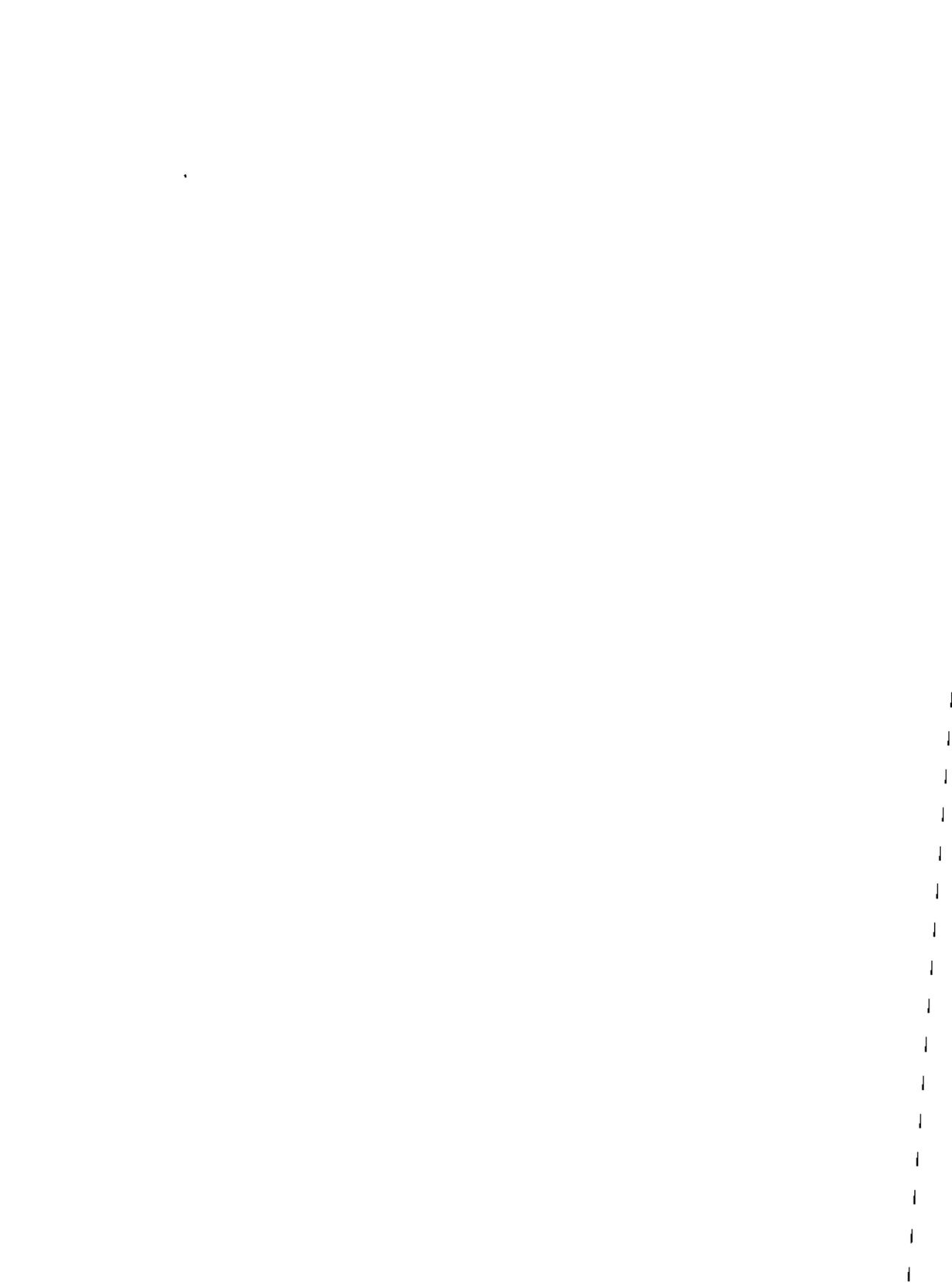
Chapter 2
Graphing Your Worksheet Data

With 1-2-3, you can visually represent your worksheet data with graphs. Graphs reveal important patterns of values in rows and columns and they can clarify overall trends. What is more, you can change the data in the worksheet, and 1-2-3 instantly redraws graphs to reflect the changes.

In this chapter, you will create several graphs using data in the Sloane Camera and Video income statement you created in Chapter 1. You will also learn how to add explanatory text and legends to your graphs, view graphs side-by-side with the worksheet data they are based on, and print the graphs you create.

To display graphs, *1-2-3 for System V* requires that you run 1-2-3 from an EGA or VGA console or SunRiver graphics terminal. If you are running 1-2-3 from other ASCII terminals or consoles, 1-2-3 cannot display the graphs discussed in this chapter.

Lesson 7 Creating Graphs

In this lesson, you will explore many different types of graphs and many options for refining graphs in 1-2-3. In addition, you will

- Create a **line graph**, which represents numeric values as points along a line

- Add explanatory text to a graph

- Switch the graph type

- Specify multiple data ranges at the same time

- Edit a graph title

- Add legends to a graph

- Save the current graph settings

To begin this lesson, start 1-2-3 as described at the beginning of Chapter 1. If you are already using 1-2-3, select /Worksheet Erase Yes to remove all files from memory and replace them with a single blank worksheet. Then use the following steps to retrieve INC7.WK3, the file you saved in Lesson 6. If you did not complete Lesson 6, retrieve the sample file named INC7S.WK3.

Select   /File

Select   Retrieve

Highlight   INC7.WK3 or INC7S.WK3

Press   ENTER *to retrieve the file*

The Sloane Camera and Video worksheet appears on the screen.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                          READY

    A        A          B          C          D          E          F
 1  INCOME STATEMENT 1989: Sloane Camera and Video
 2
 3                       Q1         Q2         Q3         Q4         YTD
 4  ---------------------------------------------------------------------------
 5  Net Sales      $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
 6  ---------------------------------------------------------------------------
 7
 8  Costs and Expenses:
 9    Salary          2,000.00   2,000.00   2,000.00   2,500.00   8,500.00
10    Int             1,200.00   1,400.00   1,600.00   1,600.00   5,800.00
11    Rent              600.00     600.00     600.00     600.00   2,400.00
12    Ads               900.00   2,000.00   4,000.00   4,500.00  11,400.00
13    COG             4,000.00   4,200.00   5,000.00   8,000.00  21,200.00
14                   ---------------------------------------------------------
15    Op Exp          8,700.00  10,200.00  13,200.00  17,200.00  49,300.00
16
17  Op Income       $3,300.00  $8,800.00  $2,800.00  $4,800.00 $19,700.00
18
19
INC7.WK3
```

Creating a Line Graph

Creating any type of 1-2-3 graph requires three basic steps:

- Specifying one or more data ranges to graph

- Selecting the graph type

- Viewing the graph

The first graph you will create in this lesson is a line graph showing how COG (cost of goods) expenses have changed over the year. Seeing this trend can help you make projections.

Specifying the Data to Graph

To create a graph, you must identify the range(s) in the worksheet that contains the values to be graphed. Each range of worksheet values to be graphed is called a **data range.** Most types of 1-2-3 graphs can include up to six different data ranges. You use the letters A through F to specify these data ranges.

The line graph you are going to create uses only one range of values: the range that contains the COG figures for each quarter (B13..E13). Complete the following steps to specify this range as the A data range:

Select   /Graph

Select   A   *(Select A when you want to graph only one range of values.)*

Move   the cell pointer to B13

Press   . (period)   *to anchor the cell pointer in B13*

Move   the cell pointer to E13   *to highlight B13..E13*

Press   ENTER   *to accept B13..E13 as the A data range*

Notice that the /Graph menu reappears when you press ENTER. Each time you select a /Graph command, unless you are selecting items from the /Graph Options menu, the /Graph menu reappears.

Selecting the Graph Type

Usually after you specify the graph data range(s), you select a graph type from the /Graph Type menu: Line, Bar, XY (scatter graph), Stacked-Bar, Pie, HLCO (high-low-close-open stock market graph), or Mixed (combined bar and line graph). Each displays data in a different way.

Because you are creating a line graph right now, however, you do not need to select a graph type. Line is the **default graph type**, the type of graph 1-2-3 creates when no other graph type has previously been selected.

Viewing the Graph

1-2-3 now has enough information to draw the graph. To look at the line graph, do the following:

Select   View   *to see the graph on your screen*

Data points

Thousands

9

8

7

6

5

4

3
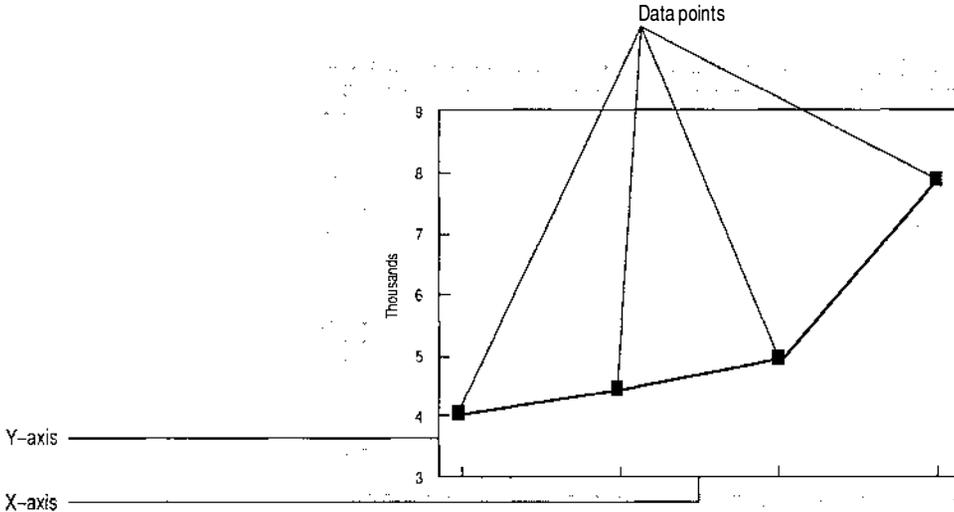
Y–axis

X–axis

The line graph has two axes: the x-axis (horizontal) and the y-axis (vertical). It depicts the quarterly COG values as four data points along a line. The position of each data point relative to the y-axis corresponds to the values that data point represents.

Press   **any key** *to return to the /Graph menu*

Adding Explanatory Text to a Graph

Although the data points in the graph accurately reflect the COG values in the worksheet, the graph provides no clues as to what the data points represent or what time period is being covered. You need to add explanatory text to the graph.

First you will identify the time periods being graphed by adding the labels Q1, Q2, Q3, and Q4 to the graph's x-axis. Then, you will add a two-line title to the graph.

Adding X-Axis Labels
You add x-axis labels to a graph by specifying the **X data range**, the worksheet range that contains the x-axis labels:

Select   X

Move   the cell pointer to B3

Press   . (period) *to anchor the cell pointer in B3*

Move   the cell pointer to E3 *to highlight B3..E3*

Press	ENTER *to accept B3..E3 as the X data range*
Select	View *to see the graph on your screen*

Now the graph includes an x-axis label for each data point on the line.

Labels along X-axis
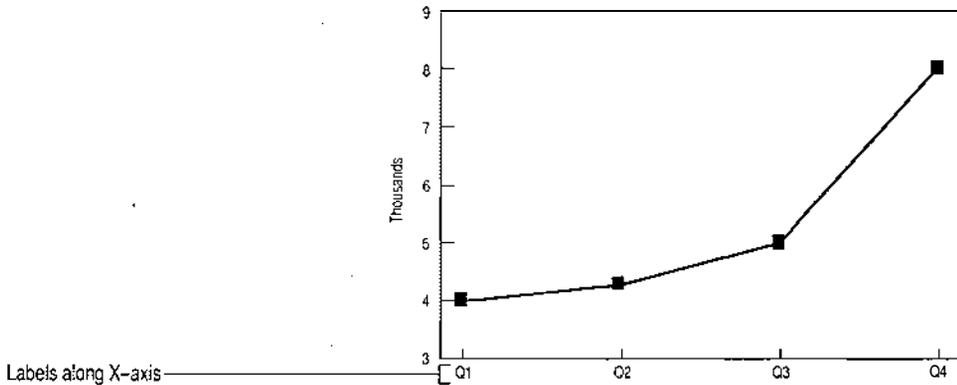
Press	**any key** *to return to the /Graph menu*

Adding a Graph Title
To add a two-line explanatory title to the graph, do the following:

Select	Options
Select	Titles
Select	First
Type	COST OF GOODS 1989
Press	ENTER *to enter the first line of the title*
Select	Titles
Select	Second
Type	Sloane Camera and Video
Press	ENTER *to enter the second line of the title*
Select	Quit *to return to the /Graph menu*
Select	View *to see the graph on your screen*

Notice the title at the top of the graph.

First line of title ——————————————————————————— COST OF GOODS 1989
Second line of title ——————————————————————————— Sloane Camera and Video
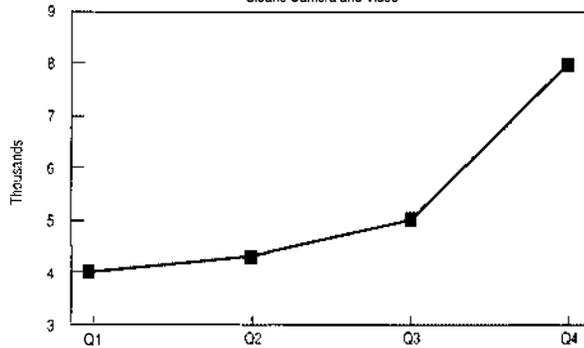
Press   **any key**   *to return to the /Graph menu*

Switching the Graph Type

It is often useful to create different types of graphs from the same data. That way, you can decide which graph best represents your data. For example, after viewing the COG data as a line graph, you might also want to view the data as a bar graph. In a bar graph, the values in the graph data range are represented as vertical bars. The height of each bar corresponds to the value the bar represents.

To view the COG data as a bar graph, do the following:

Select   Type
Select   Bar
Select   View   *to see the graph on your screen*

COST OF GOODS 1989
Sloane Camera and Video

Press   **any key**   *to return to the /Graph menu*

Suppose that after viewing the bar graph, you decide the line graph was more effective for showing how COG expenses for Sloane Camera and Video have changed from quarter to quarter. To switch back to the line graph, you would select /Graph Type Line.

Every time you switch graph types or change any other graph settings, the new graph replaces the previous graph and becomes the **current graph**, that is, the most recent graph created. The current graph appears on your screen when you select /Graph View. When you select /File Save, 1-2-3 automatically saves the current graph with the worksheet file.

Specifying Multiple Data Ranges at Once

The line and bar graphs you created to view Sloane Camera and Video's COG expenses over four quarters used a single data range. Suppose you now want to create a graph that shows how all the Costs and Expenses items (Salary, Interest, Rent, Ads, and COG) have changed over four quarters. To do this, you must specify four data ranges for the graph, with each data range containing Costs and Expenses items for a different quarter.

You could specify the data ranges by using four separate Graph commands: /Graph A for the first data range, /Graph B for the second data range, /Graph C for the third data range, and /Graph D for the fourth data range. But there is a shortcut. When the data ranges you want to graph are in

adjacent rows or columns, you can use /Graph Group to specify them collectively. To specify the four data ranges for the graph you are now creating in one step, do the following:

Select   Group

1-2-3 prompts you for the **graph group range**, the range that contains all the data ranges you want to include in the graph. 1-2-3 will divide the graph group range into the individual data ranges by columns or rows, starting with the X data range and proceeding through the A, B, C, D, E, and F data ranges. Therefore, when you specify the graph group range, you must always include the X data range, which, in this case, is the range containing the Costs and Expenses labels (A9..A13).

Move   the cell pointer to A9

Press   . (period) *to anchor the cell pointer in A9*

Move   the cell pointer to E13 *to highlight A9..E13*

Press   ENTER *to accept A9..E13 as the graph group range*

Now you must select either Columnwise or Rowwise to tell 1-2-3 whether to divide the graph group range into individual data ranges by columns or rows:

Select   Columnwise *(You want each column in the graph group range to be a data range for the graph.)*

This specifies A9..A13 as the X data range, B9..B13 as the A data range, C9..C13 as the B data range, D9..D13 as the C data range, and E9..E13 as the D data range for the graph.

Select   View *to see the graph on your screen*

1-2-3 displays a bar graph because Bar is the currently selected graph type. In this graph, each of the five x-axis labels (the five Costs and Expenses items) has four corresponding bars (the four quarterly values for that item). The four bars are shown in different shading patterns or colors to identify the quarter they represent.

The following illustrations show the relationship between the data in the Sloane Camera and Video worksheet and the graph.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                    READY

A        A           B           C           D          E            F
1    INCOME STATEMENT 1989: Sloane Camera and Video
2
3                    Q1          Q2          Q3          Q4          YTD
4    --------------------------------------------------------------------
5    Net Sales   $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
6    --------------------------------------------------------------------
7         X          A           B           C           D
8    Costs and Expenses:
9      Salary      2,000.00    2,000.00    2,000.00    2,500.00    8,500.00
10     Int         1,200.00    1,400.00    1,600.00    1,600.00    5,800.00
11     Rent          600.00      600.00      600.00      600.00    2,400.00
12     Ads           900.00    2,000.00    4,000.00    4,500.00   11,400.00
13     COG         4,000.00    4,200.00    5,000.00    8,000.00   21,200.00
14   --------------------------------------------------------------------
15   Op Exp        8,700.00   10,200.00   13,200.00   17,200.00   49,300.00
16   --------------------------------------------------------------------
17   Op Income    $3,300.00   $8,800.00   $2,800.00   $4,800.00  $19,700.00
18
19
INC7.WK3
```

Data ranges in worksheet

COST OF GOODS 1989
Sloane Camera and Video

X range
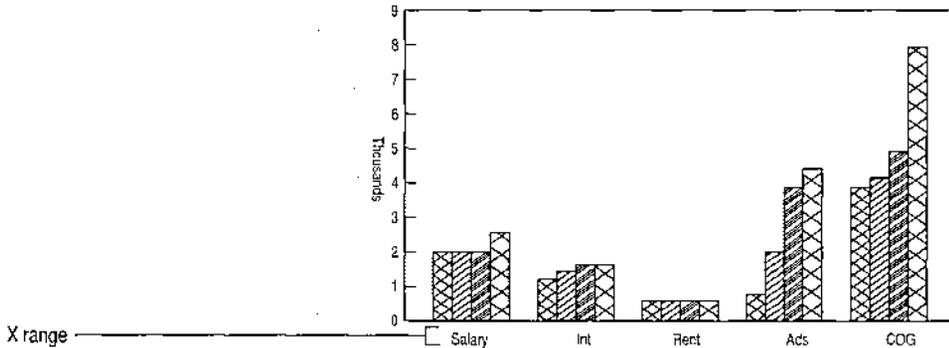
Editing the Graph Title

Notice that the first line of the title, COST OF GOODS 1989, is not appropriate for the new bar graph, which shows all costs and expenses for 1989. Edit this graph title by doing the following:

Press	any key	*to return to the /Graph menu*
Select	Options	
Select	Titles	
Select	First	

1-2-3 displays the first line of the current title in the control panel. You can edit it as you would edit a worksheet entry:

Move	the cursor to the space after the "T" in COST
Type	S
Move	the cursor to the "O" in OF
Press	→ eight times and **BACKSPACE** eight times
Type	AND EXPENSES

The complete first line of the title should read COSTS AND EXPENSES 1989.

Press	**ENTER** *to enter the new title*
Select	Quit *to return to the /Graph menu*
Select	View *to see the graph on your screen*

New title —————————————— COSTS AND EXPENSES 1989
Sloane Camera and Video
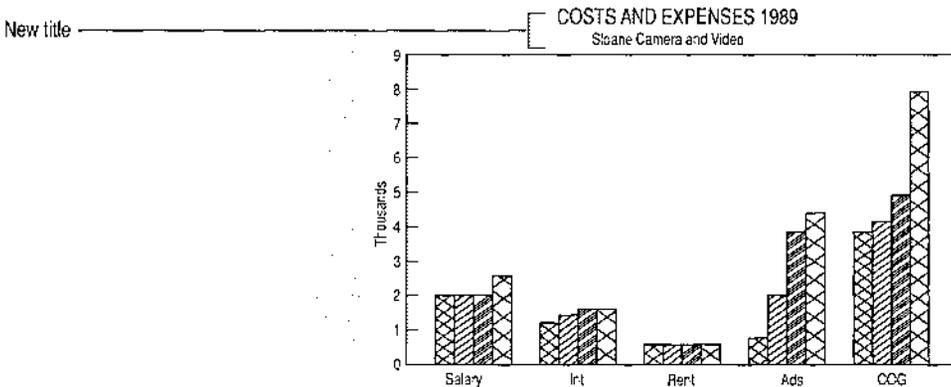
Press	**any key** *to return to the /Graph menu*

Adding Legends

For each x-axis label in the current bar graph, there are four differently shaded bars — one bar per data range. To identify what each color or shading pattern (called a **hatch** pattern) stands for in a graph, you create legends. A **legend** is an explanation of the color, symbol, or hatch pattern used to represent a particular data range. 1-2-3 places legends below the graph.

Like data ranges, you can set the legend for each data range one at a time or you can set all of the legends in one step. Because the labels you want to use for the legends are next to each other (Q1, Q2, Q3, and Q4 in range B3..E3), you can set them all at once.

Select	Options
Select	Legend
Select	Range
Move	the cell pointer to B3
Press	. (period) *to anchor the cell pointer in B3*
Move	the cell pointer to E3 *to highlight B3..E3*
Press	**ENTER** *to accept B3..E3 as the legend range*
Select	Quit *to return to the /Graph menu*
Select	View *to see the graph on your screen*

Now the bar graph has legends that correlate the shading patterns or colors to the data ranges.
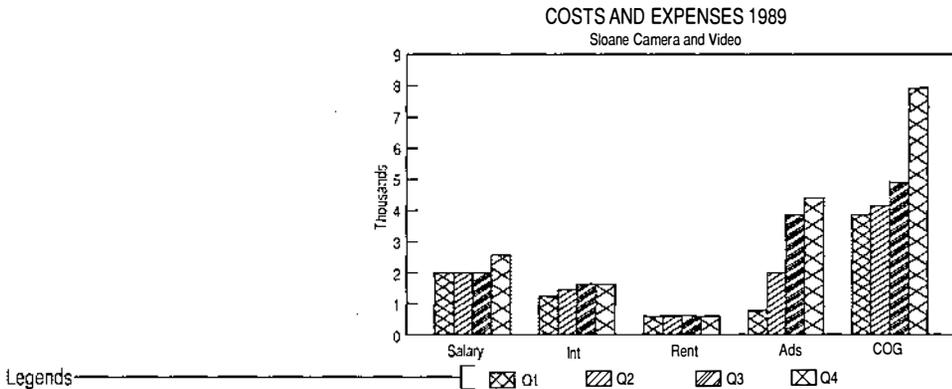
Press	**any key** *to return to the /Graph menu*

Saving the Current Graph Settings

Like any other changes you make to worksheet settings, the graph settings you establish while working in a file are saved when you save the file. Save the current file, and therefore the current graph settings, by doing the following:

Select	Quit *to return 1-2-3 to READY mode*
Select	/File
Select	Save
Type	INC8.WK3 *(to use with Lesson 8)*
Press	**ENTER** *to save INC8.WK3*

Lesson 8 Working with Several Graphs

In Lesson 7, you created three graphs by changing the current graph settings. Each time you changed the graph settings to create a new graph, the previous graph was lost. But suppose you want to create a new graph without losing the previous graph. For example, suppose you want to create three graphs in a file — one to show Costs and Expenses for each quarter, another to show Operating Expenses for a quarter, and another to show Operating Income for each quarter — and use the three graphs interchangeably without manually re-establishing their settings each time. To do so, you must name the graphs as you create them. In this lesson you will

- Name the current graph

- Create a new graph and name it

- View named graphs

- Save named graphs

- Change worksheet values and see the changing results in the current graph (what-if graphing)

Retrieve the INC8.WK3 file if it is not already on the screen. If you did not complete Lesson 7, retrieve the sample file named INC8S.WK3.

Select	/File
Select	Retrieve
Highlight	INC8.WK3 or INC8S.WK3
Press	**ENTER** *to retrieve the file*

The Sloane Camera and Video worksheet appears on the screen.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                    READY

A       A         B           C           D           E           F
1   INCOME STATEMENT 1989: Sloane Camera and Video
2
3                 Q1          Q2          Q3          Q4          YTD
4   ------------------------------------------------------------------------
5   Net Sales   $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
6   ------------------------------------------------------------------------
7
8   Costs and Expenses:
9     Salary     2,000.00    2,000.00    2,000.00    2,500.00    8,500.00
10    Int        1,200.00    1,400.00    1,600.00    1,600.00    5,800.00
11    Rent         600.00      600.00      600.00      600.00    2,400.00
12    Ads          900.00    2,000.00    4,000.00    4,500.00   11,400.00
13    COG        4,000.00    4,200.00    5,000.00    8,000.00   21,200.00
14  ------------------------------------------------------------------------
15  Op Exp       8,700.00   10,200.00   13,200.00   17,200.00   49,300.00
16  ------------------------------------------------------------------------
17  Op Income   $3,300.00   $8,800.00   $2,800.00   $4,800.00  $19,700.00
18
19
INC8.WK3
```

Naming the Current Graph

Frequently, you will want to create several graphs in the same file and work with them interchangeably. To do so, you must name the graphs as you create them. Naming a graph causes 1-2-3 to store all the settings for that graph, so you can redisplay the graph at any time.

Choose a descriptive name for the graph. For example, QTRLY_NETSALES is an appropriate name for a graph that shows Net Sales for each quarter. Like range names, graph names can be almost any combination of up to 15 characters. They should not, however, include spaces, commas, semicolons, or the characters + * − / & > < @ #. When typing a graph name, you can use uppercase or lowercase letters.

Right now, the current graph in the Sloane Camera and Video file is the last graph you created in Lesson 7 (the bar graph representing 1989 Costs and Expenses). View the bar graph so that you can see that 1-2-3 saved the current graph settings when you saved the Sloane Camera and Video file.

Select   /Graph

Select   View

By naming this graph, you will be able to change the current graph settings in order to create a new graph and still be able to view this bar graph later. To name the current graph, do the following:

Press   **any key** *to return to the /Graph menu*

Select   Name

Select   Create

Type   89_EXPENSES

Press   ENTER *to name the graph*

Although nothing appears to happen, you now have a graph named 89_EXPENSES based on the current graph settings. When you create a new graph by changing graph settings, you will still be able to display this bar graph by selecting /Graph Name Use (described later in this lesson).

| CAUTION | Naming a graph does not automatically save the graph. Like named ranges, named graphs are not saved until you save the file with /File Save. You will save the graphs you are naming when you save the file at the end of this lesson.

Creating a New Graph and Naming It

Now you are going to create a new graph and name it, so you will have two named graphs in the Sloane Camera and Video file. The new graph will be a pie chart. A **pie chart** is a circular graph that shows the relationship between a set of values (in 1-2-3, the set of values in the A data range). Each value is represented as a slice of pie. If one value is twice as large as another, for example, it gets a slice that is twice as large as the other. A pie chart is useful for comparing parts to the whole. The pie chart you create will compare the percentages of Q1 Operating Expenses spent on each of the Costs and Expenses items: Salary, Interest, Rent, Ads, and COG.

You have two options when creating a new graph. You can modify the existing current graph settings, or you can delete all the current graph settings and start with a clean slate. In this case, you will delete all of the current settings and start over.

Resetting the Graph

Select   Reset

Select   Graph   *to delete all current graph settings including options*

Now you are ready to create the new graph.

Creating the Pie Chart

Because a pie chart compares parts to the whole, you can graph only a single range of values. The value in each cell of the range becomes one slice in the pie. You identify the slices of pie with labels. Pie charts use the X data range for this purpose. Because there is no x-axis in a pie chart, 1-2-3 places labels next to the corresponding slices of the pie.

You are going to use /Graph Group to specify the Costs and Expenses labels (A9..A13) as the X data range and the Q1 Costs and Expenses values (B9..B13) as the A data range simultaneously.

Select   Group

Move   the cell pointer to A9

Press   . (period) *to anchor the cell pointer in A9*

Move   the cell pointer to B13   *to highlight A9..B13*

Press   ENTER *to accept A9..B13 as the graph group range*

Select   Columnwise *(You want each column in the graph group range to be a data range for the graph.)*

Complete the following steps to select the graph type:

Select   Type

Select   Pie

You have already viewed the current graph by selecting View from the /Graph menu. You can also use a shortcut. Pressing GRAPH allows you to view the current graph either from READY mode or from any menu.

Try using this key to view the new graph:

Press   GRAPH *to see the graph on your screen*
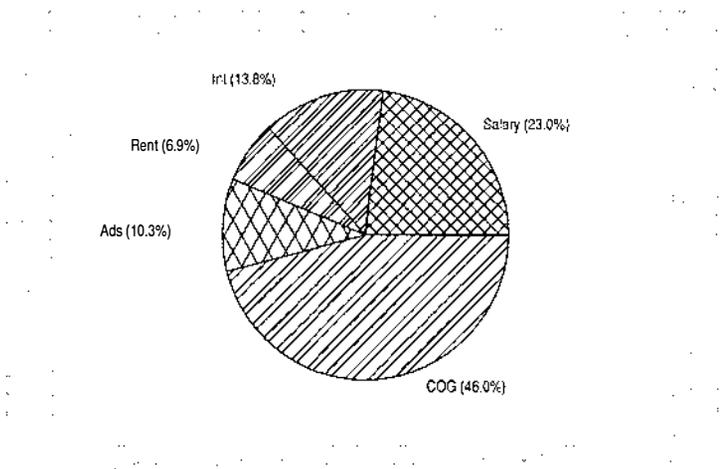
You now have a pie chart with five slices. Each slice represents a Q1 Costs and Expenses value. 1-2-3 automatically calculates each slice's percentage of the whole and displays the percentage on the screen. The X data range labels serve to identify the pie slices. Legends are unnecessary because only one numeric value can be associated with each label.

Press   **any key** *to return to the /Graph menu*

Adding a Title
Complete the graph by adding a title:

Select   Options

Select   Titles

Select   First

Type   COSTS AND EXPENSES — 1st Quarter

Press   ENTER *to enter the first line of the title*

Select   Titles

Select   Second

Type   Sloane Camera and Video

Press   ENTER *to enter the second line of the title*

Select   Quit *to return to the /Graph menu*

Press   GRAPH *to see the graph on your screen*

The title appears at the top of the graph:

COSTS AND EXPENSES — 1st Quarter
Sloane Camera and Video

Int (13 8%)

Rent (6.9%)

Salary (23.0%)

Ads (10.3%)

COG (46.0%)
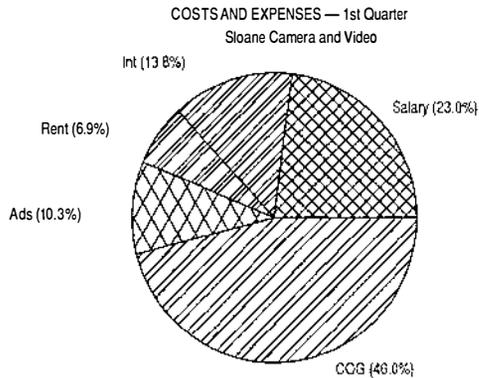
Press   any key *to return to the /Graph menu*

Naming the New Graph
Now name the pie chart so that you have two named graphs
associated with this file:

Select   Name

Select   Create

The name of the first graph you named appears in the control
panel. This serves as a reminder of the graph names you have
already used.

Type   QTR1_EXPENSES

Press   ENTER *to name the graph*

Viewing Named Graphs

Both the bar graph and the pie chart now have names and will be saved when you save the worksheet file. Use the following steps to view each graph:

Select   Name

Select   Use

Highlight   89_EXPENSES

Press   ENTER   *to view the graph 89_EXPENSES*

1-2-3 displays the bar graph you named earlier in this lesson.

Press   **any key**   *to return to the /Graph menu*

Select   Name

Select   Use

Highlight   QTR1_EXPENSES

Press   ENTER   *to view the graph QTR1_EXPENSES*

1-2-3 displays the pie chart.

Press   **any key**   *to return to the /Graph menu*

Select   Quit   *to return 1-2-3 to READY mode*

| CAUTION | When you select /Graph Name Use to display a named graph, 1-2-3 replaces the current graph settings with the named graph's settings. Therefore, if you have not named the current graph and you want to keep it, you must name the graph before selecting /Graph Name Use to work with a different graph.

Saving the Named Graphs

Whenever you save a worksheet file, 1-2-3 saves all the named graphs associated with that file. To save both the 89_EXPENSES and QTR1_EXPENSES graphs, you must save the current version of the Sloane Camera and Video file:

Select   /File

Select   Save

Type   INC9.WK3

Press   ENTER   *to save INC9.WK3*

What-If Graphing

Suppose that the figures in the worksheet represent projected data rather than actual data for the store. After looking at the forecast, Sloane Camera and Video decides they need to increase Q3 Operating Income. To do this, you must determine which Q3 Costs and Expenses to cut and how much to cut them. The easiest way to try out different cost scenarios and immediately see the changing results in a graph is to use /Worksheet Window Graph. This command lets you view the current graph alongside the worksheet data on which the graph is based. When you change a figure in the worksheet, you see the change take effect in the graph.

You are going to create a new pie chart that shows Operating Income for each quarter, and then use that graph to see the effect of changing Q3 Costs and Expenses figures in the worksheet.

Creating a New Graph
Before you can create the new graph, delete the current graph settings by doing the following:

Select   /Graph

Select   Reset

Select   Graph

1-2-3 deletes the current graph settings.

Now you need to specify Q1 through Q4 Operating Income (B17..E17) as the range of values to graph, and the Q1 through Q4 labels (B3..E3) as the range of labels for the pie slices. Because these two data ranges are not adjacent, you cannot use /Graph Group to specify them collectively. You must specify each data range individually.

Select   A

Move   the cell pointer to B17

Press   . (period) *to anchor the cell pointer in B17*

Move   the cell pointer to E17 *to highlight B17..E17*

Press   ENTER *to accept B17..E17 as the A data range*

Select the graph type by doing the following:

Select   Type

Select   Pie

Complete the following steps to specify labels for the slices of pie:

Select   X

Move   the cell pointer to B3

Press   . (period) *to anchor the cell pointer in B3*

Move   the cell pointer to E3   *to highlight B3..E3*

Press   ENTER *to accept B3..E3 as the X data range*

Now, view the new pie chart:

Press   GRAPH *to see the graph on your screen*
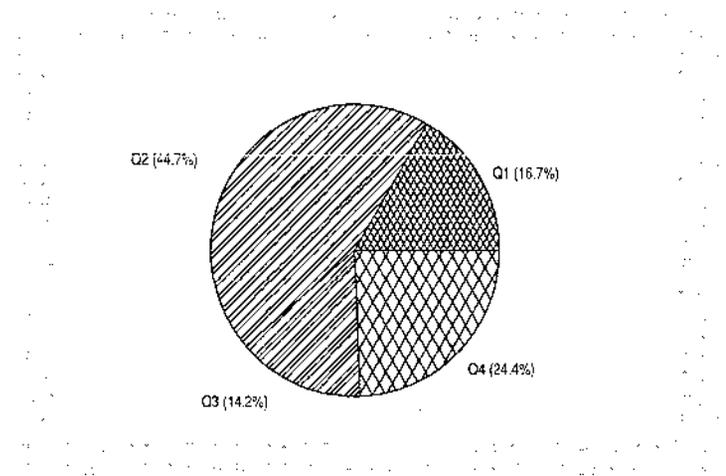
Press   **any key** *to return to the /Graph menu*

Select   Quit *to return 1-2-3 to READY mode*

Displaying the Graph in a Window

If you are running 1-2-3 on a graphics terminal, you can divide the current worksheet region into a data window and a graph window. As you change data, the graph will change.

You are going to divide the current worksheet region into a data window and graph window. You can make the graph any width you choose. Place the cell pointer in the cell where you want the left edge of the graph window to begin:

Move   the cell pointer to any cell in column E

Select   /Worksheet

Select   Window

Select   Graph

On graphics consoles or terminals, the current graph appears in the right region of your worksheet.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                    READY

A        A            B          C           D         E         f
1   INCOME STATEMENT 1989: Sloane Camera and Video
2
3                      Q1         Q2          Q3
4   --------------------------------------------------
5   Net Sales     $12,000.00  $19,000.00  $16,000.00  Q2(44.7%)
6   --------------------------------------------------
7
8   Costs and Expenses:
9     Salary        2,000.00    2,000.00    2,000.00
10    Int           1,200.00    1,400.00    1,600.00
11    Rent            600.00      600.00      600.00
12    Ads             900.00    2,000.00    4,000.00
13    COG           4,000.00    4,200.00    5,000.00
14  --------------------------------------------------
15   Op Exp         8,700.00   10,200.00   13,200.00
16  --------------------------------------------------
17  Op Income      $3,300.00   $8,800.00   $2,800.00
18
19
INC9.WK3
```

With the graph on the screen you can still move around in the worksheet. Try it:

Press   HOME   *to move to A1*

Changing Values in the Worksheet

Watch the Q3 slice of the pie chart change when you enter a lower Q3 Salary figure in the worksheet.

Move   the cell pointer to D9

Type   1200

Press   ENTER

Lowering the Q3 Salary figure raises the Q3 Operating Income figure by $800. The graph adjusts to reflect this change. Now see the effect of a lower Q3 Ads figure.

Move   the cell pointer to D12

Type   2500

Press   ENTER

Lowering the Q3 Ads figure increases the Q3 Operating Income from $2,800 to $5,100, and so the graph changes again.

Continue experimenting on your own. Try changing Costs and Expenses for other quarters and see how the graph changes.

Closing the Graph Window

To finish up this lesson, remove the window you created for the graph:

Select   /Worksheet

Select   Window

Select   Clear

The graph window disappears and you can see the entire Sloane Camera and Video worksheet again.

| NOTE | Because you were just trying out different cost scenarios in the last exercise, you are not going to save the changes you made to the worksheet data and graph settings during the exercise.

Lesson 9 Printing Graphs

Before you begin this lesson, verify that you have defined a graphics printer in the **setup123** utility. Make sure you have used /Print Printer Options Advanced Device Name to make this printer the current printer. Also, before proceeding, make sure that your printer is turned on, is online, and that the paper is adjusted so printing will begin at the top of the page.

In this lesson you will

- Print the current graph

- Print a named graph

- Print a graph along with worksheet data

You will begin this lesson by retrieving the sample file named INC9S.WK3. This file is exactly like the file you were working with in Lesson 8 before you tried out different cost scenarios.

Select   /File

Select   Retrieve

Highlight INC9S.WK3

Press   ENTER *to retrieve INC9S.WK3*

The Sloane Camera and Video worksheet appears on the screen.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                    READY

  A       A          B            C            D            E            F
  1    INCOME STATEMENT 1989: Sloane Camera and Video
  2
  3                   Q1           Q2           Q3           Q4           YTD
  4    ------------------------------------------------------------------------
  5    Net Sales   $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
  6    ------------------------------------------------------------------------
  7
  8    Costs and Expenses:
  9      Salary     2,000.00    2,000.00    2,000.00    2,500.00    8,500.00
 10      Int        1,200.00    1,400.00    1,600.00    1,600.00    5,800.00
 11      Rent         600.00      600.00      600.00      600.00    2,400.00
 12      Ads          900.00    2,000.00    4,000.00    4,500.00   11,400.00
 13      COG        4,000.00    4,200.00    5,000.00    8,000.00   21,200.00
 14    ------------------------------------------------------------------------
 15      Op Exp     8,700.00   10,200.00   13,200.00   17,200.00   49,300.00
 16    ------------------------------------------------------------------------
 17    Op Income   $3,300.00   $8,800.00   $2,800.00   $4,800.00  $19,700.00
 18
 19
 INC9S.WK3
```

Printing the Current Graph

You can print the current graph or any named graph. You are going to print the current graph in the INC9S.WK3 file. Start by verifying that the current graph is the pie chart showing Q1 Costs and Expenses (QTR1_EXPENSES).

Press	GRAPH *to view the pie chart*
Press	**any key** *to return 1-2-3 to READY mode*

(The pie chart representing Operating Income is not the current graph because you did not save the file after you created that graph at the end of Lesson 8.)

Now print the graph:

Select	/Print
Select	Printer
Select	Image *to print a graph*
Select	Current *to print the current graph*
Select	Go *to begin formatting the graph for the print spooler*
Select	Quit *to close the print job and submit the formatted graph data to the print spooler*

1-2-3 prints the pie chart representing Q1 Costs and Expenses.

Printing a Named Graph

Use the following steps to print a named graph without first making it the current graph. If there is enough room on the page, 1-2-3 will print the next graph on the same page. Otherwise, 1-2-3 will automatically skip to the top of the next page before printing. To print the named graph, do the following:

Select	/Print
Select	Printer
Select	Image *to print a graph*
Select	Named-Graph *to print a named graph*
Highlight	89_EXPENSES
Press	ENTER
Select	Go *to open a print job and begin formatting the graph data*

1-2-3 formats the bar graph.

Select   Page *to send the formatting command that begins the new page*

Select   Quit *to close the print job and submit the formatted graph data to the print spooler*

| NOTE | Printing 89_EXPENSES does not make the bar graph the current graph. The pie chart, QTR1_EXPENSES, is still the current graph.

Printing a Graph with Worksheet Data

Until now you have printed graphs on pages by themselves. You can also print a graph (either the current graph or any named graph) on the same page as worksheet data. Use the following steps to print a graph and worksheet data on the same page. This procedure will print the data first and then the graph. (If you want to print the graph first, reorder the steps accordingly.)

Printing the Worksheet Data

You are going to print the range that contains the Q1 through Q4 Costs and Expenses figures. To print the data first, do the following:

Select   /Print

Select   Printer

Select   Range

Move   the cell pointer to A8 *(If necessary, press ESC to clear the default range before moving the cell pointer to A8.)*

Press   . (period) *to anchor the cell pointer in A8*

Move   the cell pointer to E13 *to highlight A8..E13*

Press   ENTER *to accept A8..E13 as the range you want to print*

Select   Go *to open a print job and begin formatting the data*

1-2-3 formats the worksheet data.

Printing the Graph

To print the graph on the same page as the worksheet data, do the following:

Select	Image *to print a graph*
Select	Named-Graph *to print a named graph*
Highlight	89_EXPENSES
Press	ENTER
Select	Go *to begin formatting the graph data*
Select	Page *to send a "new page" command to the formatting program*
Select	Quit *to close the print job and submit the formatted worksheet and graph data to the print spooler*

1-2-3 prints the bar graph to appear on the same page as the worksheet data.
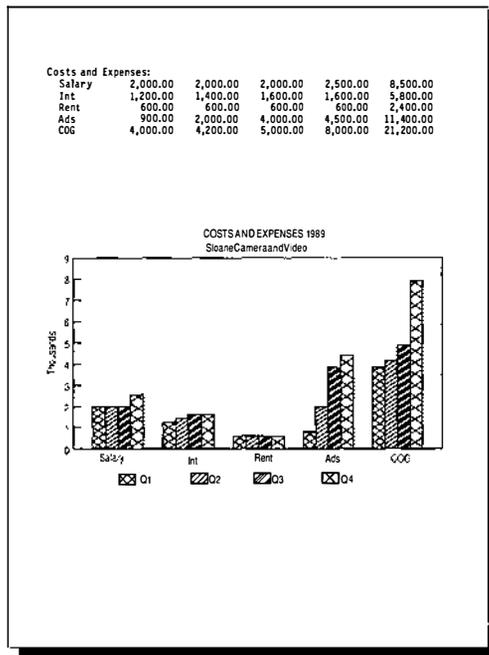
If you want to end 1-2-3 now, select /Quit Yes.

For More Information

This chapter includes basic information about graphing worksheet data. You have learned how to create line and bar graphs as well as pie charts. 1-2-3 also includes other types of graphs, such as high-low-close-open (stock market), XY (scatter), mixed (combined bar and line), and stacked-bar graphs.

Although you have learned how to add explanatory text to a graph (such as a title, x-axis labels, legends), you can also create much more sophisticated graphs in 1-2-3. The /Graph and /Print menus contain commands that refine graphs. You can use these more advanced commands after you create the basic graph. You might, for example, try any of the following:

- Set colors, hatch patterns, and fonts for the elements in a graph

- Display grid lines in a graph

- Change the scaling of a graph's axes

- Change the way numbers are displayed along a graph's axis

- Add footnotes to a graph

- Rotate a graph when you print it

- "Explode" (separate and lift out) one or more slices of a pie chart for emphasis

- Change the size of the printed graph

- Change the density of the printed graph

You may also want to explore creating graphs with the automatic graphing feature, which lets 1-2-3 automatically determine the data you want to graph based on the position of the cell pointer.

For more information about graphing your data, see "Graph Commands" in Chapter 2 of *User Reference.*

For more information on printing your graphs, see "Print Commands" in Chapter 2 of *User Reference.*

Chapter 3
Using Multiple Worksheets and Files

Learning how to manage multiple-sheet files is important for network users who need to merge, or **consolidate**, worksheet data created on other personal computers or workstations on the network. Running 1-2-3 on your UNIX System V system, you can copy or share single-sheet files created by 1-2-3 Release 2.2 users on your network or multiple-sheet files created by other network users running 1-2-3 Release 3, 1-2-3/M, or *1-2-3 for VAX/VMS.*
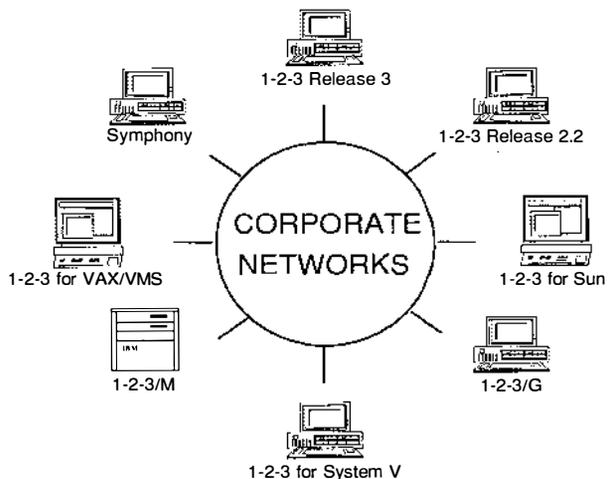
The 1-2-3 files you worked with in previous chapters were **single-sheet files** — files that contain just one worksheet. For the small amount of data in those files, one worksheet was sufficient. For larger amounts or more diverse collections of data, however, it is usually best to divide the data among several worksheets in **multiple-sheet files**.

For example, say you have a chain of stores and want to create a file that contains an income statement for each store as well as consolidated data for the entire chain. With a single-sheet file, you would have to enter all the income statements and the consolidated data in different areas of the same worksheet, format the different data areas one at a time, and probably spend a lot of time pressing keys to move from one area to another. But with a multiple-sheet file, you can enter each store's income statement in a separate worksheet and use another worksheet for the consolidated data. In addition, you can format all the data areas at once, and you can move from one area to another with a single keystroke.

Not only will you learn how to create and work with multiple-sheet files in this chapter, you will learn how to read several files into memory at the same time and how to create **linked files**, or files that are connected by a formula that uses data in another file.

Lesson 10 Getting Acquainted with Multiple Worksheets

To use multiple-sheet files you need to learn a few skills. In this lesson you will

- Add new worksheets to a file

- Move from one worksheet to another

- Format all the worksheets in a file simultaneously

- Copy data from one worksheet to another

- Edit the worksheet titles

- Save your work

To begin this lesson, start 1-2-3 as described at the beginning of Chapter 1. If you are already using 1-2-3, select /Worksheet Erase Yes to remove all files from memory and replace them with a single blank worksheet. Then retrieve the sample file named INC10S.WK3. This is a copy of the Sloane Camera and Video worksheet you worked with in Lesson 9.

Select	/File
Select	Retrieve
Highlight	INC10S.WK3
Press	ENTER *to retrieve INC10S.WK3*

The Sloane Camera and Video worksheet appears on the
screen. When you created this income statement, the company
had only one store, which was located in Boston. Since then,
the company has opened a new franchise in Chicago. This
means you need to add a projected income statement for the
Chicago store to the Sloane Camera and Video file, as well as
an income summary that consolidates the figures for both
stores.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                    READY

    A        A           B            C            D            E            F
 1     INCOME STATEMENT 1989: Sloane Camera and Video
 2
 3                     Q1           Q2           Q3           Q4          YTD
 4     -------------------------------------------------------------------------
 5     Net Sales    $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
 6     -------------------------------------------------------------------------
 7
 8     Costs and Expenses:
 9       Salary      2,000.00    2,000.00    2,000.00    2,500.00    8,500.00
10       Int         1,200.00    1,400.00    1,600.00    1,600.00    5,800.00
11       Rent          600.00      600.00      600.00      600.00    2,400.00
12       Ads           900.00    2,000.00    4,000.00    4,500.00   11,400.00
13       COG         4,000.00    4,200.00    5,000.00    8,000.00   21,200.00
14     -------------------------------------------------------------------------
15     Op Exp        8,700.00   10,200.00   13,200.00   17,200.00   49,300.00
16     -------------------------------------------------------------------------
17     Op Income    $3,300.00   $8,800.00   $2,800.00   $4,800.00  $19,700.00
18
19
INC10S.WK3
```

Instead of adding the data for Sloane Camera and Video's
Chicago store to the worksheet you see on the screen, you are
going to insert two new worksheets in the file, one for the
Boston store and one for the Chicago store. In the original
worksheet, you will consolidate the data for both stores.

Before you insert the new worksheets, however, change your
screen display so you will be able to view several worksheets
simultaneously:

Select	/Worksheet
Select	Window
Select	Perspective

What you see on your screen is called a perspective view. In **perspective view**, 1-2-3 displays three or more consecutive worksheets stacked at an upward slope. Because you have not yet added new worksheets to the file, 1-2-3 displays only worksheet A. Notice, however, two empty spaces have been left for new worksheets.

| NOTE | You can specify how many worksheets are displayed in perspective mode with the command line option -p*n* where *n* is 3-26. For more information on command-line options, see *Introducing 1-2-3 for System V*.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video'                    READY


A:A1 is current cell ─────────────────┐




                          ┌ A    A       B          C          D         E       F
                          │ 1  INCOME STATEMENT 1989: Sloane Camera and Video
Worksheet A ──────────────│ 2
                          │ 3        Q1        Q2         Q3        Q4       YTD.
                          │ 4  ---------------------------------------------------------
                          │ 5  Net Sales  $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
                          │ 6  ---------------------------------------------------------
File name ────────────────┘ INC10S.WK3
```
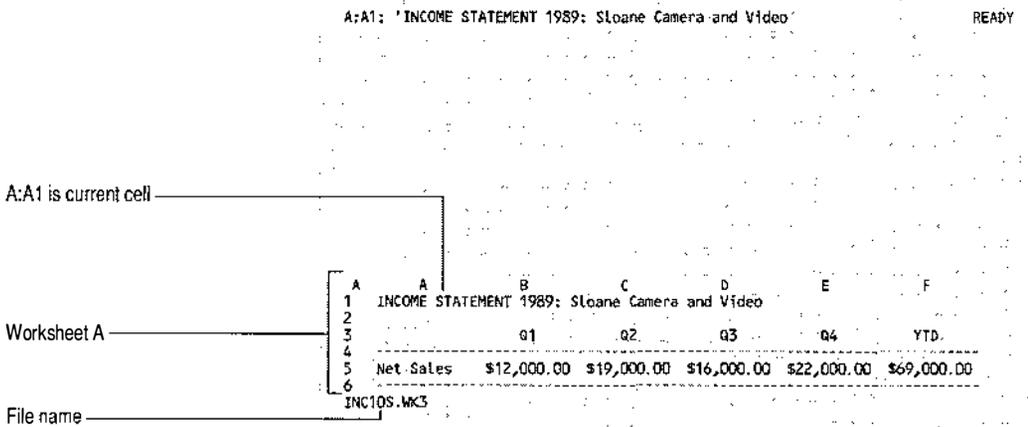
Select	/Worksheet
Select	Insert
Select	Sheet
Select	After
Type	2 *to insert two worksheets after the current one*
Press	ENTER *to insert the worksheets*

The file now contains three worksheets, the original Sloane Camera and Video worksheet and two blank worksheets after it. Notice that the cell pointer has moved to the first worksheet you inserted, making worksheet B the current worksheet.

Cell pointer   Current worksheet

B:A1:   READY

```
     C    A    B      C      D      E      F      G      H
     1
     2
     3
     4
     5
   B A    B      C      D      E      F      G      H
     1
     2
     3
     4
     5
     6
   A A        B          C          D          E          F
   1  INCOME STATEMENT 1989: Sloane Camera and Video
   2
   3           Q1         Q2         Q3         Q4        YTD
   4  ------------------------------------------------------------
   5  Net Sales  $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
   6  ------------------------------------------------------------
   INC10S.WK3
```

Worksheet letters
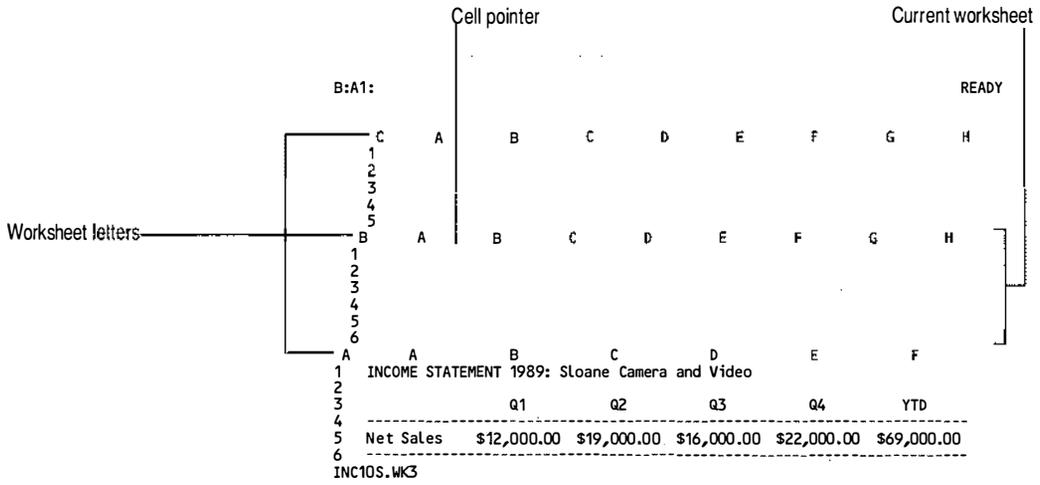
Moving Between Worksheets

You move back and forth between worksheets by using several different keys. For example, to move the cell pointer to the previous worksheet (in this case, worksheet A), you use PREV SHEET.

| NOTE | PREV SHEET and NEXT SHEET are typical of **combination keystrokes** in 1-2-3. On a UNIX/386 console, you may press the combination CTRL-A PGUP for NEXT SHEET. For more information on key combinations, see your keyboard template or consult the Function Keys section in HELP. |

Press   PREV SHEET *to move to worksheet A*

Worksheet A is now the current worksheet. To make worksheet B the current worksheet again, use NEXT SHEET:

Press   NEXT SHEET *to move to worksheet B*

Notice that the cell pointer moves to the cell you last highlighted in that worksheet.

You can also use GOTO to move between worksheets. Using GOTO is convenient because not only can you move to any worksheet, you can also specify which cell in that worksheet you want to move to.

Press   GOTO

Type   c:b5

Press   ENTER *to move the cell pointer to C:B5*

To move to cell A1 in worksheet A (A:A1) from any other worksheet in a file, use FIRST CELL.

| NOTE | FIRST CELL is a combination keystroke CTRL-A HOME on several UNIX/386 console keyboards.

Press   FIRST CELL   *to move to A:A1*

Similarly, you use LAST CELL to move the cell pointer to the last nonblank cell in the current file.

Formatting Worksheets Simultaneously

Sometimes you want all the worksheets in a file to look the same — that is, have the same cell formats, column widths, and so on. To accomplish this, you could format all the worksheets individually; however, there is an alternative way that saves time and effort. By using GROUP mode, you can format all the worksheets at once. With GROUP mode on, if you widen a column or format a range in one worksheet in a file, 1-2-3 duplicates that change in all the other worksheets.

When you turn on GROUP mode, 1-2-3 changes the format of all the worksheets in the file to match the format of the current worksheet. (Therefore, before you turn on GROUP mode, make sure that the cell pointer is in the correct worksheet and that you really want all the worksheets in the file to have the same format.) For example, in Lesson 6 you set global column width for worksheet A to 12 characters; the two new worksheets have the default global column width of 9. Because worksheet A is the current worksheet, when you turn on GROUP mode in the following example, worksheets B and C will assume the same format as worksheet A. Therefore, the global column width for each worksheet changes to 12.

Make sure the cell pointer is in worksheet A, then do the following:

Select   /Worksheet

Select   ⟋ Global

Select   Group

Select   Enable *to turn on GROUP mode*

Although worksheets B and C are still blank, they now have the same global and range formatting as worksheet A. Notice the GROUP indicator at the bottom of the screen. Until you turn off GROUP mode, the worksheets continue to format simultaneously.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                    READY

        C     A          B          C          D          E         F
        1
        2
        3
        4
        5
        a     A          b          c          d          e         f
        1
        2
        3
        4
        5
        6
   A    A          B          C          D          E         F
   1    INCOME STATEMENT 1989: Sloane Camera and Video
   2
   3              Q1         Q2         Q3         Q4        YTD
   4    ------------------------------------------------------------------
   5    Net Sales  $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
   6    ------------------------------------------------------------------
   INC10S.WK3                        GROUP
```

Column width of 12 in all worksheets ──────

GROUP indicator ──────────────

Copying Between Worksheets

As explained earlier, you are going to set up the income statements for Sloane Camera and Video's Boston and Chicago stores and a consolidated income summary in separate worksheets. Because worksheet A already contains the appropriate formulas and labels for an income statement, you can use that worksheet as a **template** or model worksheet. By copying the formulas and labels from worksheet A to worksheets B and C, you will have a ready-to-use worksheet for each store (worksheets B and C) — all you will have to do is change the data appropriately for the Chicago store. You can then enter new formulas in worksheet A to create a **summary worksheet** that consolidates the data from worksheets B and C.

To copy the contents of worksheet A to the other two worksheets, you will specify a three-dimensional range to copy TO. A **three-dimensional range** is a range that spans two or more consecutive worksheets in the same file, for example, A:B3..C:F3 (B3..F3 in worksheets A, B, and C) in the file INC10S.WK3. Whenever you are working with a multiple-sheet file, you can use three-dimensional ranges in commands and formulas. Specify a three-dimensional range the same way you specify a single-sheet range: type its address, use its range name (if it has been previously named with /Range Name Create), or highlight it.

Three–dimensional range
A:E2..C:E2
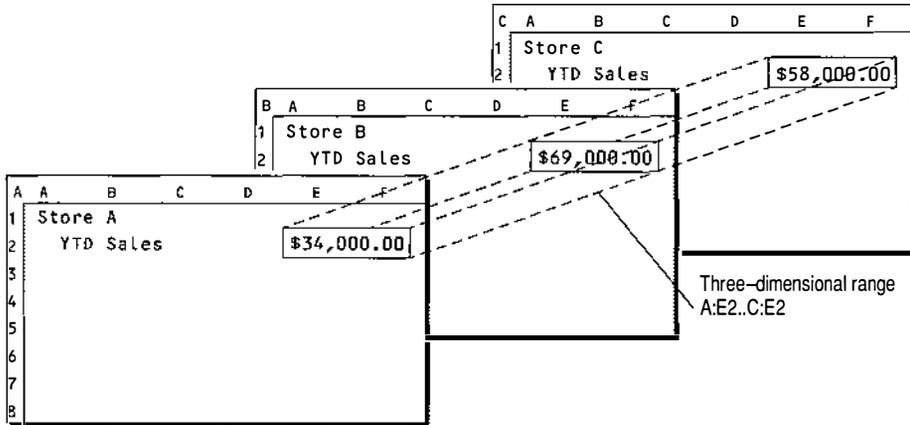
Beginning with the cell pointer in A:A1, complete the copy procedure as follows:

Select   /Copy

Move   the cell pointer to A:F17   *to highlight A:A1..A:F17*

Press   ENTER *to accept A:A1..A:F17 as the range to copy FROM*

Remember, for the TO range you need to specify only the upper left cell of the range or, for a three-dimensional range, the upper left cell in each worksheet in the range (in this case, B:A1 and C:A1).

Press   NEXT SHEET *to move the cell pointer to B:A1*

Press   . (period) *to anchor the cell pointer in B:A1*

Press   NEXT SHEET *to highlight B:A1..C:A1*

Press   ENTER· *to accept B:A1..C:A1 as the range to copy TO*

Worksheets B and C now contain copies of the Sloane Camera and Video income statement worksheet.

```
A:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video                    READY

        C      A          B          C           D          E          F
        1    INCOME  STATEMENT 1989: Sloane Camera and Video
        2
        3                   Q1         Q2          Q3         Q4        YTD
        4    ----------------------------------------------------------------
        5    Net Sales    $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
        B      A          B          C           D          E          F
        1    INCOME  STATEMENT 1989: Sloane Camera and Video
        2
        3                   Q1         Q2          Q3         Q4        YTD
        4    ----------------------------------------------------------------
        5    Net Sales    $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
        6    ----------------------------------------------------------------
        A      A          B          C           D          E          F
        1    INCOME  STATEMENT 1989: Sloane Camera and Video
        2
        3                   Q1         Q2          Q3         Q4        YTD
        4    ----------------------------------------------------------------
        5    Net Sales    $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
        6
        INC10S.WK3                     GROUP
```

Copies of worksheet A

Editing the Worksheet Titles

To identify what data will be stored in each worksheet, edit the title in worksheet A to reflect that worksheet A will be a summary worksheet, and edit the titles in the other two worksheets to reflect that they are the worksheets for the individual stores.

Beginning with the cell pointer in A:A1, do the following:

Press	EDIT *to change to EDIT mode*
Move	the cursor to the final T in STATEMENT
Press	BACKSPACE *until you delete STATEMENT*
Type	SUMMARY
Press	ENTER *to enter the correction in the worksheet*

Now edit the title in worksheet B to identify it as the worksheet for the Boston store:

Press	NEXT SHEET *to move the cell pointer to B:A1*
Press	EDIT *to change to EDIT mode*
Type	, Boston *(with a space after the comma)*
Press	ENTER *to enter the correction in the worksheet*

Finally, edit the title in worksheet C to identify it as the worksheet for the Chicago store:

Press	NEXT SHEET *to move the cell pointer to C:A1*
Press	EDIT *to change to EDIT mode*
Type	, Chicago *(with a space after the comma)*
Press	ENTER *to enter the correction in the worksheet*

Your worksheets should look like this:

```
C:A1: 'INCOME STATEMENT 1989: Sloane Camera and Video, Chicago                READY

        C         A          B          C          D          E          F
      ┌ 1    INCOME STATEMENT 1989: Sloane Camera and Video, Chicago
      └ 2
        3                    Q1         Q2         Q3         Q4         YTD
        4    --------------------------------------------------------------------
        5    Net Sales    $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
        B         A          B          C          D          E          F
      ┌ 1    INCOME STATEMENT 1989: Sloane Camera and Video, Boston
      └ 2
        3                    Q1         Q2         Q3         Q4         YTD
        4    --------------------------------------------------------------------
        5    Net Sales    $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
        6
        A         A          B          C          D          E          F
      ┌ 1    INCOME SUMMARY 1989: Sloane Camera and Video
      └ 2
        3                    Q1         Q2         Q3         Q4         YTD
        4    --------------------------------------------------------------------
        5    Net Sales    $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
        6    --------------------------------------------------------------------
     INC10S.WK3                      GROUP
```

New worksheet titles

Because all the worksheets have the same layout, you can
move easily from worksheet to worksheet to view related
data, for example, Q1 Net Sales in Boston and Q1 Net Sales in
Chicago and total Q1 Net Sales for both stores.

Saving Your Work

In the next lesson, you will complete the revisions to the
multiple-sheet Sloane Camera and Video file. For now, save
the file with the file name INC11.WK3:

Select	/File
Select	Save
Type	INC11.WK3
Press	ENTER *to save INC11.WK3*

When you save a file while in perspective view, 1-2-3 automat-
ically displays worksheets in perspective view the next time
you retrieve that file.

NOTE 1-2-3 saves the current /Worksheet Window settings
each time you save a file. If your terminal is display-
ing more than three perspective windows, 1-2-3 will
not restore more than three perspective windows the
next time you retrieve the file.

Lesson 11 Consolidating and Printing Data

With multiple-sheet files you can enter formulas in one worksheet that refer to data in other worksheets. You can also print data from several worksheets simultaneously. In this lesson you will

- Create a summary worksheet with formulas that consolidate information in other worksheets in the same file

- Turn off GROUP mode

- Print data from multiple worksheets

- Save your work

You will begin this lesson by retrieving the sample file named INC11S.WK3. This file is like the file you created in Lesson 10, except that appropriate figures for the Chicago store have been entered in worksheet C, and everything but the labels and formulas to calculate Operating Expenses and Operating Income have been erased from worksheet A in order for you to create the summary worksheet. (Right now, 1-2-3 displays zeros as the values of those formulas because the cells referred to in the formulas are blank.)

Select   /File
Select   Retrieve
Highlight   INC11S.WK3
Press   ENTER   *to retrieve INC11S.WK3*

```
A:A1: 'INCOME SUMMARY 1989: Sloane Camera and Video                           READY

 C       A          B          C          D          E          F
 1    INCOME STATEMENT 1989: Sloane Camera and Video, Chicago
 2
 3              Q1         Q2         Q3         Q4         YTD
 4    ------------------------------------------------------------------
 5    Net Sales   $10,000.00  $13,000.00  $16,000.00  $19,000.00  $58,000.00
 B       A          B          C          D          E          F
 1    INCOME STATEMENT 1989: Sloane Camera and Video, Boston
 2
 3              Q1         Q2         Q3         Q4         YTD
 4    ------------------------------------------------------------------
 5    Net Sales   $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
 6
 A       A          B          C          D          E          F
 1    INCOME SUMMARY 1989: Sloane Camera and Video
 2
 3              Q1         Q2         Q3         Q4         YTD
 4    ------------------------------------------------------------------
 5    Net Sales
 6    ------------------------------------------------------------------
 INC11S.WK3                        GROUP
```

New data entered for Chicago store ⎯⎯⎯⎯⎯

Blank cells for entering formulas to create summary worksheet ⎯⎯⎯⎯⎯

Creating a Summary Worksheet

In this lesson, you will create a summary worksheet for Sloane Camera and Video by entering formulas in worksheet A that consolidate figures from worksheets B and C, the income statements for the Boston and Chicago stores.

Entering a Formula That Refers to Multiple Worksheets

The formulas you create in 1-2-3 can refer to any cell in any worksheet in a file. For example, you are going to enter an @SUM formula in cell A:B5 that totals Q1 Net Sales from worksheets B and C (cells B:B5 and C:B5). To do this, you need to specify a three-dimensional range as the @SUM argument:

Move	the cell pointer to A:B5
Type	@sum(
Press	NEXT SHEET *to move to B:B5*
Press	. (period) *to anchor the cell pointer in B:B5*
Press	NEXT SHEET *to highlight B:B5..C:B5*
Type	) *to complete the @function*
Press	ENTER *to enter the @function in the worksheet*

Worksheet A, the summary worksheet, now shows the combined Q1 Net Sales for the Boston and Chicago stores:

A:B5: (C2) @SUM(B:B5..C:B5)   READY

```
            C       A          B          C          D          E          F
            1     INCOME STATEMENT 1989: Sloane Camera and Video, Chicago
            2
            3                  Q1         Q2         Q3         Q4        YTD
            4    -----------------------------------------------------------
            5     Net Sales  $10,000.00 $13,000.00 $16,000.00 $19,000.00 $58,000.00
            B       A          B          C          D          E          F
            1     INCOME STATEMENT 1989: Sloane Camera and Video, Boston
            2
            3                  Q1         Q2         Q3         Q4        YTD
            4    -----------------------------------------------------------
            5     Net Sales  $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
            6    -----------------------------------------------------------
            A       A          B          C          D          E          F
            1     INCOME SUMMARY 1989: Sloane Camera and Video
            2
            3                  Q1         Q2         Q3         Q4        YTD
            4    -----------------------------------------------------------
            5     Net Sales  $22,000.00
            6    -----------------------------------------------------------
                 INC11S.WK3                        GROUP
```

Chicago Q1 Net Sales

Boston Q1 Net Sales

Q1 Net Sales for both stores

Copying the Formula

Now you are going to copy the formula in A:B5 to cells A:C5 through A:F5 to total Q2, Q3, Q4, and YTD Net Sales figures for both stores. Starting with the cell pointer in A:B5, do the following

Select   /Copy

Press   ENTER *to accept A:B5..A:B5 as the range to copy FROM*

Move   the cell pointer to A:C5

Press   . (period) *to anchor the cell pointer in A:C5*

Move   the cell pointer to A:F5 *to highlight A:C5..A:F5*

Press   ENTER *to accept A:C5..A:F5 as the range to copy TO*

Worksheet A, the summary worksheet, now shows the total quarterly and YTD Net Sales figures for both stores.

```
A:B5: (C2) @SUM(B:B5..C:B5)                                          READY

     C      A        B         C         D         E         F
     1   INCOME STATEMENT 1989: Sloane Camera and Video, Chicago
     2
     3            Q1        Q2        Q3        Q4        YTD
     4   -----------------------------------------------------------
     5   Net Sales   $10,000.00 $13,000.00 $16,000.00 $19,000.00 $58,000.00
     B      A        B         C         D         E         F
     1   INCOME STATEMENT 1989: Sloane Camera and Video, Boston
     2
     3            Q1        Q2        Q3        Q4        YTD
     4   -----------------------------------------------------------
     5   Net Sales   $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
     6   -----------------------------------------------------------
     A      A        B         C         D         E         F
     1   INCOME SUMMARY 1989: Sloane Camera and Video
     2
     3            Q1        Q2        Q3        Q4        YTD
     4   -----------------------------------------------------------
     5   Net Sales   $22,000.00 $32,000.00 $32,000.00 $41,000.00 $127,000.00
     6   -----------------------------------------------------------
INC11S.WK3                       GROUP
```

Consolidated Net Sales figures

Entering More Formulas

You now need to enter @SUM formulas in rows 9 through 13 to consolidate Costs and Expenses for the Boston and Chicago stores:

Move	the cell pointer to A:B9
Type	@sum(
Press	NEXT SHEET *to move to B:B9*
Press	. (period) *to anchor the cell pointer in B:B9*
Press	NEXT SHEET *to move to worksheet C:B9*
Type	) *to complete the @function*
Press	ENTER *to enter the @function in the worksheet*

Now copy this formula for all the Costs and Expenses items (A:B9..A:F13):

Select	/Copy
Press	ENTER *to accept A:B9..A:B9 as the range to copy FROM*
Press	. (period) *to anchor the cell pointer in A:B9*
Move	the cell pointer to A:F13 *to highlight A:B9..A:F13*
Press	ENTER *to accept A:B9..A:F13 as the range to copy TO*

Now all the quarterly and YTD Costs and Expenses figures from worksheets B and C are consolidated in worksheet A. To see this, do the following:

Move   the cell pointer to A:B13

A:B13: @SUM(B:B13..C:B13)   READY

	C	A	B	C	D	E	F
	8	Costs and Expenses:					
Chicago Costs and Expenses	9	Salary	1,500.00	1,500.00	1,500.00	1,500.00	6,000.00
	10	Int	1,000.00	1,200.00	1,400.00	1,400.00	5,000.00
	11	Rent	350.00	350.00	350.00	350.00	1,400.00
	12	Ads	500.00	1,000.00	2,000.00	3,000.00	6,500.00
	B	A	B	C	D	E	F
	8	Costs and Expenses:					
Boston Costs and Expenses	9	Salary	2,000.00	2,000.00	2,000.00	2,500.00	8,500.00
	10	Int	1,200.00	1,400.00	1,600.00	1,600.00	5,800.00
	11	Rent	600.00	600.00	600.00	600.00	2,400.00
	12	Ads	900.00	2,000.00	4,000.00	4,500.00	11,400.00
	13	COG	4,000.00	4,200.00	5,000.00	8,000.00	21,200.00
	A	A	B	C	D	E	F
	8	Costs and Expenses:					
Costs and Expenses for both stores	9	Salary	3,500.00	3,500.00	3,500.00	4,000.00	14,500.00
	10	Int	2,200.00	2,600.00	3,000.00	3,000.00	10,800.00
	11	Rent	950.00	950.00	950.00	950.00	3,800.00
	12	Ads	1,400.00	3,000.00	6,000.00	7,500.00	17,900.00
	13	COG	7,000.00	8,200.00	10,000.00	15,000.00	40,200.00

INC11S.WK3   GROUP

Press   HOME *to move to A:A1*

The transformation of the Sloane Camera and Video file from a single-sheet file to a multiple-sheet file is now complete. You do not need to change the formulas that total Operating Expenses because they are now calculating values that reflect the consolidated Costs and Expenses for both stores (A:B9..A:F13). The resulting values in row 15 are the total quarterly and YTD Operating Expenses for both stores.

You also do not need to change the formulas in row 17 that calculate Operating Income (the difference between Net Sales and Operating Expenses) because they are now calculating values that reflect consolidated Net Sales (A:B5..A:F5) and Operating Expenses (A:B15..A:F15) for both stores. The resulting values in row 17 are the total quarterly and YTD Operating Income figures for both stores.

Turning Off GROUP Mode

Now that you have finished setting up and formatting the income summary worksheet and the income statement worksheets for the individual stores, you can turn off GROUP mode:

Select	/Worksheet
Select	Global
Select	Group
Select	Disable *to turn off* GROUP *mode*

In the next exercise, you will learn how to create a printout of the data in the Sloane Camera and Video file.

Printing Data from Multiple Worksheets

Now that you have income statements for the Boston and Chicago stores as well as an income summary, it would be useful to print this data so you can easily compare the figures and share the data with other people in the company. This exercise shows you two methods for printing data in multiple worksheets.

To print the same group of cells in two or more consecutive worksheets in a file, you specify a three-dimensional print range. For example, to print rows 1 through 17 in all three worksheets in the Sloane Camera and Video file, specify A:A1..C:F17 as the print range. Beginning with the cell pointer in A:A1, do the following:

Select	/Print
Select	Printer
Select	Range
Press	. (period) *to anchor the cell pointer in A:A1*
Move	the cell pointer to A:F17 *to highlight A:A1..A:F17*
Press	NEXT SHEET twice *to highlight A:A1..C:F17*
Press	ENTER *to accept A:A1 ..C:F17 as the print range*
Select	Go *to open a print job and begin formatting the data*

1-2-3 formats consecutively the income summary (worksheet A), the income statement for Boston (worksheet B), and the income statement for Chicago (worksheet C).

Select	Page *to insert the formatting command that begins a new page*
Select	Quit *to close the print job and send the formatted data to the print spooler*

To specify a group of print ranges at once, you specify all the ranges you want to print, separated by commas and with no spaces. Complete the following steps to print all of worksheet A and just the worksheet title and Net Sales figures from worksheets B and C:

Select	/Print
Select	Printer
Select	Range

1-2-3 highlights the print range you previously specified (A:A1..C:F17). You need to specify a new print range.

Press	ESC *to unanchor the cell pointer*
Move	the cell pointer to A:A1
Press	. (period) *to anchor the cell pointer in A:A1*
Move	the cell pointer to A:F17 *to highlight A:A1..A:F17*
Press	, (comma) *to indicate you want to print another range*
Press	NEXT SHEET *to move to worksheet B*
Press	. (period) *to anchor the cell pointer in B:A1*
Move	the cell pointer to B:F6 *to highlight B:A1..B:F6*
Press	NEXT SHEET *to highlight B:A1..C:F6*
Press	ENTER *to accept A:A1..A:F17,B:A1..C:F6 as the ranges to print*
Select	Go *to open a print job and begin formatting the data*

1-2-3 formats the data in the print ranges: the entire income summary (worksheet A), rows 1 through 6 in the Boston income statement (worksheet B), and rows 1 through 6 in the Chicago income statement (worksheet C).

Select	Page *to insert the formatting command that begins a new page*
Select	Quit *to close the print job and send the formatted data to the print spooler*

**Saving Your
Work**

Now save the Sloane Camera and Video file (with the new
consolidation formulas and the current print settings) with the
name INC12.WK3:

Select	/File
Select	Save
Type	INC12.WK3 *(to use with Lesson 12)*
Press	**ENTER** *to save INC12.WK3*

Lesson 12 Working with Multiple Active Files

In the previous lesson you worked with a single file contain-
ing three worksheets. Suppose you want to compare the 1989
consolidated income summary, stored in one file, with the
1988 income statement, which is stored in a different file. You
can do this easily with 1-2-3. Besides having multiple-sheet
files, you can also have multiple active files. An **active file** is a
file in memory as opposed to on disk. You make a file active
in order to look at or change its data.

In this lesson you will

• Make several files active

• Move from one active file to another

• Link files by entering formulas in one file that refer to data
  in other files

• Examine the relationship between linked files

• Save multiple active files

• Selectively delete active files from memory

To begin this lesson, retrieve the 1988 Sloane Camera and
Video income summary, which is in a file named
SUM1988S.WK3:

Select	/File
Select	Retrieve
Highlight	SUM1988S.WK3
Press	**ENTER** *to retrieve SUM1988S.WK3*

Now SUM1988S.WK3 is an active file.

```
A:A1: 'INCOME SUMMARY 1988: Sloane Camera and Video                    READY

A      A         B           C            D           E           F
1   INCOME SUMMARY 1988: Sloane Camera and Video
2
3             Q1          Q2           Q3          Q4          YTD
4   ----------------------------------------------------------------
5   Net Sales  $10,000.00  $13,000.00  $16,000.00  $19,000.00  $58,000.00
6   ----------------------------------------------------------------
7
8   Costs and Expenses:
9     Salary    1,500.00    1,500.00    1,500.00    1,500.00    6,000.00
10    Int       1,000.00    1,200.00    1,400.00    1,400.00    5,000.00
11    Rent        350.00      350.00      350.00      350.00    1,400.00
12    Ads         500.00    1,000.00    2,000.00    3,000.00    6,500.00
13    COG       3,000.00    4,000.00    5,000.00    7,000.00   19,000.00
14  ----------------------------------------------------------------
15    Op Exp    6,350.00    8,050.00   10,250.00   13,250.00   37,900.00
16  ----------------------------------------------------------------
17  Op Income  $3,650.00   $4,950.00   $5,750.00   $5,750.00  $20,100.00
18
19
SUM1988S.WK3
```

Making Several Files Active

At this point, SUM1988S.WK3 is the only active file. To make another file active as well, you must use /File Open. You cannot use /File Retrieve because that command replaces the current file when it retrieves the new file. /File Open, however, inserts the new file either before or after the current file.

To make the 1989 Sloane Camera and Video file active along with the 1988 file, open INC12.WK3, the file you saved at the end of Lesson 11. If you did not complete Lesson 11, open the sample file named INC12S.WK3.

Select   /File

Select   Open

Select   After

Highlight INC12.WK3 or INC12S.WK3

Press   ENTER *to open the file*

NOTE   If you opened INC12S.WK3, the sample file, you must now save it as INC12.WK3, as follows:

Select   /File

Select   Save

1-2-3 displays [ALL MODIFIED FILES] because you have more than one active file.

Press	ESC twice *to clear the current file name*
Type	INC12.WK3
Press	ENTER *to save the file with the name INC12.WK3*
Select	Replace *if you saved INC12.WK3 in the previous lesson*

INC12.WK3 is now the current file. To see SUM1988S.WK3 again, do the following:

Press	PREV SHEET

```
A:A1: 'INCOME SUMMARY 1988: Sloane Camera and Video                    READY

    B     A          B            C           D          E          F
    1   INCOME STATEMENT 1989: Sloane Camera and Video, Boston
    2
    3              Q1           Q2          Q3          Q4         YTD
    4   --------------------------------------------------------------
    5   Net Sales   $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
    A     A          B            C           D          E          F
    1   INCOME STATEMENT 1989: Sloane Camera and Video
    2
    3              Q1           Q2          Q3          Q4         YTD
    4   --------------------------------------------------------------
    5   Net Sales   $22,000.00  $32,000.00  $32,000.00  $41,000.00  $127,000.00
    6   --------------------------------------------------------------
    A     A          B            C           D          E          F
    1   INCOME SUMMARY 1988: Sloane Camera and Video
    2
    3              Q1           Q2          Q3          Q4         YTD
    4   --------------------------------------------------------------
    5   Net Sales   $10,000.00  $13,000.00  $16,000.00  $19,000.00  $58,000.00
    6   --------------------------------------------------------------
    SUM1988S.WK3
```

Worksheet A in INC12.WK3

Worksheet A in SUM1988S.WK3

Current file

Notice that the 1988 file, which was not in perspective view before you opened the 1989 file, is now in perspective view. 1-2-3 uses the window settings for the most recently opened file (INC12.WK3) for all active files. Because INC12.WK3 was in perspective view when you saved it in Lesson 11, it is in perspective view when you open it now; SUM1988S.WK3 assumes the same window settings.

To verify that both files are active, do the following:

Select	/File
Select	List
Select	Active

1-2-3 displays the names of the two active files, INC12.WK3 and SUM1988S.WK3.

Press	ENTER *to return 1-2-3 to* **READY** *mode and redisplay the current worksheet*

Moving Between Active Files

To move between active files, you use FILE in combination with other keys. Each key combination has a name, for example, NEXT FILE and PREV FILE. Try using NEXT FILE to move to Sloane Camera and Video's 1989 file (INC12.WK3).

Press   NEXT FILE   *to move to INC12.WK3*

Notice the file name INC12.WK3 appears in the file-and-clock indicator at the bottom of the screen. This indicator shows you the current file. The **current file** is the one that contains the cell pointer. Now move back to the SUM1988S.WK3 file:

Press   PREV FILE   *to move to SUM1988S.WK3*

SUM1988S.WK3 is now the current file.

You can also use PREV SHEET and NEXT SHEET to move consecutively through all the worksheets in all active files:

Press   NEXT SHEET   *to move to worksheet A in INC12.WK3*

Press   NEXT SHEET   *to move to worksheet B in INC12.WK3*

Press   NEXT SHEET   *to move to worksheet C in INC12.WK3*

When you have more than one active file, pressing FIRST FILE always moves the cell pointer to the first active file:

Press   FIRST FILE   *to move to SUM1988S.WK3*

1-2-3 moves the cell pointer to the cell you last highlighted in this file.

Likewise, you use LAST FILE to move the cell pointer to the last active file.

Linking Files

When you enter a formula in one file that uses information from another file, you link the two files. Now that you have the two files to compare, you will enter formulas that calculate the difference between the 1989 and 1988 YTD Net Sales, Operating Expenses, and Operating Income figures. This will let you see whether the company is on an upward or downward trend.

Adding a New Worksheet

Start by inserting a new worksheet in the INC12.WK3 file. You will use this worksheet to enter the formulas that link INC12.WK3 and SUM1988S.WK3.

Move	the cell pointer to C:A1 in the file INC12.WK3 *to make worksheet C the current worksheet*
Select	/Worksheet
Select	Insert
Select	Sheet
Select	After
Press	ENTER *to accept the default of 1*

The INC12.WK3 file now contains four worksheets: the 1989 income summary (worksheet A), the Boston store's income statement (worksheet B), the Chicago store's income statement (worksheet C), and a blank worksheet (worksheet D). Worksheet D is the current worksheet.

Entering Labels

Now enter a title for worksheet D and labels for the new data. Begin with the cell pointer in D:A1 in the INC12.WK3 file:

Type	COMPARISON OF 1989 AND 1988: Sloane Camera and Video
Move	the cell pointer to D:A3
Type	Difference in Net Sales:
Press	↓ *to enter the label and move the cell pointer to D:A4*
Type	Difference in Op Exp:
Press	↓ *to enter the label and move the cell pointer to D:A5*
Type	Difference in Op Inc:
Press	ENTER *to enter the label*

Worksheet D in INC12.WK3 should look like this:

```
D:A5: 'Difference in Op Inc:                                              READY

  D       A        B        C        D        E        F        G        H
  1   COMPARISON OF 1989 AND 1988: Sloane Camera and Video
  2
  3   Difference in Net Sales:
  4   Difference in Op Exp:
  5   Difference in Op Inc:
  6
```

Entering Formulas that Refer to Multiple Files

Next, enter the formulas to calculate the difference between the YTD Net Sales, Operating Expenses, and Operating Income for the two years. Start with the formula to calculate the difference between 1989 and 1988 YTD Net Sales:

Move   the cell pointer to D:D3 in the file INC12.WK3

Type   +

Move   the cell pointer to A:F5 in the file INC12.WK3

Type   -

Press   PREV FILE *to move to SUM1988S.WK3*

Move   the cell pointer to A:F5 in the file SUM1988S.WK3

Before you press ENTER, look at the control panel.

YTD Net Sales in SUM1988S.WK3

YTD Net Sales in INC12.WK3

File reference

```
A:F5: (C2) @SUM(B5..E5)                                        POINT
+A:F5 <<SUM1988S.WK3>>A:F5
    A        A          B          C          D         E        F
    1   INCOME SUMMARY 1988: Sloane Camera and Video
    2
    3                   Q1         Q2         Q3        Q4       YTD
    4   ------------------------------------------------------------------
    5   Net Sales   $10,000.00 $13,000.00 $16,000.00 $19,000.00 $58,000.00
    6   ------------------------------------------------------------------
```

To calculate the difference between 1989 and 1988 YTD Net Sales, you are subtracting one cell from another — one cell in INC12.WK3 and one cell in SUM1988S.WK3. Therefore, the first A:F5 in the formula refers to the YTD Net Sales cell in the current file, INC12.WK3, and the second A:F5 refers to the YTD Net Sales cell in SUM1988S.WK3. The file reference <<SUM1988S.WK3>> in front of the second A:F5 indicates the cell is in a file other than the current file. Typically 1-2-3 will display file references with a full directory path.

Whenever you are specifying a range in another file for use in a command or formula, you must precede the range specification with a file reference. A **file reference** consists of a file name and extension enclosed in << >> (double angle brackets). When you create a formula by highlighting the cell to calculate in another active file, 1-2-3 automatically adds the file reference. (You can also type the file reference, as you will see in the next example.)

Press   ENTER *to complete the formula*

Because the formula you entered in INC12.WK3 uses data in the file SUM1988S.WK3, the files are now linked.

Next, enter a formula to calculate the difference between 1989 and 1988 YTD Operating Expenses. This time you will type the formula.

Move   the cell pointer to D:D4 in the file INC12.WK3

The YTD Operating Expenses figure is in cell A:F15 in both files. Note that you may need to enter the full file path for SUM1988S.WK3.

Type   +a:f15-<<SUM1988S.WK3>>a:f15

Press   ENTER

Finally, enter a formula to calculate the difference between 1989 and 1988 YTD Operating Income. You can do this by subtracting the difference in Net Sales from the difference in Operating Expenses:

Move   the cell pointer to D:D5 in the file INC12.WK3

Type   +d:d3-d:d4

Press   ENTER *to enter the formula in the worksheet*

Although this cell is not itself linked, its value will change if you change the values in the linked file (SUM1988S.WK3) because it depends on cells that are linked to that file (D:D5 and D:D4).

Formatting the Data

Now format the new values using Currency format:

Select   /Range

Select   Format

Select   Currency

Press   ENTER *to accept 2 decimal places*

Move   the cell pointer to D:D3 *to highlight D:D5..D:D3*

Press   ENTER *to accept D:D5..D:D3 as the range to format*

1-2-3 displays asterisks because the formatted values exceed the current column width. Widen the columns in worksheet D to 12 characters:

Select	/Worksheet
Select	Global
Select	Col-Width
Type	12
Press	**ENTER** *to change the column width*

Worksheet D in INC12.WK3 should look like this:

```
D:D5: (C2) +D3-D4                                              READY


 D     A           B           C           D         E       F
 1   COMPARISON OF 1989 AND 1988: Sloane Camera and Video
 2
 3   Difference in Net Sales:              $69,000.00
 4   Difference in Op Exp:                 $49,300.00
 5   Difference in Op Inc:                 $19,700.00
 6
```

As you can see, because the differences between the 1989 and 1988 figures are positive, Sloane Camera and Video is on an upward trend.

Examining the Relationship Between Linked Files

Using formulas, you can link a 1-2-3 file to any other 1-2-3 file. If the file containing the referenced data is active, you can create the linking formula by highlighting the cells to calculate. If, however, the file is on disk, you must create the linking formula by typing the entire formula. Include the path as well as the file name and extension. The **path** is the root directory and all the subdirectories in which you save a file. For example, if the file link consisted of <</usr/worksheets/ EXPENSES.WK3>>, the file specification is /usr/worksheets. 1-2-3 can also interpret file paths that refer to files stored on other workstations, local file servers, or remote systems. If you have mounted the network directory /usr/worksheets as a local directory named /files/net, you can link to a remote worksheet file called EXPENSES.WK3 with the reference <</files/net/EXPENSES.WK3>>.

> NOTE   1-2-3 cannot provide a greater degree of file access
>   and security than that provided by your network
>   software. If your network software does not support
>   remote file systems or file locking, you cannot incor-
>   porate file links that depend on these capabilities.

Take a closer look at one of the formulas you entered to see
how 1-2-3 handles a formula that links files.

Move   the cell pointer to D:D3 in the file INC12.WK3

The control panel displays
+A:F5-<<SUM1988S.WK3>>A:F5..A:F5. The file reference
<<SUM1988S.WK3>> indicates that the formula uses data in
another file and, therefore, that the current file is linked to
another file. In this case, the cell D:D3 in INC12.WK3 uses
the information in A:A5 in the SUM1988S.WK3 file, linking
INC12.WK3 to SUM1988S.WK3. See "Working with Formu-
las" and "Working with Multiple Files" in Chapter 1 of *User
Reference* for more information on linking.

When you retrieve a file that is linked to another file, you
must select /File Admin Link-Refresh to update the formulas
contain the links. See "File Commands" in Chapter 2 of
User Reference for information on using /File Admin
Link-Refresh.

Try changing a value in the SUM1988S.WK3 file to see the
effects of the link:

Move   the cell pointer to A:E5 in the file SUM1988S.WK3

Type   35000

Press   **ENTER** *to enter the new value in the worksheet*

Because you changed the Q4 Net Sales figure, 1-2-3
recalculates the YTD Net Sales formula.

```
A:E5: (C2) 35000                                                        READY

    B        A              B           C           D           E          F
    1    INCOME STATEMENT 1989: Sloane Camera and Video, Boston
    2
    3                      Q1          Q2          Q3          Q4         YTD
    4    --------------------------------------------------------------------
    5    Net Sales    $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
    A        A              B           C           D           E          F
    1    INCOME SUMMARY 1989: Sloane Camera and Video
    2
    3                      Q1          Q2          Q3          Q4         YTD
    4    --------------------------------------------------------------------
    5    Net Sales    $22,000.00  $32,000.00  $32,000.00  $41,000.00 $127,000.00
    6    --------------------------------------------------------------------
    A        A              B           C           D           E          F
    1    INCOME SUMMARY 1988: Sloane Camera and Video
    2
    3                      Q1          Q2          Q3          Q4         YTD
    4    --------------------------------------------------------------------
    5    Net Sales    $10,000.00  $13,000.00  $16,000.00  $35,000.00  $74,000.00
    6    --------------------------------------------------------------------
    SUM1988S.WK3
```

YTD Net Sales in SUM1988S.WK3

Move   the cell pointer to D:D3 in the file INC12.WK3

You can see that 1-2-3 has recalculated the Difference in Net Sales to reflect the new YTD Net Sales figure in SUM1988S.WK3. The Difference in Net Sales has decreased from $69,000 to $53,000. Because the Difference in Operating Income is dependent on the value of D:D3, this formula has also been updated appropriately.

```
D:D3: (C2) A:F5 << SUM1988S.WK3>>A:F5..A:F5                              READY

    D        A              B           C           D           E          F
    1    COMPARISON OF 1989 AND 1988: Sloane Camera and Video
    2
    3    Difference in Net Sales:             $53,000.00
    4    Difference in Op Exp:                $49,300.00
    5    Difference in Op Inc:                 $3,700.00
    6
```

Linked formula is updated in INC12.WK3

Saving Multiple Active Files

Save the two active files as follows:

Select   /File

Select   Save

1-2-3 displays [ALL MODIFIED FILES] because you have more than one active file.

Press   ESC *to display the file name INC12.WK3*

Press   ENTER *to save INC12.WK3*

Select   **Replace**   *to replace the existing version of INC12.WK3*

Now save SUM1988S.WK3 as SUM1988.WK3.

Press   PREV FILE *to move to SUM1988S.WK3*

Select   /File

Select   Save

1-2-3 displays [ALL MODIFIED FILES] because you have more than one active file.

Press   ESC twice   *to clear the current file name*

Type   SUM1988.WK3

Press   ENTER *to save the file with the name SUM1988.WK3*

Selectively Deleting Active Files

Every active file takes up memory, thus the more files that are active, the less memory you have available for entering data and inserting new worksheets. To regain memory, you can delete active files you are not using. For example, suppose you finish working on the 1988 Sloane Camera and Video file and want to work only on the 1989 file. You can delete the 1988 file from memory by completing the following steps. This procedure does *not* erase the file on disk.

Select   /Worksheet

Select   Delete

Select   File

1-2-3 displays a list of all the active files, and you select the one you want to delete from memory:

Highlight   SUM1988.WK3

Press   ENTER *to remove SUM1988.WK3 from memory*

Now only INC12.WK3 is active. You can no longer see SUM1988.WK3. To verify that SUM1988.WK3 is no longer active, you can use /File List.

Select   /File

Select   List

Select   Active

1-2-3 lists only INC12.WK3.

Press   ENTER *to return 1-2-3 to READY mode and redisplay the current worksheet*

If you want to end 1-2-3 now, select /Quit Yes.

For More Information

In this chapter you have learned how to transform a single-sheet file into a multiple-sheet file, and how to use multiple worksheets to organize and consolidate your data. You have also learned how to work with several active files, how to create formulas that link files, and how to save and delete active files.

There are many other ways to use multiple-sheet files and multiple active files. For more information on topics covered in this chapter, see "Using Multiple-Sheet Files" and "Working with Multiple Files" in Chapter 1 of *User Reference* and "File Commands" and "Worksheet Commands" in Chapter 2 of *User Reference*.

Chapter 4
Managing a Database Table

In this chapter, you will learn how to work with a 1-2-3 database table. In its most basic form, a 1-2-3 **database table** is a set of related information organized in rows (records) and columns (fields) in a single worksheet. Examples of basic database tables include personnel records, client records, inventories, and mailing lists. 1-2-3 also supports such advanced database functions as input forms, relational queries, "live" connections to external database tables, and cross-table joins. For further information about advanced database functions, see "Data Commands" in Chapter 2 of *User Reference.*

You will be working with a personnel database table for Sloane Camera and Video. After you complete the lessons in this chapter, you will understand database table structure and basic database operations.

Lesson 13 Setting Up and Sorting a Database Table

To use database tables effectively, you need to master some basic concepts and skills. In this lesson, you will

- Identify the elements of a 1-2-3 database table

- Learn the rules for setting up a database table

- Move around a database table

- Sort the information in a database table

- Save your work

To begin this lesson, start 1-2-3 as described at the beginning of Chapter 1. If you are already using 1-2-3, select /Worksheet Erase Yes to remove all files from memory and replace them with a single blank worksheet. Then retrieve the sample file named DBT13S.WK3. This file will help you learn about using 1-2-3 database tables without requiring you to make a large number of entries. It contains information about each employee from the six regional stores Sloane Camera and Video has now opened.

Select   /File

Select   Retrieve

Highlight   DBT13S.WK3

Press   ENTER *to retrieve DBT13S.WK3*

Elements of a 1-2-3 Database Table

The following screen shows a portion of the employee database table. Compare it with the data illustrated in the card index — a traditional tool for recording and organizing information.

```
A:A1: [W14] 'PERSONNEL DATA: Sloane Camera and Video                    READY

  A        A           B           C           D            E
 .1    PERSONNEL DATA: Sloane Camera and Video
  2
  3    EMPLOYEE#    LASTNAME    FIRSTNAME    LOCATION     DATE_HIRED                Field names
  4    000220       Edwards     Jack         Atlanta      14-Feb-87
  5    000297       Percival    James        Atlanta      18-Dec-87
  6    000348       Reese       Carl         Atlanta      13-Sep-88
  7    000190       Santos      Elizabeth    Atlanta      17-Jul-86
  8    000247       Savage      Elaine       Atlanta      27-May-87
  9    000281       Adamson     Joy          Boston       21-Oct-87
 10    000262       Bird        Lance        Boston       13-Aug-87                Record
 11    000159       Caulfield   Sherry       Boston       19-Mar-84
 12    000139       Cobb        William      Boston       28-May-82
 13    000367       Fletcher    Amanda       Boston       03-Jan-89
 14    000185       Johnson     Rebecca      Boston       04-Feb-86
 15    000118       Kaplan      Janet        Boston       22-Jun-81
 16    000307       Bjorkman    Robert       Chicago      24-Feb-88
 17    000146       Krauss      Edward       Chicago      13-Jul-83
 18    000162       Lerner      Kimberly     Chicago      28-Jun-84
 19    000284       Morse       Miriam       Chicago      02-Nov-87
DBT13S.WK3
```

Field

#000159
CAULFIELD, Sherry   40 yrs

#000307
BJORKMAN, Robert   23 yrs

#000262
BIRD, Lance   38 yrs
Boston
13-Aug-87   1.5 yrs
$21,100
No profit sharing

Record

Records

Just as each card in the card index contains information about one employee, so does each row in the database table. Each single-row collection of information in a database table is a **record**.

Fields

Just as all cards in the card index contain the same categories of information (employee number, last name, first name, location, and so on), so do all records in the database table. Each single-column category of information in a database table is a **field.**

Field Names

The label at the top of each column in the database table is a **field name**, for example, EMPLOYEE#, LASTNAME, and DATE_HIRED. Field names identify the type of information in fields in a database table.

Database Table Rules

Any collection of data that you organize as records and fields can be a 1-2-3 database table. When you create your own database tables, keep these rules in mind:

• The first row of the database table must contain the field names. Subsequent rows must contain the records.

> | CAUTION | Do not insert blank rows or divider lines between the field names and the records. You will get incorrect results when you work with the database table.

• Each field name must be unique within the database table and should identify the type of information you will enter in that field. For example, the field name LASTNAME indicates the field that contains employees' last names.

• Each field name must be a label and must be entered in a single cell. Because you cannot use field names that contain spaces in formulas, you should avoid using spaces in field names.

• The entries in a field must be either all labels or all values; you cannot mix labels and values within the same field. The entries in a field also cannot be formulas.

• A database table can contain up to 256 fields and 8,191 records.

Moving Around a Database Table

In the next exercise you will use the pointer-movement keys to move around a database table. Start by moving the cell pointer to the first cell in the database table:

Move   the cell pointer to A3

To move to the last field in the database table (the PROFIT-SHARING field), press and release END and then press →.

Press   END → *to move to the last field in the database table*

The cell pointer moves to I3. Notice that the database table extends beyond what you previously saw on the screen, with fields in columns F through I (YEARS_EMPLOYED, SALARY, AGE, and PROFITSHARING).

Now move to the last record in the database table:

Press   END ↓ *to move to the last record in the database table*

The cell pointer moves to I33. Again, the database table extends beyond what you saw on the screen.

Try using other pointer-movement keys (such as PGUP and PGDN) to explore the database table. Examine the formats in each field. Notice that column widths and cell formats have been specified for each field. When you set up a database table yourself, you can adjust column widths and change cell formats however you like. When you have finished exploring the database, do the following:

Press   HOME *to move to A1*

Sorting a Database Table

Currently the records are in the order in which they were entered in the database table — that is, in no special order. You will not always want to work with records in the order in which they were entered. Suppose, for example, that you want to look at the records in this database table in alphabetical order by employees' last names. /Data Sort lets you **sort** (or rearrange) the records in a database table. This command requires that you specify three items:

- A range to sort

- A field by which to sort

- A sort order

Begin by selecting /Data Sort:

Select   /Data

Select   Sort

Specifying a Range to Sort

The range you want to sort is called the **data range**. The data range should include all records and fields in the database table. It should not, however, include the row of field names because you do not want them sorted along with the records.

Select   Data-Range

Move   the cell pointer to A4   *(the first cell of the range that contains the database table records)*

Press   . (period)   *to anchor the cell pointer in A4*

Move   the cell pointer to I33   *to highlight A4..I33*

Press   ENTER   *to accept A4..I33 (all the records and fields in the database table) as the data range*

Specifying a Sort Key

Now that you have specified what range to sort, you must specify one or more sort keys. A **sort key** is a field in the database table that 1-2-3 uses to determine the order for the records. You can specify a primary and secondary sort key, as well as up to 253 extra sort keys.

The **primary sort key** determines the primary order for records in the database table. In this case, you want to arrange the records in alphabetical order by last name, so specify the LASTNAME field as the primary sort key:

Select   Primary-Key

Move   the cell pointer to any cell in the LASTNAME field   (except the cell that contains the field name) *to sort by last name*

Press   ENTER   *to specify the LASTNAME field as the primary sort key*

Specifying a Sort Order

Finally, you must specify the **sort order**, or the order in which you would like to sort the records: ascending order (a through z and 1 through 9) or descending order (z through a and 9 through 1). For this example, specify ascending order:

Type   a *for ascending sort order*

Press   ENTER

Beginning the Sort

Now you are ready to sort the records:

Select   Go *to sort the records*

1-2-3 sorts all the records in ascending order by last name and returns to READY mode. Move the cell pointer around the database table to see the results of the sort.

Primary-key field ───

Employees sorted alphabetically by last name ───

```
A:A1: [W14] 'PERSONNEL DATA: Sloane Camera and Video                    READY

      A        A              B            C           D          E
      1   PERSONNEL DATA: Sloane Camera and Video
      2
      3   EMPLOYEE#      LASTNAME     FIRSTNAME    LOCATION     DATE_HIRED
      4   000281        Adamson       Joy          Boston       21-Oct-87
      5   000262        Bird          Lance        Boston       13-Aug-87
      6   000307        Bjorkman      Robert       Chicago      24-Feb-88
      7   000159        Caulfield     Sherry       Boston       19-Mar-84
      8   000139        Cobb          William      Boston       28-May-82
      9   000141        Dickinson     Angela       Detroit      13-Nov-86
     10   000220        Edwards       Jack         Atlanta      14-Feb-87
     11   000174        Edwards       Cindy        San Francisco 15-Aug-85
     12   000367        Fletcher      Amanda       Boston       03-Jan-89
     13   000315        Grogan        Dave         Seattle      03-Apr-88
     14   000211        Johnson       Stuart       Seattle      29-Dec-86
     15   000185        Johnson       Rebecca      Boston       04-Feb-86
     16   000118        Kaplan        Janet        Boston       22-Jun-81
     17   000222        King          Mary         Detroit      10-Mar-87
     18   000146        Krauss        Edward       Chicago      13-Jul-83
     19   000162        Lerner        Kimberly     Chicago      28-Jun-84
     DBT13S.WK3
```

Using Two Sort Keys

At present, the records in the database table are listed in alphabetical order by employees' last names. Now suppose you want the records to be listed in alphabetical order by store location, but you also want the employees working at each store to be listed in alphabetical order by last name. To do so, you need to specify two sort keys: the LOCATION field as the primary sort key and the LASTNAME field as the secondary sort key.

The **secondary sort key** determines the order for records in the database table that have the same entry in the primary-key field. When you specify the LOCATION field as the primary sort key and the LASTNAME field as the secondary sort key, 1-2-3 lists the records in alphabetical order by location and then arranges the records within each location in alphabetical order by last name.

Begin by selecting /Data Sort:

Select   /Data

Select   Sort

1-2-3 remembers the data range you specified the last time you sorted the database table (A4..I33). All you need to specify now is a new primary sort key, a secondary sort key, and a sort order:

Select   Primary-Key

1-2-3 moves the cell pointer to a cell in the LASTNAME field, the primary sort key you specified the last time you sorted the database table. However, you want to specify a different primary sort key:

Move   the cell pointer to any cell in the LOCATION field (except the cell that contains the field name) *to sort by location*

Press   ENTER *to specify the LOCATION field as the primary sort key*

1-2-3 displays an A for ascending order, the sort order you specified for the primary sort key the last time you sorted the database table.

Press   ENTER *to accept ascending order*

Select   Secondary-Key

Move   the cell pointer to any cell in the LASTNAME field (except the cell that contains the field name) *to sort by last name*

Press   ENTER *to specify the LASTNAME field as the secondary sort key*

Type   a *for ascending order*

Press   ENTER

Select   Go *to sort the records*

Move the cell pointer around the database table to see the results of the sort. Notice that employees are now listed according to the location where they work. The locations are listed in alphabetical order (Atlanta, Boston, Chicago, Detroit, San Francisco, and Seattle). Also notice that within each group of employees working in a particular location, the records are in alphabetical order by last name. If several people working in the same location have the same last name, you could specify the FIRSTNAME field as a third sort key when you sort the database table.

A:A1: [W14] 'PERSONNEL DATA: Sloane Camera and Video   READY

Primary-key field ————————————————————————

Secondary-key field ——————————

	A	A	B	C	D	E
1		PERSONNEL DATA: Sloane Camera and Video				
2						
3		EMPLOYEE#	LASTNAME	FIRSTNAME	LOCATION	DATE_HIRED
4		000220	Edwards	Jack	Atlanta	14-Feb-87
5		000297	Percival	James	Atlanta	18-Dec-87
6		000348	Reese	Carl	Atlanta	13-Sep-88
7		000190	Santos	Elizabeth	Atlanta	17-Jul-86
8		000247	Savage	Elaine	Atlanta	27-May-87
9		000281	Adamson	Joy	Boston	21-Oct-87
10		000262	Bird	Lance	Boston	13-Aug-87
11		000159	Caulfield	Sherry	Boston	19-Mar-84
12		000139	Cobb	William	Boston	28-May-82
13		000367	Fletcher	Amanda	Boston	03-Jan-89
14		000185	Johnson	Rebecca	Boston	04-Feb-86
15		000118	Kaplan	Janet	Boston	22-Jun-81
16		000307	Bjorkman	Robert	Chicago	24-Feb-88
17		000146	Krauss	Edward	Chicago	13-Jul-83
18		000162	Lerner	Kimberly	Chicago	28-Jun-84
19		000284	Morse	Miriam	Chicago	02-Nov-87

DBT13S.WK3

Employees sorted by location, then by last name ——————————

Saving Your Work

Save this new arrangement of the database table along with the data range, sort key, and sort order settings in a new file called DBT14.WK3:

Select	/File
Select	Save
Type	DBT14.WK3 *(to use with Lesson 14)*
Press	ENTER *to save DBT14.WK3*

Lesson 14 Querying a Database Table

In Lesson 13, you learned how to sort records in a database table. In this lesson, you will learn how to do the following:

- Set up a query

- Find records that match your requirements

- Edit records that match your requirements

- Copy records that match your requirements

- Save your work

Suppose you want to search the personnel database table for the records of all employees who are not currently eligible for profit sharing. Fortunately, you do not have to check each record in the database table to determine whether it matches this **criterion**, or requirement. You can set up a **query**, which is a search that automatically locates all records that meet your requirements.

Once you set up a query, you have several options. You can view the matching records in the database table, edit them, or **extract** them — that is, copy the records to another part of the worksheet or to a separate worksheet.

To begin this lesson, retrieve DBT14.WK3, the file you saved at the end of Lesson 13. If you did not complete Lesson 13, retrieve the sample file named DBT14S.WK3.

Select   /File

Select   Retrieve

Highlight DBT14.WK3 or DBT14S.WK3

Press   ENTER   *to retrieve the file*

```
A:A1: [W14] 'PERSONNEL DATA: Sloane Camera and Video                       READY

A        A              B              C              D              E
1    PERSONNEL DATA: Sloane Camera and Video
2
3    EMPLOYEE#      LASTNAME       FIRSTNAME      LOCATION       DATE_HIRED
4    000220         Edwards        Jack           Atlanta        14-Feb-87
5    000297         Percival       James          Atlanta        18-Dec-87
6    000348         Reese          Carl           Atlanta        15-Sep-88
7    000190         Santos         Elizabeth      Atlanta        17-Jul-86
8    000247         Savage         Elaine         Atlanta        27-May-87
9    000281         Adamson        Joy            Boston         21-Oct-87
10   000262         Bird           Lance          Boston         13-Aug-87
11   000159         Caulfield      Sherry         Boston         19-Mar-84
12   000139         Cobb           William        Boston         28-May-82
13   000367         Fletcher       Amanda         Boston         03-Jan-89
14   000185         Johnson        Rebecca        Boston         04-Feb-86
15   000118         Kaplan         Janet          Boston         22-Jun-81
16   000307         Bjorkman       Robert         Chicago        24-Feb-88
17   000146         Krauss         Edward         Chicago        13-Jul-83
18   000162         Lerner         Kimberly       Chicago        28-Jun-84
19   000284         Morse          Miriam         Chicago        02-Nov-87
DBT14.WK3
```

As you can see, the records are arranged in the order they
were in when you saved the database table in Lesson 13.

Setting Up a Query

Setting up a query is a four-part process. You must do the
following:

- Set up a range in which to enter the criteria (criteria range)

- Enter the criteria

- Specify the range that contains the criteria

- Specify the range to query (input range)

Setting Up a Criteria Range
The first step in setting up a query is to set up a **criteria range**,
a range that contains the selection requirements. Criteria
ranges consist of at least two rows: the first row must include
one or more field names from the database table you are
querying, and the second row must include criteria. (Complex
searches can involve more than one row of criteria. See /Data
Query in Chapter 2 of *User Reference* for more information.)

To set up a criteria range, you copy the field names from the
database table to a separate worksheet. By placing the criteria
range on a separate worksheet, you prevent the possibility
of writing over it if you add more records or fields to the
database table.

First, insert a new worksheet after the current worksheet.

Select   /Worksheet

Select   Insert

Select   Sheet

Select   After

Press   ENTER *to insert one worksheet*

The new worksheet appears on the screen. To see both worksheets at the same time, use perspective view.

Select   /Worksheet

Select   Window

Select   Perspective

The screen shows the two worksheets. Notice that the columns in worksheet B all have the default column width (9) rather than the different column widths of worksheet A. To make the format of worksheet B the same as worksheet A, turn on GROUP mode.

Move   the cell pointer to worksheet A

Select   /Worksheet

Select   Global

Select   Group

Select   Enable

The column widths in worksheet B change to match those of worksheet A.

Now you copy the field names from the database table in worksheet A to worksheet B. It is a good idea to copy all the field names, even though you are using only some of them right now. This lets you change criteria easily later on.

Follow these steps to copy the field names to worksheet B:

Move   the cell pointer to A:A3   *(the first cell in the row that contains the field names)*

Select   /Copy

Move   the cell pointer to A:I3   *to highlight A:A3..A:I3*

Press   ENTER   *to accept A:A3..A:I3 as the FROM range*

Move   the cell pointer to B:A1   *to highlight B:A1*

Press   ENTER   *to accept B:A1 as the TO range*

1-2-3 moves the cell pointer back to A:A3. To see the results of the copy procedure, do the following:

Move   the cell pointer to B:A1

Keep moving the cell pointer to the right to see all the field names 1-2-3 copied. They are located in B:A1..B:I1.

```
B:A1: [W14] 'EMPLOYEE#                                      READY


                  B        A          B         C          D          E
                  1     EMPLOYEE#  LASTNAME   FIRSTNAME  LOCATION   DATE_HIRED
Copied field      2
names in B:A1..B:I1  3
                  4
                  5
                  6
                  A        A          B         C          D          E
                  1    PERSONNEL DATA: Sloane Camera and Video
                  2
                  3    EMPLOYEE#   LASTNAME   FIRSTNAME  LOCATION   DATE_HIRED
                  4    000220      Edwards    Jack       Atlanta    14-Feb-87
                  5    000297      Percival   James      Atlanta    18-Dec-87
                  6    000348      Reese      Carl       Atlanta    13-Sep-88
                  DBT14.WK3                   GROUP
GROUP indicator
```

Entering the Criteria

To search for employees who are not currently eligible for profit sharing, you enter the criterion No in cell B:I2, directly under the field name PROFITSHARING in the criteria range:

Move   the cell pointer to B:I2

When you enter a label as the criterion, it can be in uppercase or lowercase letters, but the spelling must match the database table entry exactly.

Type   no *to indicate the employee is not eligible for profit sharing*

Press   ENTER

Your screen should look like this:

```
   B:I2: [W14] 'no                                                                    READY




                                 B        E              F              G         H              I
Field names in B:A1..B:I1 ───────┌  1     DATE_HIRED  YEARS_EMPLOYED        SALARY         AGE  PROFITSHARING
                                 │  2                                                            no
                                 │  3
                                 │  4
Criterion ───────────────────────│  5
                                 └  6
                                    A        E              F              G         H              I
                                    1
                                    2
                                    3     DATE_HIRED  YEARS_EMPLOYED        SALARY        AGE  PROFITSHARING
                                    4      14 Feb 87        2.0   $32,200.00            44           Yes
                                    5      18-Dec-87        1.2   $19,200.00            36           Yes
                                    6      13-Sep-88        0.4   $15,800.00            23           No
                                    DBT14.WK3                         GROUP
GROUP indicator ─────────────────
```

Specifying the Criteria Range

For 1-2-3 to use the criteria range you have set up, you need to specify the location of the range. When you specify the criteria range, you must include both the field names and the row that contains the criteria:

Select   /Data

Select   Query

Select   Criteria

Move   the cell pointer to B:A1 *(the first cell of the criteria range)*

Press   . (period) *to anchor the cell pointer in B:A1*

Move   the cell pointer to B:I2 *to highlight B:A1..B:I2*

Press   ENTER *to accept B:A1..B:I2 as the criteria range (one row of field names and one row of criteria)*

Although there is no change in the data or display, 1-2-3 now knows the location of the criteria range.

Specifying an Input Range

For 1-2-3 to find records that meet your criteria, you must specify the range you want to search, called the **input range**. The input range for a query is the area of the worksheet that contains the database table. It is similar to the data range you specify for a sort, except that an input range must contain the database table's field names as well as the records.

Before you specify the input range, return worksheet A, which contains the database table, to full-screen size using the ZOOM key. ZOOM switches a window between its original size and full-screen size.

Select	Quit *to leave the /Data Query menu*
Move	the cell pointer to cell A:A1
Press	ZOOM *to return worksheet A to full-screen size*

To specify the input range for the query, do the following:

Select	/Data
Select	Query
Select	Input
Move	the cell pointer to cell A:A3 *(the first cell of the database table)*
Press	. (period) *to anchor the cell pointer in A:A3*
Move	the cell pointer to A:I33 *to highlight A:A3..A:I33*
Press	ENTER *to accept A:A3..A:I33 as the input range*

Although there is no change in data or the display, 1-2-3 now knows the location of the input range.

Finding Records in a Database Table

With the criteria and input ranges set up and specified, you are now ready to search for the records that match your criterion.

Beginning the Search

To find employees who are not eligible for profit sharing, do the following:

Select	Find *to begin the search*

The mode indicator in the control panel changes to **FIND**, and 1-2-3 highlights the first record in the input range that matches the criterion in the criteria range. Your screen should look like this:

FIND indicator ——————————————————————————

```
A:A6: [W14] '000348                                              FIND

  A        A            B            C              D            E
  1   PERSONNEL DATA: Sloane Camera and Video
  2
  3   EMPLOYEE#     LASTNAME      FIRSTNAME     LOCATION     DATE_HIRED
  4    000220       Edwards       Jack          Atlanta      14-Feb-87
  5    000297       Percival      James         Atlanta      18-Dec-87
  6    000348       Reese         Carl          Atlanta      13-Sep-88
  7    000190       Santos        Elizabeth     Atlanta      17-Jul-86
  8    000247       Savage        Elaine        Atlanta      27-May-87
  9    000281       Adamson       Joy           Boston       21-Oct-87
 10    000262       Bird          Lance         Boston       13-Aug-87
 11    000159       Caulfield     Sherry        Boston       19-Mar-84
 12    000139       Cobb          William       Boston       28-May-82
 13    000367       Fletcher      Amanda        Boston       03-Jan-89
 14    000185       Johnson       Rebecca       Boston       04-Feb-86
 15    000118       Kaplan        Janet         Boston       22-Jun-81
 16    000307       Bjorkman      Robert        Chicago      24-Feb-88
```

Matching record is highlighted —————————

Right now, you cannot verify that the currently highlighted record contains information on an employee who is not eligible for profit sharing because you cannot see the PROFITSHARING field. In **FIND** mode, use → and ← to see fields not currently in view:

Press   → eight times   *to move the cell pointer to column I, the PROFITSHARING field*

You are now viewing the part of the database table you could not previously see on your screen.

```
A:I6: [W14] "No                                                 FIND

  A      E            F              G            H        I
  1
  2
  3   DATE_HIRED  YEARS_EMPLOYED    SALARY         AGE  PROFITSHARING
  4    14-Feb-87       2.0        $32,200.00       44         Yes
  5    18-Dec-87       1.2        $19,200.00       36         Yes
  6    13-Sep-88       0.4        $15,800.00       23         No
```

No in PROFITSHARING field ——————————————————————————

To see the record for the next employee with No entered in the PROFITSHARING field, do the following:

Press   ↓ *to move to the next matching record*

1-2-3 highlights the next matching record. Each time you press ↓, 1-2-3 highlights the next record that matches your criterion. To see previous records that match your criterion, use ↑. If you try to move beyond the first or last record that matches the criterion, 1-2-3 beeps.

Press   ↓ *to move to the next matching record*

When you are done viewing the records that match your criterion, end the search:

Press   **ENTER**   *to end the search*

Select   Quit *to return 1-2-3 to* **READY** *mode*

Using Formulas As Criteria

Suppose you want to search the personnel database table for the records of all employees who are not currently eligible for profit sharing, have worked at the company for three or more years, do not work in Atlanta, and earn more than $20,000 a year. These criteria can be summarized as follows:

- PROFITSHARING: No

- YEARS_EMPLOYED: 3 or more years

- LOCATION: not Atlanta

- SALARY: more than $20,000

In the last exercise, you entered the criterion for finding employees who are not eligible for profit sharing. Now you are going to create criteria for the other three conditions.

For 1-2-3 to understand the concept of "3 or more years," you need to express "3 or more" as a logical formula. A **logical formula** evaluates whether a condition is true or false — a given employee has either worked for 3 or more years or has not. A logical formula uses **logical operators** (such as = < and >) that express the relationship between two values.

To specify "3 or more years," you will use the formula +YEARS_EMPLOYED>=3. The operator >= means greater than or equal to. You must enter the formula in cell B:F2 of the criteria range, directly below the field name YEARS_EMPLOYED:

Move   the cell pointer to B:F2

Type   +YEARS_EMPLOYED>=3 *(Be sure to type the underscore.)*

Press   ENTER

1-2-3 displays ERR because it cannot display a value for this formula yet. You will format the cell to display the value in the next section.

Entering More Criteria

You can express the condition "not Atlanta" by using a ~ (tilde) in front of a label. This tells 1-2-3 to exclude that label in its search for matching records.

When you enter ~ATLANTA below the field name LOCATION in the criteria range (cell B:D2), you are telling 1-2-3 that you want to search for records with any entry in the LOCATION field that is not Atlanta. When you enter the criterion, it can be in uppercase or lowercase letters, but the spelling must match the database table entry exactly:

Move   the cell pointer to B:D2

Type   ~ATLANTA

Press   ENTER

For 1-2-3 to understand the concept of "more than $20,000," you need to express "more than $20,000" as a logical formula. The formula for this is +SALARY>20000. The operator > means greater than. You must enter the formula in cell B:G2 of the criteria range, directly below the field name SALARY:

Move   the cell pointer to B:G2

Type   +SALARY>20000

Press   ENTER

1-2-3 displays **ERR** because it cannot display a value for this formula yet.

Your screen should look like this:

```
B:G2: [W14] +SALARY>20000                                          READY

   B            C            D              E         F              G
1          FIRSTNAME    LOCATION    DATE_HIRED YEARS_EMPLOYED   SALARY
2                       ~atlanta                        ERR          ERR
3
4
5
6
```

To display the actual formulas you entered in the criteria range rather than ERR, you will change the format of those cells. Beginning with the cell pointer in B:G2, do the following:

Select	/Range
Select	Format
Select	Text *to display formulas as text rather than as their values*
Move	the cell pointer to B:F2 *to highlight B:G2..B:F2*
Press	ENTER *to accept B:G2..B:F2 as the range to format*

Now widen column F so you can see the complete formula in that column:

Move	the cell pointer to B:F2
Select	/Worksheet
Select	Column
Select	Set-Width
Type	20 *to widen column F to 20 characters*
Press	ENTER

Your screen should look like this:

```
B:F2: (T) [W20] +YEARS_EMPLOYED>=3                                        READY


  B        C            D              E              F
1     FIRSTNAME      LOCATION      DATE_HIRED     YEARS_EMPLOYED
2                    ~atlanta                     +YEARS_EMPLOYED>=3
3
4
5
6
```

Finding More Records

You are ready to search for the records that match all the
criteria: employees who are not currently eligible for profit
sharing, have worked at the company for three or more years,
do not work in Atlanta, and earn more than $20,000 a year.
Because you previously specified the criteria and input
ranges, you do not need to specify those ranges again. You just
need to tell 1-2-3 to begin searching. 1-2-3 automatically uses
the new criteria you entered in the criteria range:

Select	/Data
Select	Query
Select	Find

Use ↓ and ↑ to view the records that match the criteria. 1-2-3
highlights the records for three employees: Rebecca Johnson
from the Boston store, Kimberly Lerner from the Chicago
store, and Cindy Edwards from the San Francisco store.

Editing Records During a Search

When 1-2-3 is in **FIND** mode, you can edit any field in any of
the records that match your criteria. For example, you can
change the PROFITSHARING field for Kimberly Lerner as
follows:

Highlight	the record for Kimberly Lerner
Press	→ eight times *to position the cell pointer in the PROFITSHARING field*
Press	**EDIT**

The current entry appears in the control panel. Change Kimberly Lerner's profit sharing status to Yes by doing the following:

Press	BACKSPACE twice *to erase No*
Type	Yes
Press	ENTER *to enter the correction in the database table*
Press	ENTER *to end the search*
Select	Quit *to return 1-2-3 to* **READY** *mode*

Extracting Records from a Database Table

As you learned in the previous section, /Data Query Find locates records that match your criteria so you can view them or edit them in the database table. /Data Query Extract, on the other hand, makes a copy of the matching records in a range outside the database table. This allows you to work with a subset of the database table, which is useful, for example, if you want to print only records that match your criteria.

The /Data Query Extract command requires that you specify three items:

- An input range

- A criteria range

- The range where 1-2-3 will copy the records that match your criteria (output range)

Because you already specified the input range (A:A3..A:I33) and the criteria range (B:A1..B:I2) in the last exercise, the only remaining step is to set up and specify an output range.

Setting Up an Output Range

An **output range** is an area of the worksheet where 1-2-3 copies the records that match your criteria. The first row of the output range must contain the names of the fields you want included when 1-2-3 extracts the records. For example, if you want to see only the last name, first name, and salary for each employee who matches the criteria, you would enter only the field names LASTNAME, FIRSTNAME, and SALARY in the first row of the output range.

The field names in the output range must be identical to the corresponding field names in the input and criteria ranges, but can appear in any order. 1-2-3 uses the remaining rows of an output range to place the records that match your criteria.

You should enter the field names for the output range in a separate worksheet to prevent accidentally writing over data. Insert a new worksheet after worksheet B.

Move	the cell pointer to cell B:A1
Select	/Worksheet
Select	Insert
Select	Sheet
Select	After
Press	ENTER *to insert one worksheet*

The new worksheet appears on the screen. To see all three worksheets at the same time, use ZOOM to return to perspective view.

Press	ZOOM

The screen shows the three worksheets. Because you are in GROUP mode, the new worksheet has the same formats and column widths as the other worksheets.

To ensure that the field names are identical to the field names in the input range, copy them as follows:

Move	the cell pointer to A:A3
Select	/Copy
Move	the cell pointer to A:I3 *to highlight A:A3..A:I3*
Press	ENTER *to accept A:A3..A:I3 as the FROM range*
Move	the cell pointer to C:A1
Press	ENTER *to accept C:A1 as the TO range*
Move	the cell pointer to C:A1

Keep moving the cell pointer to the right to see the rest of the field names 1-2-3 copied.

.

```
C:A1: [W14] 'EMPLOYEE#                                                      READY
```

```
                         C    A           B           C           D           E
Field names in C:A1..C:I1 ─────────── 1  EMPLOYEE#   LASTNAME    FIRSTNAME   LOCATION    DATE_HIRED
                              2
                              3
                              4
                              5
                         B    A           B           C           D           E
                              1  EMPLOYEE#   LASTNAME    FIRSTNAME   LOCATION    DATE_HIRED
                              2                                      ~atlanta
                              3
                              4
                              5
                              6
                         A    A           B           C           D           E
                              1  PERSONNEL DATA: Sloane Camera and Video
                              2
                              3  EMPLOYEE#   LASTNAME    FIRSTNAME   LOCATION    DATE_HIRED
                              4  000220      Edwards     Jack        Atlanta     14-Feb-87
                              5  000297      Percival    James       Atlanta     18-Dec-87
                              6  000348      Reese       Carl        Atlanta     13-Sep-88
                         DBT14.WK3                      GROUP
```

Specifying the Output Range

You have two choices when specifying an output range: you can specify a single-row output range or a multiple-row output range.

If you specify a single-row output range, 1-2-3 erases everything in the worksheet below the field names in the output range before it puts anything in the output range.

If you specify a multiple-row output range, 1-2-3 uses only the number of rows you specify. If the output range is too small to hold all the extracted records, 1-2-3 beeps and displays an error message. If this happens, press ESC to clear the error message and return 1-2-3 to **READY** mode. Then specify an output range with more rows.

| CAUTION | Do not specify a single-row output range if you have any data below the field names. Instead, specify a multiple-row output range. |

In this example, the entire worksheet containing the output range is blank, so you can safely specify a single-row output range:

Select   /Data

Select   Query

Select   Output

Move   the cell pointer to C:A1

Press   . (period) *to anchor the cell pointer in C:A1*

Move   the cell pointer to C:I1   *to highlight C:A1..C:I1*

Press   ENTER   *to accept C:A1..C:I1 as the output range*

Although there is no change to the data displayed, 1-2-3 now knows where to place the records it extracts.

Extracting Records

You are now ready to extract from the database table the records that meet your criteria (employees who are not currently eligible for profit sharing, have worked at the company for three or more years, do not work in Atlanta, and earn more than $20,000 a year):

Select   Extract

Select   Quit *to return 1-2-3 to* **READY** *mode*

1-2-3 places a copy of all the records that match the criteria in the output range. You can print these records or incorporate them into a report. Right now, move the cell pointer around the output range so you can see that these records meet the criteria you entered.

C:A1: [W14] 'EMPLOYEE#   READY

	A	B	C	D	E
1	EMPLOYEE#	LASTNAME	FIRSTNAME	LOCATION	DATE_HIRED
2	000185	Johnson	Rebecca	Boston	04-Feb-86
3	000174	Edwards	Cindy	San Francisco	15-Aug-85
4					
5					

Extracted records

B	A	B	C	D	E
1	EMPLOYEE#	LASTNAME	FIRSTNAME	LOCATION	DATE_HIRED
2					
3				-atlanta	
4					
5					
6					

A	A	B	C	D	E
1	PERSONNEL DATA: Sloane Camera and Video				
2					
3	000220	Edwards	Jack	Atlanta	14-Feb-87
4	000297	Percival	James	Atlanta	18-Dec-87
5	000348	Reese	Carl	Atlanta	13-Sep-88
6	000190	Santos	Elizabeth	Atlanta	17-Jul-86

DBT14.WK3   GROUP

Printing the Extracted Records

NOTE | Before you continue with this lesson, make sure that your network connection to your default printer is established and that this printer is defined as your default printer.

To print the first four fields of the extracted records, do the following:

Select	/Print
Select	Printer
Select	Range
Move	the cell pointer to C:A1 *if it is not already there*
Press	. (period) *to anchor the cell pointer in C:A1*
Move	the cell pointer to C:D3 *to highlight C:A1..C:D3*
Press	ENTER *to accept C:A1..C:D3 as the print range*
Select	Go *to open a print job and begin formatting the data*
Select	Page *to insert the formatting command that begins a new page*
Select	Quit *to close the print job and send the formatted data to the print control program*

Before printing, you can specify a page format for your printed copy. By selecting /Print Printer Options you can change margins and create headers and footers that include information such as page numbers and the current date. For more information on print options, see /Print [E,F,P] Options in Chapter 2 of *User Reference*.

Saving Your Work

To save the criteria, the extracted records, and the current settings for the input, criteria, and output ranges, you must save the file:

Select	/File
Select	Save
Type	DBT15.WK3
Press	ENTER *to save DBT15.WK3*

If you want to end 1-2-3 now, select /Quit Yes.

For More Information

In this chapter you have learned about the structure of database tables and basic database operations, including how to sort, find, and extract information from a database table.

In addition to performing the database table operations described in this chapter, you can use the Data commands to perform other database table tasks such as filling a range automatically with a sequence of values, dates or times (/Data Fill), performing "what-if" analysis with one, two, three, or more variables (/Data Table), performing regression analysis (/Data Regression), and using queries for more than one database table simultaneously (/Data Query).

Many of the Data commands also let you manipulate data in external tables (tables created using other database management programs). For example, you can copy the contents of an external table to a range in a worksheet (/Data External Use and /Data Query), get information about the fields in an external table (/Data External List Fields), perform special functions available through the database management program (/Data External Other), and create formulas and database @functions that refer to the contents of an external table (/Data External Use).

For more information on these commands, see "Data Commands" in Chapter 2 of *User Reference*.

Chapter 5
Automating Your Work with Macros

Any task that 1-2-3 can perform, from the simplest to the most complex, can be automated with a 1-2-3 macro. A **macro** is a series of keystrokes and special commands (collectively called **macro instructions**) that performs a 1-2-3 task. When you run the macro, 1-2-3 reads through the instructions and performs the task automatically, much faster than you could enter the commands and instructions manually. Once you create a macro, you can use it over and over again.

Although macros require some planning and time to develop, they ultimately save you considerable time and expedite your work in a 1-2-3 session. For example, if you spend an hour printing reports every week, you can create a macro that lets you print the same reports in half the time or even less. Even if you initially spend an hour creating the macro, you will save time over the long run.

In a networked environment, you can develop one or more collections of macros that several people can use to complete a complex task. These collections of macros are called **macro libraries** and can be placed on a network server so that many members of a workgroup can access and use them. For more information on designing and using macro library worksheets, see Appendix B in *User Reference*.

In this chapter, you will explore the uses and construction of macros by creating several yourself. Each macro demonstrates a different concept or technique. You will create a macro that enters labels in the worksheet, a macro that prints a worksheet, and a macro that enters the current date.

Lesson 15 Macro Fundamentals

In this lesson you will create a macro that enters three labels. As you will see, every macro you create requires that you complete the same seven steps:

1. Plan the macro

2. Enter the macro instructions

3. Name the macro

4. Document the macro

5. Run the macro

6. **Debug** or correct problems in the macro, if necessary

7. Save the macro by saving the file

To begin this lesson, start 1-2-3 as described at the beginning of Chapter 1. If you are already using 1-2-3, select /Worksheet Erase Yes. A single blank worksheet appears on your screen. You will use this blank worksheet to create your first macro.

Planning the Macro

When creating a macro, it is important to plan carefully. You must identify each step involved in the task you want to automate. In most cases, this means performing the task manually and writing down each key you press.

In this example, you want to create a macro that enters the address for Sloane Camera and Video's Boston store because you frequently type this address as a heading for new work-sheets. To create this macro, you must know that the task involves these steps:

- Type the label Sloane Camera and Video.

- Press ↓ to enter the label and move the cell pointer down one cell.

- Type the label One Emerson Place.

- Press ↓ to enter the label and move the cell pointer down one cell.

- Type the label Boston, MA 02176.

- Press ENTER to enter the label and leave the cell pointer in the current cell.

Now that you have worked out the steps, you are ready to start translating them into 1-2-3 macro instructions.

Entering the Macro

When you enter a macro, you need to know two things: where you will put the macro and how to write the macro instructions.

Choosing a Macro Location

You can enter macros in a file with other data, or you can enter them in a file that contains only macros, called a **macro library**. Macros that you enter in a file with other data should generally be placed in a separate worksheet from the data. In that way, you avoid the possibility of writing over data when you enter the macro or of damaging the macro when you insert or delete rows and columns of data. If you do enter macros in the same worksheet as other data, enter the macros in an area below and to the right of the data.

Wherever you decide to put a macro, do not put it directly before or after another macro. Make sure there is at least one blank cell separating each macro.

In this lesson, you will enter a macro in a single-sheet file that contains no other data. In Lesson 16, you will enter a macro in a multiple-sheet file that contains other data. Finally, in Lesson 17, you will learn the basic concept of a macro library by entering a macro in one file and then using it in another file.

Writing the Macro Instructions

All macro instructions must be entered as labels in the worksheet. You can include the entire set of macro instructions (up to a total of 512 characters) in one label, or you can divide the instructions among a series of labels, in which case you must enter the labels in consecutive cells in a column. Generally, a macro is easier to read and debug when you divide the instructions among a series of labels.

In the following example, you will divide the macro instructions among three labels.

Move	the cell pointer to B1
Type	Sloane Camera and Video{down}
Press	ENTER *to enter the first part of the macro*
Move	the cell pointer to B2
Type	One Emerson Place{down}

Press	ENTER	*to enter the second part of the macro*
Move	the cell pointer to B3	
Type	Boston, MA 02176	
Press	ENTER	*to enter the last part of the macro*

NOTE	The last line of macro instructions intentionally omits a necessary character so you can learn how to debug a macro and correct an error later in this lesson.

Your screen should look like this:

```
A:B3: 'Boston, MA  02176                                              READY

          A      A        B        C       D        E      F       G       H
          1          ┌ Sloane Camera and Video{down}
          2          │ One Emerson Place{down}
          3          └ Boston, MA  02176
          4
          5
          6
```
Macro instructions ──────────────
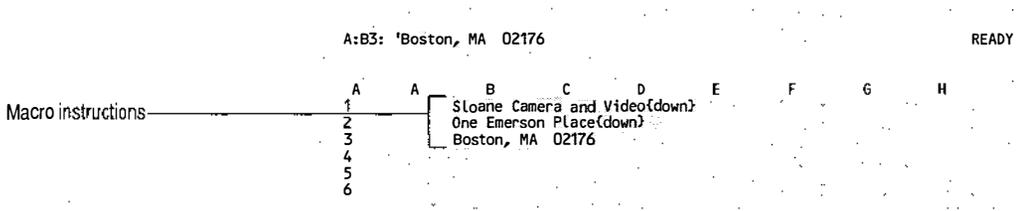
The {down} instructions in the macro represent the ↓ key. In a macro, all pointer-movement and function keys are represented by their key names enclosed in { } (braces). You can type the key names in uppercase or lowercase. See "Entering a Macro" in Chapter 4 of *User Reference* for a complete list of key names.

Naming the Macro

The next step is to use /Range Name Create to assign a range name to the macro. The range name you assign is the name you use to run the macro.

There are two types of macro range names: a \ (backslash) followed by a single letter (such as \a or \t) and a multiple-character name up to 15 characters in length (such as HEADING_BOSTON). The type of name you use determines how you run the macro, as you will see later in this lesson.

In the following example, you are going to use a name consisting of \ (backslash) followed by a single letter. Because the macro you are creating will enter a heading in the worksheet, you will name the macro \H. (It doesn't matter whether you use an uppercase or lowercase "H" to name the macro.)

When you name a macro, you need to specify only the first cell of the macro, in this case B1. To assign a range name to the macro, do the following:

Move	the cell pointer to B1 *(the first cell of the macro)*
Select	/Range
Select	Name
Select	Create
Type	\h *(Be sure to type the backslash; the "h" can be uppercase or lowercase.)*
Press	ENTER *to complete the range name*
Press	ENTER *to accept B1..B1 as the range to name*

Documenting the Macro

After entering and naming a macro, it is good practice to document both the macro's range name and the macro instructions. To document the macro's range name, you enter the range name as a label to the immediate left of the macro. To document the macro instructions, you enter explanatory comments to the immediate right of the macro. This documentation is not part of the macro; it is only a reminder of the macro's name and purpose.

In the following example, you will document the macro's range name in A1 and the macro's purpose in cells F1, F2, and F3:

Move	the cell pointer to A1

You must type a label prefix to start the label in A1; otherwise 1-2-3 will interpret the \ (backslash) in the range name \h as the repeating label prefix and display hhhhhhhh in A1:
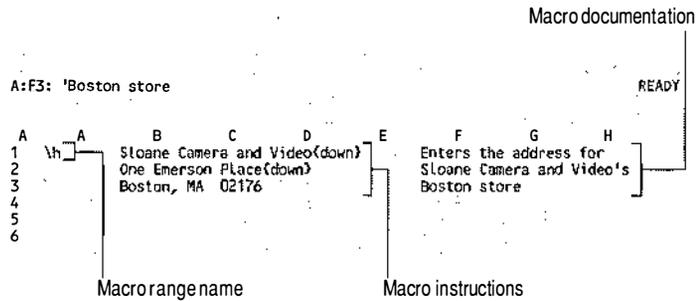
Type	' *(the apostrophe label prefix)*
Type	\h *(Do not type a space between the label prefix and the backslash.)*
Press	ENTER *to enter the label*

Now enter a description of the macro's purpose:

Move	the cell pointer to F1
Type	Enters the address for
Press	↓ *to enter the label and move the cell pointer to F2*
Type	Sloane Camera and Video's
Press	↓ *to enter the label and move the cell pointer to F3*

Type   Boston store

Press   **ENTER** *to enter the label*

Your screen should look like this:

Macro documentation

```
A:F3: 'Boston store                                          READY

  A    A         B        C        D       E      F       G       H
1     \h         Sloane Camera and Video{down}        Enters the address for
2               One Emerson Place{down}               Sloane Camera and Video's
3               Boston, MA  02176                     Boston store
4
5
6
```

Macro range name   Macro instructions

Using the ALT Key to Run a Macro

When you run a macro, 1-2-3 reads macro instructions from left to right in each cell and then moves down to the next cell. 1-2-3 continues down a column of macro instructions until it reaches a blank cell, a cell that contains a number or numeric formula, or the advanced macro command {QUIT}. (See Chapter 4 of *User Reference* for information about {QUIT}.)

Because the macro you created enters data, be sure the cell pointer is in a blank area of the worksheet when you run the macro so it doesn't write over other data.

Move   the cell pointer to A10

To run a macro whose name consists of a \ (backslash) and a letter, press the **ALT** key and then press the letter key. On many UNIX/386 consoles, the **ALT** key is mapped to **CTRL-F** by default. You can use the Lotus **keyedit** utility to redefine the location of this **ALT** key or any **ALT-letter** combination.

Press   **ALT-h** *to run the macro*

Your screen should look like this:

```
A:A12:                                                              LABEL
Boston, MA  02176—

 A     A       B        C        D      E     F       G      H
 1   \h              Sloane Camera and Video{down}  Enters the address for
 2                   One Emerson Place{down}        Sloane Camera and Video's
 3                   Boston, MA  02176              Boston store
 4
 5
 6
 7
 8
 9
10  Sloane Camera and Video
11  One Emerson Place
12
13
14
15
16
```

Macro error

Notice that 1-2-3 entered the first two lines of the address in the worksheet, but the third line of the address appears in the control panel. The macro typed "Boston, MA 02176" but did not enter it in the worksheet. This is because you did not include a keystroke instruction for ENTER, which is necessary to complete the process for entering a label. You will fix this problem in the next exercise.

Debugging the Macro

When a macro does not perform the task you expected it to, or if 1-2-3 does not finish running a macro because of an error, you need to debug the macro, that is, find out what instructions are causing the problem and edit them.

Macros often require some experimentation to debug, so when you create a macro, it is a good idea to schedule time for such adjustments. In this case, however, the problem is immediately obvious: the ENTER instruction is missing from the third line of the macro. To fix this macro, you need to edit the label in B3 by adding a ~ (tilde). The tilde is the macro instruction that represents ENTER.

Press	ESC *to clear the control panel*
Move	the cell pointer to B3
Press	EDIT *to change to EDIT mode*
Type	~ *(tilde)*
Press	ENTER *to enter the correction in the worksheet*

Now your screen should look like this:

```
A:B3: 'Boston, MA 02176~                                                    READY

  A   A        B        C        D       E        F        G       H
  1  \h      Sloane Camera and Video(down)      Enters the address for
  2           One Emerson Place(down)            Sloane Camera and Video's
  3           Boston, MA  02176~                 Boston store
  4
  5
  6
```

Tilde represents ENTER

Try running the macro again.

Move   the cell pointer to A10

Press   ALT-h *to run the macro*

This time, the full address appears in the worksheet.

```
A:A12: 'Boston, MA  02176                                                   READY

  A   A        B        C        D       E        F        G       H
  1  \h      Sloane Camera and Video(down)      Enters the address for
  2           One Emerson Place(down)            Sloane Camera and Video's
  3           Boston, MA  02176~                 Boston store
  4
  5
  6
  7
  8
  9
 10  Sloane Camera and Video
 11  One Emerson Place
 12  Boston, MA  02176
 13
 14
 15
 16
```

Macro results

Saving the Macro

Now that the macro works correctly, save the macro by saving the file:

Select   /File

Select   Save

Type   FIRSTMAC.WK3

Press   ENTER *to save FIRSTMAC.WK3*

You have now completed your first macro by following the seven basic steps -- planning the macro, entering the macro instructions, naming the macro, documenting the macro, running the macro, debugging the macro, and saving the macro.

Clearly it took longer to create this macro than to type the
heading once manually. If you had to type this heading sever-
al times each day, however, the macro would save you a lot of
time.

Lesson 16 Creating a Macro to Print Data

In this lesson, you will create a macro that prints worksheet
data. To create the macro, you will follow the seven basic steps
you learned in Lesson 15 (planning, entering, naming, docu-
menting, running, debugging, and saving the macro). In the
course of the exercise, however, you will also learn some new
techniques.

The techniques you will learn in this lesson include

- Entering a macro in a file with other data

- Using 1-2-3 commands in a macro

- Using RUN to run a macro

- Using STEP mode to debug a macro

In this exercise, you will create a macro in the same file as
other data, so begin by retrieving the sample file named
INC16S.WK3. It is a copy of Sloane Camera and Video's 1989
income file that you worked with in Lesson 12.

Select	/File
Select	Retrieve
Press	NAME
Highlight	INC16S.WK3
Press	ENTER *to retrieve INC16S.WK3*

The screen should look like this:

```
A:A1: 'INCOME SUMMARY 1989: Sloane Camera and Video                      ·READY

     C      A         B           C           D           E          F
     1   INCOME STATEMENT 1989: Sloane Camera and Video, Chicago
     2
     3              Q1          Q2          Q3          Q4         YTD
     4   ------------------------------------------------------------
     5   Net Sales   $10,000.00  $13,000.00  $16,000.00  $19,000.00  $58,000.00
     B      A         B           C           D           E          F
     1   INCOME STATEMENT 1989: Sloane Camera and Video, Boston
     2
     3              Q1          Q2          Q3          Q4         YTD
     4   ------------------------------------------------------------
     5   Net Sales   $12,000.00  $19,000.00  $16,000.00  $22,000.00  $69,000.00
     6   ------------------------------------------------------------
     A      A         B           C           D           E          F
     1   INCOME SUMMARY 1989: Sloane Camera and Video
     2
     3              Q1          Q2          Q3          Q4         YTD
     4   ------------------------------------------------------------
     5   Net Sales   $22,000.00  $32,000.00  $32,000.00  $41,000.00  $127,000.00
     6   ------------------------------------------------------------
     INC16S.WK3
```

The Sloane Camera and Video file already contains four
worksheets. You are going to insert a new worksheet in the file
so you can enter the macro in a worksheet that does not
contain data. In this way, you avoid the possibility of writing
over data when you enter the macro or of damaging the macro
when you insert or delete rows and columns of data.

Move   the cell pointer to D:A1 *to make worksheet D the*
              current worksheet

Select   /Worksheet

Select   Insert

Select   Sheet

Select   After

Press   ENTER   *to accept the default of 1*

The file now contains five worksheets. The cell pointer is in
E:A1, the worksheet you just inserted. Move back to work-
sheet A by doing the following:

Press   FIRST CELL   *to move back to worksheet A*

Planning the Macro

In this example, you want to create a macro that prints Sloane Camera and Video's 1989 income summary for all stores. To identify the steps involved in this task, you are going to work through the task manually. Write the steps down as you complete them for reference when you enter the macro instructions.

Select	/Print
Select	Printer
Select	Range
Type	A:A1..A:F17
Press	ENTER *to accept A:A1..A:F17 as the print range*
Select	Align *to tell 1-2-3 to reset current page alignment*
Select	Go *to open a print job and begin formatting the data*
Select	Page *to insert the formatting command that begins a page*
Select	Quit *to close the print job and send the formatted data to the print spooler*

Entering the Macro

For this example, you will enter the macro in E:B1..E:B3. Although you could enter all the instructions in E:B1, the macro will be easier to read if you divide the instructions among three cells. Begin by moving the cell pointer to E:B1, where you will enter the first line of the macro:

Move   the cell pointer to E:B1

Remember that the first steps for printing the income summary worksheet are to select /Print Printer Range and specify a print range. In a macro, a 1-2-3 command is represented by a / (slash) followed by the keystroke sequence you would use if you were selecting the command manually using the typing method explained in Lesson 2, where you type the first letter of each command.

When a line of macro instructions begins with a 1-2-3 command, you must type the label prefix ' " or ^ in front of the starting slash, or 1-2-3 displays the main menu instead of entering LABEL mode.

Type   ' *(the apostrophe label prefix)*

1-2-3 is now in LABEL mode. (Be sure to enter all macro instructions as labels.)

Type /ppr *(Do not type a space between the label prefix and the command.)*

Press ↓ *to enter the first part of the macro and move the cell pointer to E:B2*

Now you need to include the print range specification in the macro instructions. Because you press ENTER to complete a range specification, you must type the macro keystroke instruction for ENTER, a ~ (tilde), after the print range specification:
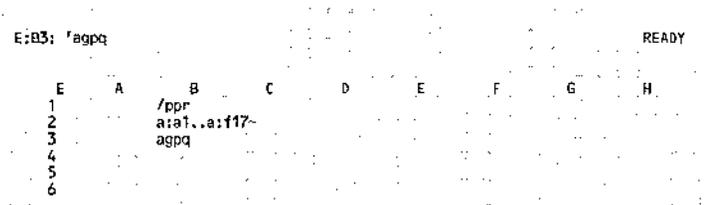
Type A:A1..A:F17~ *(Be sure to include the tilde.)*

Press ↓ *to enter the second part of the macro and move the cell pointer to E:B3*

Remember that when you stepped through the printing procedure manually, the final step was to select Align, Go, Page, and then Quit from the /Print menu. You do not need to start this sequence of Print commands with a slash because you are already in the /Print menu at this point.

Type agpq

Press ENTER *to enter the final part of the macro in the worksheet*

Your worksheet should look like this:

```
E:B3: 'agpq                                                      READY

    E     A      B      C      D      E      F      G      H
    1            /ppr
    2            a:a1..a:f17~
    3            agpq
    4
    5
    6
```

Naming the Macro

Now you will name the macro, using /Range Name Create.

For this example, try using a longer macro range name instead of a backslash-letter combination. The macro prints the 1989 income summary, so use the name PRINT_SUM1989.

Move the cell pointer to E:B1 *(the first cell of the macro)*

Select /Range

Select Name

Select Create

1-2-3 displays the names of the ranges you named in
Chapter 1.

Type	PRINT_SUM1989
Press	**ENTER** *to complete the range name*
Press	**ENTER** *to accept E:B1..E:B1 as the range to name*

Documenting the Macro

Next you will document the macro by entering the macro's
range name and an explanation of its purpose in the
worksheet. First enter the macro's range name:

Move	the cell pointer to E:A1
Type	PRINT_SUM1989
Press	**ENTER** *to enter the label*

The label is cut off because the column is not wide enough to
display it. To see the entire range name, do the following:

Select	/Worksheet
Select	Column
Select	Set-Width
Type	15
Press	**ENTER** *to widen column A in worksheet E to 15 characters*

Now enter a description of the macro's purpose:

Move	the cell pointer to E:D1
Type	Prints A:A1..A:F17
Press	↓ *to enter the label and move the cell pointer to E:D2*
Type	which is 1989 income summary
Press	**ENTER** *to enter the label*

Your worksheet should look like this:

```
E:D2: 'which is 1989 income summary                                    READY

     E      A          B        C      D      E      F     G
     1   print_sum1989  /ppr             Prints a:a1..a:f17
     2                 a:a1..a:f17~     which is 1989 income summary
     3                 agpq
     4
     5
     6
```

Using the RUN Key to Run a Macro

In Lesson 15, you used the ALT key to run the macro you created and named \H. That method, however, can be used to run only macros named with a backslash-letter combination. To run the macro PRINT_SUM1989, you must press RUN then select the name of the macro to run.

Press RUN

Highlight PRINT_SUM1989 *(the name of the macro)*

Press ENTER *to run PRINT_SUM1989*

1-2-3 reads through the macro instructions and prints the income summary.

In this case, the macro worked correctly the first time you ran it (no errors were deliberately introduced as was the case with the macro in Lesson 15). In order to practice debugging the macro in STEP mode, however, you are going to change the macro instructions so it does contain an error.

Move the cell pointer to E:B2

Press EDIT *to change to* EDIT *mode*

Move the cursor under the : in a:f17

Press BACKSPACE *to delete the a*

Type g *to change the range specification to G:F17*

This makes the range specification invalid because there is no worksheet G.

Press ENTER *to enter the change in the worksheet*

Run the macro to see the effects of the error

Press RUN

Highlight PRINT_SUM1989 *(the name of the macro)*

Press ENTER *to run PRINT_SUM1989*

The macro resulted in an error. You are now going to use STEP mode to find and fix the error.

Press ESC *to clear the error*

Debugging the Macro in STEP Mode

If a macro does not work as expected when you run it and you cannot immediately identify the problem, you may want to run the macro in **STEP** mode to see exactly what the macro is doing. When you run a macro in **STEP** mode, 1-2-3 pauses after each macro instruction until you press a key to continue. You can run a macro one instruction at a time until you locate the error.

Turning On Step Mode

To turn on **STEP** mode, you will press RECORD and select Step from the Record menu:

Press   RECORD *to display the Record menu*

Select   Step *to turn on STEP mode*

1-2-3 enters STEP mode, displaying **STEP** at the bottom of your screen.

Press   RUN

Highlight PRINT_SUM1989

Press   ENTER *to run PRINT_SUM1989*

The **STEP** indicator changes to a flashing SST (for Single Step) to indicate the macro is running in **STEP** mode.

Press   space bar *to execute the first macro instruction*

1-2-3 displays the main menu because the first macro instruction is a / (slash). Keep stepping through the macro instructions until you find the error. Although you can press any key to execute the next macro instruction, it is recommended that you use the space bar.

Press   space bar repeatedly *to keep stepping through the macro instructions*

When attempting to execute the print range specification, 1-2-3 enters **ERROR** mode, showing you that the print range specification is incorrect.

Press   ESC *to end the macro so you can correct the error*

When you end the macro to edit it, the **STEP** indicator replaces the SST indicator to remind you that **STEP** mode is still on. You do not need to turn off **STEP** mode before you edit the macro.

Correcting the Error
Starting with the cell pointer in E:B2, do the following:

Press	EDIT *to change to **EDIT** mode*
Move	the cursor under the G in G:F17
Press	DEL *to delete the G*
Type	A
Press	ENTER *to enter the correction in the worksheet*

Now run the macro again in **STEP** mode to make sure there are no other problems.

Press	RUN
Highlight	PRINT_SUM1989
Press	ENTER *to run PRINT_SUM1989*
Press	the space bar repeatedly until 1-2-3 completes the macro by printing the income summary

When the macro is finished, the SST indicator changes back to **STEP**.

Turning Off STEP Mode
To turn off **STEP** mode and return 1-2-3 to **READY** mode, do the following:

Press	RECORD *to display the Record menu*
Select	Step *to turn off **STEP** mode*

Saving the Macro

Save the macro you created by saving the file in which you entered it:

Select	/File
Select	Save
Type	MAC17 *(to use with Lesson 17)*
Press	ENTER *to save MAC17.WK3*

The macro is now in the MAC17.WK3 file; you can use the printing macro whenever this file is active.

Lesson 17 Using the Record Feature to Create Macros

With the macros you created in previous lessons, you entered the macro instructions by typing them directly in the worksheet. You can also enter macro instructions by using RECORD.

RECORD gives you access to the **record buffer**, an area of computer memory where 1-2-3 records the keys you press during a work session in the same format as macro keystroke instructions. To create a macro, you can perform the macro task manually and then use RECORD to copy the keystroke instructions for the task from the record buffer to the worksheet. Copying the keystrokes 1-2-3 recorded instead of typing them yourself saves you time and prevents typing errors.

This lesson leads you through the process of creating a macro with the record feature. It also illustrates the concept of macro libraries by showing you how to run a macro that you entered in one file in a different file. To begin the lesson, retrieve MAC17.WK3, the file you saved in Lesson 16. If you did not complete Lesson 16, retrieve the sample file named MAC17S.WK3.

Select   /File

Select   Retrieve

Highlight   MAC17.WK3 or MAC17S.WK3

Press   ENTER   *to retrieve the file*

```
A:A1: 'INCOME SUMMARY 1989: Sloane Camera and Video                    READY

   C      A          B          C          D          E          F
   1    INCOME STATEMENT 1989: Sloane Camera and Video, Chicago
   2
   3                  Q1         Q2         Q3         Q4         YTD
   4    ----------------------------------------------------------------
   5    Net Sales    $10,000.00 $13,000.00 $16,000.00 $19,000.00 $58,000.00
   B      A          B          C          D          E          F
   1    INCOME STATEMENT 1989: Sloane Camera and Video, Boston
   2
   3                  Q1         Q2         Q3         Q4         YTD
   4    ----------------------------------------------------------------
   5    Net Sales    $12,000.00 $19,000.00 $16,000.00 $22,000.00 $69,000.00
   6    ----------------------------------------------------------------
   A      A          B          C          D          E          F
   1    INCOME SUMMARY 1989: Sloane Camera and Video
   2
   3                  Q1         Q2         Q3         Q4         YTD
   4    ----------------------------------------------------------------
   5    Net Sales    $22,000.00 $32,000.00 $32,000.00 $41,000.00 $127,000.00
   6    ----------------------------------------------------------------
MAC17.WK3
```

Now use /File New to create a new file in which you will enter the macro. This command creates a new worksheet file on disk and reads the file into memory before or after the current file. The new file contains one blank worksheet.

Select   /File

Select   New

Select   After

1-2-3 prompts you to enter a name for the new file.

Type   MACLIB1 *to create a new file*

Press   ENTER *to place the new file after the current file*

New file

```
A:A1:                                                          READY

     A    A      B      C      D      E      F      G      H
     1
     2
     3
     4
     5
   E      A         B      C      D      E      F      G
   1   print_sum1989  /ppr           Prints a:a1..a:f17
   2                  a:a1..a:f17~    which is 1989 income summary
   3                  agpq.
   4
   5
   6
   D    A      B      C      D      E      F      G
   1  COMPARISON OF 1989 AND 1988: Sloane Camera and Video
   2
   3    Difference in Net Sales:    $53,000.00
   4    Difference in Op Exp:       $49,300.00
   5    Difference in Op Inc:        $3,700.00
   6
   MACLIB1.WK3
```

Move   the cell pointer to A:B1 in the file MACLIB1.WK3

This is the cell where you will begin performing the task to automate.

Planning the Macro

As with all macros, you should begin by identifying the steps necessary for the task you want to accomplish. The macro you are going to create will enter today's date in the current cell. This type of macro is useful if, for example, you write daily reports.

This first thing the macro must do is to calculate the date number for today's date. A **date number** is a number from 1 to 73050 that 1-2-3 assigns in sequence to each date from January 1, 1900 through December 31, 2099. Do this by typing @TODAY (an @function that calculates the date number for

today's date). Next, the macro must convert the formula @TODAY to its current value. This keeps the date from changing when you retrieve the worksheet on a different date.

To change the date number into a recognizable date, the macro must change the cell format to Date using the /Range Format Date command. This command gives you a choice of five formats. For example, you can display the date number 32871 as 29-Dec-89, 29-Dec, Dec-89, 12/29/89, or 12/29. This macro will assign the Date 1 (D1) format (DD-MMM-YY).

But the D1 format requires a column width of 10; 1-2-3 displays asterisks instead of the date if the column width is less than 10. Therefore, the last thing the macro must do is set the column width to 10.

Entering the Macro

To enter a macro using the record feature, you need to do three things:

1. Erase the record buffer.

2. Perform the task you want to automate.

3. Copy the recorded keystrokes to the worksheet.

Erasing the Record Buffer

As you work, 1-2-3 automatically records your keystrokes. When you look at the record buffer, it will probably contain keystrokes you do not want in your macro. To get rid of unwanted keystrokes and make it easier to locate the keystrokes you do want to use in the macro, you erase the contents of the record buffer before you perform the task you want to automate.

Before you erase the record buffer, take a look at its current contents:

Press RECORD *to display the Record menu*

Select Copy

1-2-3 displays your most recent keystrokes at the top of your screen. To remove these keystrokes from the record buffer, do the following:

Press ESC two times *to return to the Record menu*

Select Erase

1-2-3 erases the record buffer. Check to see that the record buffer is empty.

Press	RECORD *to display the Record menu*
Select	Copy

Nothing appears after the prompt on the top of your screen, showing you that the record buffer is now empty.

```
                                    Record buffer is empty

 A:B1:                                                           EDIT
 Select keystrokes to copy:
      A      A      B      C      D      E      F      G      H
      1
      2
      3
      4
      5
      6
```
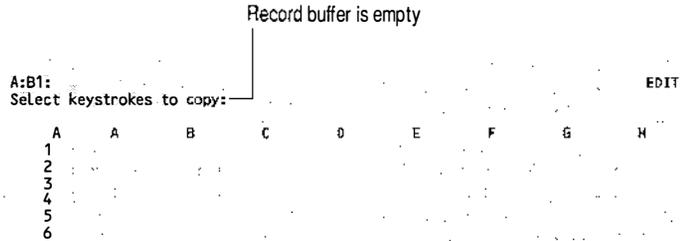
Press	ESC two times *to return 1-2-3 to READY mode*

Performing the Macro Task

The next step in creating the macro is to perform the macro task manually so that 1-2-3 can record the keystrokes.

Type	@today
Press	ENTER
Press	EDIT *to change to **EDIT** mode*
Press	CALC *to convert the formula @TODAY to its current value*
Press	ENTER *to enter the value in the worksheet*

The date number for today's date appears in A:B1. Now use /Range Format Date to format the date number as a date:

Select	/Range
Select	Format
Select	Date
Type	1 *to select DD-MMM-YY as the Date format*
Press	ENTER *to accept A:B1..A:B1 as the range to format*

1-2-3 displays asterisks because the column is not wide enough. Widen the column using /Worksheet Column Set-Width:

Select	/Worksheet
Select	Column

Select	Set-Width
Type	10 *to set the width of column B to 10 characters*
Press	ENTER *to change the width of column B*

Although your date will be different, the worksheet should look like this:

```
A:B1: (D1) [W10] 32801                                              READY


    A     A        B       C.     D      E      F      G
    1             20-Oct-89
    2
    3
    4
    5
    6
```

Copying the Macro Instructions from the Record Buffer

Now you will copy the sequence of keystrokes you just used from the record buffer to the worksheet:

Press	RECORD *to display the Record menu*
Select	Copy

Your most recent keystrokes appear at the top of your screen:
@today~{EDIT}{CE}*a date number*~/RFD1~/WCS10~

NOTE   If you made an error while you were performing the task or if a system broadcast message interrupted the record sequence, your keystrokes may look different. You can edit the keystrokes after you copy them to the worksheet. In addition, the date number you see will reflect the current date.

Notice that 1-2-3 records keystrokes in the same format you use to represent them as macro instructions (for example, /Range Format Date is /RFD). For keystrokes that have several possible formats, 1-2-3 always uses the shortest format. For example, 1-2-3 records the ↓ keystroke as {D} rather than {DOWN}.

Selecting keystrokes from the record buffer is similar to highlighting a range. You position the cursor on the first character you want to select, anchor the highlight, and then use → to highlight the keystrokes. The only difference is that instead of using . (period) to anchor the highlight, you use TAB.

Press	HOME *to move to the beginning of the keystrokes*
Press	TAB *to anchor the highlight*
Press	END *to highlight all the keystrokes in the record buffer*
Press	ENTER *to accept all the keystrokes as the macro instructions to copy*

You no longer need the current date so it is all right to copy over the contents of A:B1.

Move	the cell pointer to A:B1 in the file MACLIB1.WK3
Press	ENTER *to accept A:B1..A:B1 as the range to copy* **TO**

Your worksheet should look like this:

```
A:B1: (D1) [W10] '@today~{EDIT}{CE}32801~/RFD1~/WCS10~                    READY

       A       A       B        C        D        E       F       G
       1               @today~{EDIT}{CE}32801~/RFD1~/WCS10~
       2
       3
       4
       5
       6
```
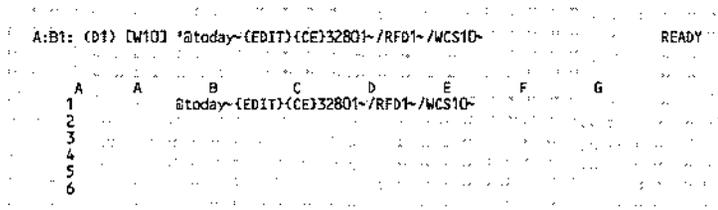
From this point on, the steps for creating a macro are exactly the same as if you had typed the macro instructions in the worksheet manually: name, document, run, debug, and save the macro.

Naming the Macro

The keystrokes that you typed and 1-2-3 recorded in the record buffer are now in cell A:B1 in the MACLIB1.WK3 file. To use these keystrokes as macro instructions, you must name the range containing the keystrokes. You are going to name the macro \D for date. With the cell pointer in A:B1 in the MACLIB1.WK3 file, do the following:

Select	/Range
Select	Name
Select	Create
Type	\d
Press	ENTER *to complete the range name*
Press	ENTER *to accept A:B1..A:B1 as the range to name*

Documenting the Macro

Now you will document the macro by entering the macro's range name in A:A1 and a description of the macro's purpose in A:F1.

Move	the cell pointer to A:A1 in the MACLIB1.WK3 file
Type	' *(the apostrophe label prefix)*
Type	\d *(Do not type a space between the label prefix and the backslash.)*
Press	**ENTER** *to enter the label in the worksheet*
Move	the cell pointer to A:F1 in the MACLIB1.WK3 file
Type	Enters today's date
Press	**ENTER** *to enter the label*

Your screen should look like this:

```
 A:F1: 'Enters today's date                                          READY

       A    A         B        C          D        E         F       G
       1    \d        @today~{EDIT}{CE}32801~/RFD1~/WCS10~ Enters today's date
       2
       3
       4
       5
       6
```

Running the Macro

To test the macro, try running it in MAC17.WK3, the other active file.

Move	the cell pointer to A:H1 in the file MAC17.WK3
Press	**ALT-d** *to run the macro*

The macro enters today's date in the current cell.

> NOTE When you press an **ALT**-*letter* combination to run a macro, 1-2-3 first searches the current file for a range named *letter*. If you have more than one file active with a *letter* macro range name, 1-2-3 will execute the macro in the current file. To run a backslash-letter macro with the **ALT** key when the macro is in another file, it must be the only macro named with that backslash-letter combination in any active file.

| TIP | If you want your macros included in a network macro library, assign a range of the alphabet (like M-Z) for workgroup macros and A-L (for personal macros). In this way, network users can retrieve a macro library from a server and run any workgroup macros named \M — \Z without interfering with personal macros stored in local locations. |

Saving the Macro

Save the macro you created by saving the file in which you entered it:

Press   NEXT FILE   *to make MACLIB1.WK3 the current file*

Select   /File

Select   Save

1-2-3 displays [ALL MODIFIED FILES], which is the default for saving multiple files. To save only the file you entered the macro in

Press   ESC   *to display the name of the current file,*
              MACLIB1.WK3

Press   ENTER

Select   Replace

The macro is now saved in the MACLIB1.WK3 file. This file is called a **macro library** because it will contain only macros and no other data. You may want to use this file as the start of your own macro library and add other macros to it.

The advantage of storing your macros in a separate file is that you can use the macros with any active worksheet. Use /File Open to read the macro file into memory with other active files. As long as the macro file is in memory, you can use the macros with any other active files.

If you want to end 1-2-3 now, select /Quit Yes.

For More Information

In this chapter you have learned the basic process for creating a macro, including typing macro instructions directly in the worksheet and using the record feature to automate macro creation. You created a macro that enters labels in the worksheet, another macro that prints a worksheet, and a third macro that enters today's date and formats the cell for dates.

1-2-3 also includes advanced macro commands, special macro instructions that perform 1-2-3 programming functions. Advanced macro commands let you manipulate data and files, direct the flow of control to create branching and looping macros, suspend macro processing to allow input from the keyboard, and control different parts of the screen display.

For example, in the last macro you created, you could use the advanced macro command {IF} to determine whether the column width of the current cell is greater than or equal to 10 characters. If it is, do not change it; otherwise, do.

For more information on advanced macro commands and the commands described in this chapter, see Chapter 4 of *User Reference.* To review a library of sample macros for 1-2-3, see Appendix B in *User Reference.*

Task Summary

This summary describes 1-2-3 tasks and lists the commands you use to complete them. It is organized by category, with the tasks listed alphabetically on the left and the 1-2-3 commands you use to accomplish the tasks, or a reference to a specific part of the 1-2-3 documentation, on the right. Use this summary to help you identify a specific command for completing a task, and then refer to the description of the command in Chapter 2 of *User Reference* for specific procedures.

Although this summary includes many tasks you can accomplish using 1-2-3 commands, it is not a comprehensive list of commands.

The information in this summary is divided among the following sections:

- Annotating Data

- Controlling Worksheet Appearance

- Converting Formulas to Values

- Copying Data

- Data Analysis

- Database Tables

- Defining and Using Ranges

- Editing Data

- Entering Labels, Numbers, and Formulas

- Erasing Data

- Fixing Mistakes

- Graphing Data

- Listing Information

- Moving Data and the Cell Pointer

- Printing Data and Graphs

- Protecting Data and Files

- Returning 1-2-3 to the Operating System

- Using Files

- Using Macros

Annotating Data

Attach notes to formulas or values	See "Working with Formulas" in Chapter 1 of *User Reference*
Create, list, and delete notes for range names	/Range Name Note

Controlling Worksheet Appearance

When you turn GROUP mode on with /Worksheet Global Group Enable, any changes you make to cell formats and settings in the current worksheet affect the corresponding area of every worksheet in the current file. The following commands work in GROUP mode: /Range Format; /Range Label; /Range Prot; /Range Unprot; /Worksheet Column; /Worksheet Global Col-Width, Format, Label, Prot, and Zero; Worksheet Insert, Delete, Page; and /Worksheet Titles.

Worksheet Global Format commands and Range Format commands provide the same formatting options. /Worksheet Global Format affects an entire worksheet. /Range Format affects the area (range) you choose and overrides /Worksheet Global Format.

Changing Text Display

Rearrange a column of labels to fit in a specified range	/Range Justify
Reset the label alignment (left, right, or center) in a range after you enter labels	/Range Label
Set the label alignment (left, right, or center) for the current worksheet before you enter labels	/Worksheet Global Label

Controlling Columns, Rows, and Worksheets

Change the width of all columns in a worksheet unless previously set with /Worksheet Column Set-Width	/Worksheet Global Col-Width
Change the width of one column or a range of columns	/Worksheet Column
Fix rows or columns so they remain in view when you scroll through a worksheet	/Worksheet Titles
Insert blank columns, rows, and worksheets in the current file	/Worksheet Insert
Remove columns, rows, and worksheets from the current file	/Worksheet Delete

Displaying Numbers and Formulas in Different Formats

Control how 1-2-3 displays data	/Worksheet Global Format/Range Format
Display actual formulas, not the results	/Worksheet Global Format Text /Range Format Text
Display blank cells or a label instead of zeros	/Worksheet Global Zero
Display negative values in a different color (color displays) or intensity (monochrome displays)	/Worksheet Global Format Other Color /Range Format Other Color
Format cells to display numbers automatically in Date, Time, Percent, Fixed, Sci (Scientific), Currency, or , (Comma) format	/Worksheet Global Format Other Automatic /Range Format Other Automatic
Reset a range to the global cell format	/Range Format Reset
Set formats for international currency, date, and time	/Worksheet Global Default Other International
Widen a column to display values instead of asterisks	/Worksheet Column Set-Width

Hiding Data

Hide or redisplay columns	/Worksheet Column
Hide or redisplay ranges	/Range Format Hidden /Range Format Reset
Hide or redisplay values equal to zero	/Worksheet Global Zero
Hide or redisplay worksheets	/Worksheet Hide

Using Worksheet Windows

Display different parts of a worksheet or file by splitting the screen into two windows	/Worksheet Window Horizontal or Vertical
Display three or more consecutive worksheets at once	/Worksheet Window Perspective
Synchronize and unsynchronize window scrolling	/Worksheet Window Sync or Unsyn
View data in the worksheet by displaying symbols for labels, numbers, and formulas	/Worksheet Window Map
View the current graph in a window to the right of the current worksheet	/Worksheet Window Graph

Converting Formulas to Values

Convert a range of formulas to values	/Range Value
Convert the formula in the current cell to a value	Press **EDIT** then **CALC** then **ENTER**
Copy a range, switching columns, rows, or worksheets and converting all formulas to values	/Range Trans
Save a range from the current file in a new file, converting formulas to values in the new file	/File Xtract Values

Copying Data

Copy a range, switching columns, rows, or worksheets and converting all formulas to values	/Range Trans
Copy data from one worksheet or file to another worksheet or file	/Copy

Data Analysis

Create a frequency distribution of values in a range	/Data Distribution
Invert a matrix formed by rows and columns of data	/Data Matrix Invert
Multiply two matrices	/Data Matrix Multiply
Perform customized what-if analysis and enter results in a table	/Data Table Labeled
Perform linear regression analysis (calculate the relationships between independent and dependent variables)	/Data Regression
Perform what-if analysis or cross-tabulate information and enter the results in a table	/Data Table 1, 2, or 3

Database Tables

Using 1-2-3 Database Tables	Create a 1-2-3 database table	See "Database Tables" in "Data Commands" in Chapter 2 of *User Reference*
	Sort records in a database table	/Data Sort
Using 1-2-3 with External Database Tables	Connect 1-2-3 to external tables so you can manipulate data in the tables	/Data External Use
	Create a new table in an external database	/Data External Create

List the names of tables in an exter-
nal database or list the fields in a
table

/Data External List Tables or
Field

Remove a table from an external
database

/Data External Delete

Translate data created using
foreign language character sets in
an external database

/Data External Other
Translation

Defining and Using Ranges

Assign a name to a range of cells

/Range Name Create

Cancel the association between a
range name and its range address

/Range Name Undefine

Create, edit, and delete notes for
range names

/Range Name Note

Delete all range names and notes

/Range Name Reset

Delete one range name

/Range Name Delete

Indicate a range in a worksheet

See "Working with Ranges"
in Chapter 1 of *User Reference*

Use a label entered in one cell as
the range name for an adjacent cell

/Range Name Labels

Editing Data

Edit data in one cell

Press **EDIT**
See "Entering Data" in
Chapter 1 of *User Reference*

Find and replace text in formulas
or labels in the current file

/Range Search

Entering Labels, Numbers, and Formulas

Enter a character that is not on the keyboard	See "Displaying Characters" in Appendix A of *User Reference*
Enter a sequence of numbers, dates, or times	/Data Fill
Enter formulas	See "Working with Formulas" in Chapter 1 of *User Reference*
Enter formulas that link to data in other files	+<<filename>>cell

Erasing Data

Erase data in one or more cells	/Range Erase
Remove all active worksheets and files from memory and replace them with one blank worksheet	/Worksheet Erase Yes
Remove one file from memory	/Worksheet Delete File
Remove one or more columns, rows, or worksheets from the current file	/Worksheet Delete

Fixing Mistakes

Edit data in one cell	Press **EDIT** See "Entering Data" in Chapter 1 of *User Reference*
Erase data	/Range
List error messages, causes, and possible solutions	Press **HELP** and select Error Message Index from the Help Index
Locate a circular reference in a file	/Worksheet Status
Use undo to cancel a mistake in the worksheet	Press **UNDO**

Graphing Data

Creating Graphs	Clear some or all of the current graph settings	/Graph Reset
	Create a graph by assigning all data ranges at once when data is located in consecutive columns or rows	/Graph Group
	Create a graph by selecting individual data ranges	See "Creating a Graph" in "Graph Commands" in Chapter 2 of *User Reference*
	Create a second y-axis	/Graph Type Features 2Y-Ranges
	Select color or black and white for displaying and printing graphs	/Graph Options Color or B&W
	Select the kind of graph you want to display or print	/Graph Type
	Set whether 1-2-3 uses rows or columns to create automatic graphs	/Worksheet Global Default Graph Columnwise or Rowwise
Displaying Graphs	Display a named graph on the full screen (terminal) or in a popup graph window (workstation)	/Graph Name Use
	Display the current graph in a graph window to the right of the current worksheet (terminal) or in a popup graph window (workstation)	/Worksheet Window Graph
	Display the current graph on the full screen (terminal) or in a popup graph window (workstation)	/Graph View or press **GRAPH**
Enhancing Graphs	Add horizontal and/or vertical grid lines	/Graph Options Grid
	Change the way 1-2-3 displays numbers along an axis	/Graph Options Scale [Y-Scale, X-Scale, 2Y-Scale] Format
	Graph data ranges as a percentage of the total value in line, bar, mixed, stacked bar, and XY graphs	/Graph Type Features 100%

Hide a pie slice in a pie chart	/Graph Type Pie and /Graph B with a negative number in the B data range
Remove the percent labels from a pie chart	/Graph Type Pie and /Graph C with the C data range containing zero
Rotate the x-axis 90 degrees so it is vertical rather than horizontal	/Graph Type Features Vertical
Select the colors or hatch patterns for the data in a graph	/Graph Options Advanced Colors or Hatches
Separate one or more slices in a pie chart	/Graph Type Pie and /Graph B with values equal to or greater than 100 in the B data range
Set the appearance of lines in line, mixed, HLCO, and XY graphs	/Graph Options Format
Set the axis scaling	/Graph Options Scale
Set the colors or hatch pattern of each slice in a pie chart	/Graph Type Pie and /Graph B with the B data range containing 1 to 16 (for colors) if the display is set to color or 1 to 14 (for hatch patterns) if the display is set to black and white
Stack the values in the data ranges in line, bar, and mixed graphs	/Graph Type Features Stacked

Labeling Data in Graphs

Add graph titles, axis titles, and notes	/Graph Options Titles
Add text below a graph to label the data ranges represented by each symbol, color, or hatch pattern	/Graph Options Legend
Create labels for the x-axis in line, bar, stacked bar, mixed, and HLCO graphs or label the slices in a pie chart	/Graph X
Label the points or bars in a graph	/Graph Options Data-Labels
Set font, size, and color of text in a graph	/Graph Options Advanced Text
Set the number of labels displayed along the x-axis	/Graph Options Scale Skip

Saving Graphs

Name a graph and save it with a file so you can view the graph again when you use the file	/Graph Name Create and then /File Save
Save a graph in a graph file for use with other programs	/Graph Save
Set the type of graph file (graphic metafile or picture) 1-2-3 creates when you use /Graph Save	/Worksheet Global Default Graph

Listing Information

Display a list of active files, files on disk, or files linked to the current file	/File List
Display a list of advanced macro commands and enter a command in a macro	Type {, press **NAME** twice, highlight a macro command, and press **ENTER**
Display a list of file, graph, range, or print settings names when 1-2-3 is in the middle of a command	Press **NAME** after selecting any command that lists names of files, graphs, ranges, or print settings
Display a list of @functions and enter an @function in a formula	Type @, press **NAME** twice, highlight an @function, and press **ENTER**
Display a list of range names	Press **GOTO** once and press **NAME**
Display global default settings	/Worksheet Global Default Status
Display information about memory use, hardware, and global settings	/Worksheet Status
In the current worksheet, list defined range names	/Range Name Table
In the current worksheet, list information about active files, files on disk, or files linked to active files	/File Admin Table
In the current worksheet, list named graphs	/Graph Name Table
In the current worksheet, list named print settings	/Print [E,F,P] Options Name Table
In the current worksheet, list notes attached to range names	/Range Name Note Table

Moving Data and the Cell Pointer

Move data within the same file	/Move
Move the cell pointer between active files	See "Working with Multiple Files" in Chapter 1 of *User Reference* files
Move the cell pointer between worksheets	See "Using Multiple-Sheet Files" in a file Chapter 1 of *User Reference*
Move the cell pointer within a worksheet	See "The 1-2-3 Screen" in Chapter 1 of *User Reference*

Printing Data and Graphs

You must have one or more printers available to your 1-2-3 session in order to print worksheet data or graphs. See the *1-2-3 Configuration Guide* for more information on selecting printers.

NOTE   /Print [E,F,P] means /Print [Encoded, File, Printer] for the Print commands listed below.

Selecting Data and Graphs for Printing

Select a graph you want to print	/Print [E,P] Image
Select a range of data you want to print	/Print [E,F,P] Range
Select nonadjacent columns and rows to print one after the other	/Print [E,F,P] Range and enter each range separated by a comma
Select text and a named graph you want to print on the same page	/Print [E,P] Range and enter the range for text, a comma, an asterisk, and then the graph name

Selecting Options for Printing Data and Graphs

Advance the paper one line or insert one blank line in a text or encoded file	/Print [E,P] Line
Advance the paper to the next page or insert blank lines in a text or encoded file	/Print [E,F,P] Page

Control margins, borders, page length, headers, footers, and setup strings for the current session	/Print [E,F,P] Options
Eliminate page breaks, headers, footers, and top and bottom margins when you print the range	/Print [E,F,P] Options Other Unformatted
Eliminate the blank lines 1-2-3 leaves at the top and bottom of a printed page	/Print [E,F,P] Options Other Blank-Header Suppress
Print contents of each cell in the print range including the cell address, format, and protection status	/Print [E,F,P] Options Other Cell Formulas
Print worksheet frame with each print range	/Print [E,F,P] Options Borders Frame
Select a color for a print range	/Print [E,P] Options Advanced Color
Select fonts for the border, frame, header/footer, or print range	/Print [E,P] Options Advanced Fonts
Select line spacing, orientation, and pitch	/Print [E,P] Options Advanced Layout
Select the colors or hatch patterns for the data in a graph	/Graph Options Advanced Colors or Hatches
Select the density, size, and orientation of a printed graph	/Print [E,P] Options Advanced Image
Select the font, size, and color for the text in a graph	/Graph Options Advanced Text
Tell 1-2-3 where to start printing a new page	/Worksheet Page

Setting Up 1-2-3 to work with a Printer

Select a printer for the current print job if you do not want to use the default printer	/Print Printer Options Advaned Device Name
Select the default printer you want 1-2-3 to use from a list of printers	/Worksheet Global Default Printer Name
Specify an alternate UNIX print spooler if different from the default setting	/Print Printer Options Advanced Device Interface
Set the default UNIX print spooler for your 1-2-3 session	/Worksheet Global Default Printer Interface

Starting and Stopping Printing	Cancel all 1-2-3 print jobs	/Print Cancel
	End the print job by closing the file if printing to a text or encoded file on disk	/Print [E,F] Quit
	Leave the /Print menu and return 1-2-3 to READY mode without closing the current print job so you can make changes to the worksheet and then continue the print job	/Print [E,F,P] Hold
	Format worksheet or graph data for the current printer type and print spooler	/Print Printer Go
	Save data, graphs, and formatting codes in an encoded file to print later	/Print Encoded Go
	Save data in a text file for use with programs that can read text files	/Print File Go
Viewing and Changing Print Settings	Change the default print settings that 1-2-3 automatically uses when you start 1-2-3	/Worksheet Global Default Printer
	Create, select, modify, and delete print settings names	/Print [E,F,P] Options Name
	Display a list of the default print settings that 1-2-3 automatically uses when you start 1-2-3	/Worksheet Global Default Status
	Print a sample page that shows you the current print settings and your printer's capabilities	/Print [E,F,P] Sample
	Reset some or all of the current print settings to the default print settings	/Print [E,F,P] Clear
	Reset the page counter to one and tell 1-2-3 to begin printing at the top of a page	/Print [E,F,P] Align

Protecting Data and Files

Protecting Data

When a file is in GROUP mode, /Worksheet Global Prot, /Range Prot, and /Range Unprot affect all worksheets in the file.

Display worksheet protection status	/Worksheet Status
Prevent or allow changes to data in a worksheet	/Worksheet Global Prot
Protect or unprotect cells in a range	/Range Prot or Unprot
Restrict cell-pointer movement to unprotected cells for data entry	/Range Input

Protecting Files

Allow a user to read a file into memory but prevent changes to some graph, print, range, worksheet, and reservation settings	/File Admin Seal
Prevent more than one person from simultaneously saving changes to a shared file	/File Admin Reservation See "Working with Files" in Chapter 1 of *User Reference*
Save a worksheet file with a password	See /File Save in "File Commands" in Chapter 2 of *User Reference*

Returning 1-2-3 to the Operating System

End a 1-2-3 session	/Quit
Suspend 1-2-3 to use the operating system	/System

Using Files

Copying Data Between Files	Add numbers from a worksheet file on disk to numbers in the current file	/File Combine Add
	Copy data from a worksheet file on disk to the current file	/File Combine Copy
	Copy data from one worksheet or file to another worksheet or file	/Copy
	Subtract numbers in a worksheet file on disk from numbers in the current file	/File Combine Subtract
	Write formulas that refer to data in other files (link files)	See "Linking Files with Formula Chapter 1 of *User Reference*
Erasing Files	Delete one file from memory	/Worksheet Delete File
	Erase a file on disk	/File Erase
	Remove all active worksheets and files from memory and replace them with one blank worksheet	/Worksheet Erase Yes
	Replace the current file with a file from disk	/File Retrieve
Reading Files from Disk into Memory	Change the current directory that 1-2-3 uses when you save, read, or list files	/File Dir
	Read a file from disk into memory before or after the current file	/File Open
	Read data from a text file into separate cells in the current worksheet	/File Import Numbers with a delimited text file or /File Import Text and then /Data Parse
	Read data from a text file into the current worksheet	/File Import
	Replace the current file with a file from disk	/File Retrieve
	Set the default directory that 1-2-3 automatically uses to save, read, and list files when you begin a session	/Worksheet Global Default Dir

Saving Files on Disk

Save a graph in a file to use with another program	/Graph Save
Save a range of data, converting formulas to values, in a worksheet file on disk	/File Xtract Values
Save a range of data, including formulas, in a worksheet file on disk	/File Xtract Formulas
Save a worksheet file with a password	/File Save in Chapter 2 of *User Reference*
Save data, graphs, and formatting codes in an encoded file	/Print Encoded Go
Save data in a text file	/Print File Go
Save modified active files in files on disk	/File Save

Starting a New File

Create a new worksheet file in memory	/File New

Transferring Data Between 1-2-3 and Other Programs

Read data from a text file into separate cells in the current worksheet	/File Import Numbers with a delimited text file or /File Import Text and then /Data Parse
Save data in a text file for use with programs that can read text files	/Print File Go

Using Multiple-Sheet Files

Delete one or more worksheets from the current file	/Worksheet Delete Sheet
Insert one or more worksheets in a file	/Worksheet Insert Sheet
View three or more worksheets at one time	/Worksheet Window Perspective

Using Macros

Create a macro to perform 1-2-3 tasks	See "Creating a Macro" in Chapter 4 of *User Reference*
Record 1-2-3 keystrokes to create a macro	See "Using the Record Feature for Macros" in Chapter 4 of *User Reference*
Run a macro as soon as 1-2-3 reads the file that contains the macro into memory	/Worksheet Global Default Autoexec
Use the sample macro library	See "Sample Macros" in Chapter 4 of *User Reference*

Lotus 1-2-3 for UNIX System V

Release Notes

These Release Notes supplement the documentation for Lotus *1-2-3 for UNIX System V*.
The product has been designed to be easy to install, set up, and use on your System V
workstation. Please read these notes, bearing in mind that some may not apply to your
system configuration. Some helpful tips are also included here. After looking through
the Release Notes, insert them in the back of your *User Reference* binder.

Contents

1-2-3 for UNIX System V Release Notes

Release Notes
1-2-3 for UNIX System V

These release notes contain updated information on installing, configuring, and running *1-2-3 for UNIX System V.* Read through these notes before you begin to use 1-2-3.

| TIP | Information specific to an operating system is enclosed in square brackets, for example, **[XENIX]** .

Installation

Read the *Installation and Administration Guide* for complete information about installing 1-2-3. This section updates that guide and contains information for the administrator or the person who is installing the Multi-user or the Single-user Edition of *1-2-3 for UNIX System V* on your system.

System V version requirements

The following table shows the supported versions of System V and the operating system patches or additional operations that must be performed for each version to ensure trouble-free operation. The *Installation and Administration Guide* explains how to perform these functions.

System V Version	System	Additional changes
SCO UNIX Release 3.2.0	Compaq Deskpro 386 or IBM PS/2 Models 70, 80	SCO OS patch 900305 **chown** and **chmod** to **123_exe**
SCO XENIX Release 2.3	Compaq Deskpro 386 or IBM PS/2 Models 70, 80	**chown** and **chmod** to **123_exe**

Do not apply the SCO 900305 operating system patch to different versions of the SCO UNIX or XENIX operating systems, including those with Open Desktop. If you do not know which operating system release, you are using, check the system messages when you boot your system, your license agreement, or the labels on your distribution diskettes.

Use separate directories for dual installation

If you are installing both the Multi-user Edition and the Single-user Edition of *1-2-3 for UNIX System V* on a single system, you must specify separate destination (installation) directories when you are prompted for the destination directory

Using manual pages

To access the 1-2-3 or `setup123` manual pages on a XENIX system, enter `help lotus123` or `help setup123`.

DataLens drivers

You can install one DataLens driver when you install *1-2-3 for UNIX System V*. You may be able to install multiple DataLens drivers. Please call Lotus Product Support for an update on using multiple DataLens drivers.

Configuration

Administrators should see the *Installation and Administration Guide* for complete information about system-wide configuration. 1-2-3 users should see the *Configuration Guide* for information about setting up individual systems. See Appendix A in the Release Notes for more information on keyboards and keymaps.

DOS file name mode

DOS file name mode allows you to use DOS file specifications only. When you use 1-2-3 in DOS file name mode, three-character file extensions are used to differentiate between different types of files. When you create or save a file, use valid DOS characters to name it. See the DOS file-naming conventions described in Chapter 1 of *User Reference* for more information.

UNIX file name mode

1-2-3 in UNIX file name mode appends lowercase extensions to file names, except for /Print File files. The maximum length for UNIX file names is 14 characters. Do not create files with names greater than ten characters since a period and a three-character extension are automatically added to the file name.

Printers

The notes in this section are related to printers and printing.

Serial/Parallel interfaces

Use the parallel interface to print on an Epson LQ 800/1000 printer.

[SCO UNIX 3.2.0] SCO UNIX cannot print graphics on parallel printers. Use the serial interface to print text and graphics.

Customizing a printer interface or /Print Printer

If you use **prsetup123** to install the printer-interface files, **lpshut** is invoked and the print scheduler is stopped. Any active print jobs are interrupted, without warning or any system prompts.

Using special characters in file names

Use the UNIX standard file-naming characters when you name any UNIX files (a-z, 0-9, and an underscore_). You cannot use special characters to name your printer-interface file during **prsetup123**.

Printer name restriction

[SCO XENIX] In step 4 of the **prsetup123** procedure (described in Chapter 5 in the *Installation and Administration Guide*), you can specify a printer name of up to nine characters.

Start-Up Options

Read Chapter 2 of *Introducing 1-2-3 for System V* and Chapter 1 of *User Reference* for more information on starting 1-2-3.

Using the -w option

When you use the **123** command with the **–w** option to open 1-2-3 with a specified worksheet, use a file path that is relative to your default directory. If you specify a relative path name, it is always relative to the 1-2-3 default directory and not relative to the current working directory in the shell. If you do not want the path to be interpreted relative to the default directory, specify an absolute path name.

You specify your default directory when you select /Work- sheet Global Default Directory. For example, if you specified the 1-2-3 default directory as **/usr/jsmith/worksheets** and you want to open 1-2-3 with a file called **accounts.wk3** in the **worksheets** directory, use the following:

```
123 -w accounts.wk3
```

To access a file called **staff.wk3** in your home directory (using the previous default directory), use one of the following commands:

```
123 -w /usr/jsmith/staff.wk3
```

```
123 -w $HOME/staff.wk3
```

In DOS mode, remember these points. The **123** command assumes that you are specifying a fully qualified path. When specifying file names in DOS mode, remember to quote the file path and name. For example:

```
123 -f dos -c lower -w "c:\myfile.wk3"
```

Enter the drive letter and path components in upper or lower- case since the case is forced to the proper case with the **–c** option. Use backward slashes (\) to define paths. Do not create or save files with mixed-case file names.

Using 1-2-3

These notes contain additional information about using 1-2-3 features and functions.

Too many open files

If you get the following error message, Too many open files, access the Help screen and follow the instructions carefully. Use the /Worksheet Delete File option to remove some worksheet files from memory.

Relative path names

Use the file name or the absolute path name and file name when you specify a worksheet or an off-sheet file. Do not refer to the same file using a relative and an absolute path name at different times. Use absolute path names whenever possible because the correct file cannot be accessed if the default directory changes.

Long path Names

You can create path names (including the file name) that are up to 256 characters long in 1-2-3. In UNIX file name mode, if you use special characters in your path names, they are preceded with a backslash (\) and count as two characters.

Floating-point required

When the system does not have an 80387 floating-point coprocessor and also does not have the software floating-point emulator installed, *1-2-3 for UNIX System V* cannot run.

Floating-point precision

1-2-3 for UNIX System V uses the IEEE standard floating-point representation (15 decimal digits of precision). 1-2-3 Release 3 uses a different representation (18 decimal digits of precision). The same formulas may produce different results on these two platforms, but they should be the same within the lesser precision. Use @ROUND to limit the precision if needed.

Database Updates

The updates in this section are related to /Data Query Extract and /Data External options.

Column names in criteria range

Column names in formulas are converted to uppercase by 1-2-3. If your column name in the database is actually in lowercase, you must include this column in your output range in lowercase or your search criterion is ignored.

Deleting views

When you use the /Data External Delete command with an SQL-capable database, 1-2-3 assumes you are deleting a table, not a view. Therefore, you cannot delete a view with this Delete option. Use /Data External Other Command to enable you to enter an SQL command that can delete the view.

Extract does not strip out null values

When you select records from an on-sheet table, the null values are not stripped (the values are stripped in an external table). Eliminate each null value for on-sheet queries.

System V Information

File locking

Due to the implementation of the file locking mechanism in SCO's UNIX and XENIX System V operating systems, file locking across a network is not supported from within 1-2-3.

Accessing files on a network

You can retrieve files over a network on a READ-ONLY basis. You can retrieve a remote file, edit it, and store it on your local system successfully.

Virtual terminal switching

Virtual terminal switching is supported in 1-2-3 in all situations, except the following:

- During 1-2-3 startup
- [SCO XENIX] When you execute the /System command or a {SYSTEM} macro from within 1-2-3

Using SIGINT

The DEL key is mapped by default to the UNIX System V software interrupt (SIGINT). Lotus recommends that you change the software interrupt default to another key sequence (such as CTRL-C). Use the **stty** command to view the current default setting and make the following change:

```
"stty -a"
```

```
"stty intr ^c"
```

Changing the Escape key delay

ESC is used alone and in combination with other keys in System V and 1-2-3. To distinguish how ESC will work, a time delay is used. The time delay is specified in the **LOTUS_ESCAPE_TIMEOUT** environment variable. To specify how quickly 1-2-3 responds to the terminal Escape key, add the following timeout variable to your **.login** or **.profile** file:

```
LOTUS_ESCAPE_TIMEOUT=20
```

The **20** represents the value of the variable in tenths of a second. The default value is 20 or 2 seconds. The range for the timeout variable is 1 to 255. The variable is incremented in one-tenths of a second.

Press F11 to access the *fast* escape for the **sco386-101** keyboard. Use this key to avoid the two-second delay after you press ESCAPE.

Memory handling

1-2-3 uses RAM and swap space to optimize the performance of your spreadsheet. You may want to increase the system's swap space and increase the user's virtual address space when you get an **Out of memory** or **Memory Full** error. Consult your system administrator for information about increasing swap space and reconfiguring the kernel with a larger user virtual address space (MAXUMEM). See also Appendix A in the *Installation and Administration Guide* for more information.

Documentation Additions and Changes

Note the following additions and corrections to the *Installation and Administration Guide*, Volume 1, and Volume 2 of the *1-2-3 for UNIX System V* documentation set.

Installation and Administration Guide

Note the following change to the **Installing Updates** section on page 2-5. In step 4, you want to change to the directory that contains the **lotus** tree. Do not change to the destination directory. The example is correct (**cd /usr**) if you used the default directory.

See the Installation, Configuration, and Printer sections in these release notes for additional changes to the *Installation and Administration Guide*.

Volume 1: Chapter 3 in the Configuration Guide

There are several references to the statement "and Key Name appears in line 2 of the Control Panel" in the procedures for Copy, Delete, Edit, and Redo. This statement should be "and Key Name appears in **line 1** of the Control Panel".

Volume 1: Chapter 3 in the Configuration Guide

Note the following change to the **/Save** section on page 3-16. Use the **keyedit** utility to modify the system keyboard map (selected in **setup123 -s**) for your own use. For example, most SCO systems use the **sco386-101** keyboard. Make your changes to the system keymap and save it by inserting the prefix "**U**" and your initials before the keymap name, for example, **Ujs_sco386-101**.

Follow these steps to specify the new keymap in the following directory: **lotus/123.v10/keymap/U**

1. Run **setup123**. Choose the **Change Selected Options** on the main menu.

2. On the list of selected options, choose **Change Selected Keyboard**.

3. Choose **Others** from the list of options. Then, type the new name of the keymap, for example, **Ujs_sco386-101**. Save your edits and exit from **setup123**.

   TIP   If your Lotus directory is *not* mounted read/write, copy the keymaps directory from the installation directory to your local directory. Run **setup123 -k** to inform 1-2-3 of the location of the keymap database.

Appendix A: Keyboards and Keymaps

System V Keyboard Information

System V and DOS keymaps

System V keys are mapped either the same or as closely as possible to the DOS and OS/2 version of 1-2-3 Release 3. UNIX systems use more keys and key combinations to perform system functions. Some of the system keys cannot be mapped or used in *1-2-3 for UNIX System V.* See the information in the following table for examples.

1-2-3 Key	DOS/OS2	System V
NEXT PAGE	**CTRL-PG UP**	**Ctrl-A Pg Up**
BREAK	**BREAK**	n/a
ALT	**ALT**	**Ctrl-F**

FILE functions

When you run 1-2-3 using multiple files, you may want to move between two windows or multiple windows. Use the FILE key combined with other keys to move among the windows. You can also move to the last cell using a combination of the mapped keys. The following table shows how to move to different files or cells within 1-2-3.

1-2-3 Operation	Shortcut	sco386-101 keymap
FIRST FILE	**FILE HOME**	**Ctrl-A End Home**
LAST FILE	**FILE END**	**Ctrl-A End End**

(continued)

1-2-3 Operation	Shortcut	sco386-101 keymap
NEXT FILE	FILE NEXT SHEET	Ctrl-A End Ctrl-A Pg Up
PREV FILE	FILE PREV SHEET	Ctrl-A End Ctrl-A Pg Dn
LAST CELL	END FIRST CELL	End Ctrl-A Home

Keyboards and key maps

Use the following information when you update your keyboard or use the **keyedit** utility. Read the *Configuration Guide* for more information.

Delete key

The UNIX System V software interrupt (SIGINT) defaults to the key labelled DEL on most console keyboards on most SCO System V systems. For 1-2-3 users who want to use the DEL key or the DELETE key for 1-2-3 operations, Lotus recommends changing the software interrupt default to another key sequence (such as CTRL-C). For example, when you assign the DEL key to the software interrupt (SIGINT) and you try to correct an error in the current 1-2-3 cell by pressing DEL, the entire string is deleted since you interrupted your editing. Enter the following to change the default:

```
stty intr "^c"
```

You can only map the software interrupt once.

BREAK key

You cannot assign the BREAK key in any System V keymap. You can assign the software interrupt (SIGINT) to the BREAK key or CTRL-C.

NUM, CAPS, and SCROLL LOCK Keys

When you press the Num Lock key, the Caps Lock key, or the Scroll Lock key, the Num Lock, the Caps Lock , or the Scroll Lock indicators in 1-2-3 do not always appear on most keyboards. The behavior of the Num Lock or the Scroll Lock light on the keyboard depends upon the type of workstation you are using. Typed input using Caps Lock is entered correctly in uppercase.

Wyse and VT Keyboards and Terminals

The following table provides information about the Wyse and VT keyboards:

- *Terminal* refers to the physical terminal

- *Keyboard* refers to the keyboard type

- *Personality* describes the local terminal settings (SELECT, SETUP, or SHIFT-SELECT)

- *TERM* describes the UNIX environment variable

- *Keymap* refers to the keymap file in the **keyedit** utility

Terminal	Keyboard	Personality	TERM	Keymap
Wyse 50	Wyse 50, 60, 350	WYSE 50	wyse50	wyse50
Wyse 50	Wyse PCE	WYSE 50	wyse50	wyse-pce
Wyse 60	Wyse 50, 60, 350	WYSE 60	wyse50	wyse50
Wyse 60	Wyse PCE	WYSE 60	wyse60	wyse-pce
Wyse 85	Wyse 85	VT320	vt100	vtxxx
Wyse 99GT	Wyse 50, 60, 350	Wyse 99GT	wyse50	wyse50
Wyse 150	Wyse 50, 60, 350	Wyse 50, 50+, 150	wyse50	wyse50
Wyse 150	Wyse PCE	WYSE 150	wyse50, 60, 150	wyse-pce
Wyse 150	Wyse PCE	VT100	vt100	vt100
Wyse 185	Wyse 85	VT100, VT220	vt100, vt220	vtxxx
Wyse 350	Wyse PCE	WYSE 350	wyse50	wyse-pce
Wyse 370	Wyse PCE	Wyse 350	wyse50	wyse-pce
VT100	VT100	n/a	vt100	vt100
VT220	VT220	VT220	vt100	vtxxx
VT320	VT320	VT320	vt100	vtxxx

TIP   Generally, you want to match the settings for the terminal and the personality. **TERM** is usually set to the terminal family, for example, **wyse50** or **vt100**.

WYSE50, 60, or 150 terminals

During installation, **wyse50-lts123** is copied to the directories **/usr/lib/terminfo/w/wyse50-lts123** and **lotus/ 123.v10/sysV386/lib/wyse50-lts123**.

If you want to use the Wyse 50 keyboard, you may select the **wyse50-lts123** from the **lotus/123.v10/keymaps** directory. After installation, you need to set the **TERM** environment variable in your **.profile** or **.login** file and then run **setup123** to select the keymap. For example, enter or modify one of the following in your **.login** or **.profile** file:

```
setenv TERM wyse50-lts123 (.login (csh))

TERM=wyse50-lts123; export TERM (.profile (sh))
```

You can then select **Default** in the **Change Selected Keyboard** screen in **setup123**.

If you need to change **terminfo** manually, use the following information. When you use a Wyse 50 terminal (with Personality = wyse50) or Wyse 60 or 150 terminals (with Personality = wyse50+), you must change **terminfo** as follows:

• Enter the following at the shell prompt:

   cd /usr/lib/terminfo

• Edit **terminfo.src** to change the copy of the wyse50 settings as indicated in the following steps:

   1. Lotus recommends that you create a **wyse50-lts123** keymap by copying the information for the standard **wyse50** keymap and renaming the headings as follows:

wy50 (original)   *wy50-lts123 (renamed)*

wy50 | wyse50 | Wyse 50   **wy50-lts123|wyse50-lts123|Wyse 50 for Lotus 1-2-3**

wy50-vb | wyse50-vb | Wyse 50 Visable Bell

   wy50-vb-lts123|Wyse 50 Visable Bell for Lotus 1-2-3

wy50-w | wyse50-w | wyse 50 132-column

   wy50-w-lts123|wyse 50 132-column for Lotus 1-2-3

wy50-wvb| wyse50-wvb | wyse 50 132-column Visable Bell

   wy50-wvb-l123|wyse 50 132-column Visable Bell for 1-2-3

2. Make the following changes to the information in the **wy50-lts123|wyse50-lts123|Wyse 50 for Lotus 1-2-3** section:

wy50	*wy50-lts123*
rmso=\EG0	rmso=\E (
sgr~	.sgr=
sgr0=	.sgr0=
smso=\EGt	smso=\E'6\E)
xmc#1	.xmc#1

3. Make the following changes to the information in the **wy50-vb-lts123, wy50-w-lts123,** and **wy50-wvb-l123** sections, respectively and then, save your editing changes:

use=wy50-vb-lts123

use=wy50-w-lts123

use=wy50-wvb-l123

- Run **tic**. The settings for all the **wyse50-lts123** keymaps are updated.

- After you make these changes, set the environment variable as previously described and run **setup123**. If you do not want to change the keyboard with **setup123**, enter the following at the shell prompt:

123 -k wyse50-lts123

RETURN key

For the Wyse 50 or Wyse PCE keyboards, you define the RETURN key when you start **keyedit**. The **keyedit** utility asks you to: **"Press Return to continue."** If you remap keys on the **wyse50** or **wyse-pce**, choose another key for RETURN. Lotus recommends using the TAB key.

BACKSPACE and Left arrow keys

For the Wyse 50 or Wyse PCE keyboards, both the BACKSPACE and the Left Arrow keys output CTRL-H. To enable the backspace with deletion on the **wyse50** or **wyse-pce**, map BACK-SPACE to ^B (CTRL-B) with the **Select** mode on your terminal.

System V Keymaps

The System V keymaps are provided in these release notes. You or the system administrator can select and use one of these default keymaps, or you can edit and rename one or more keymaps to use on your system.

The keymaps for the following keyboards are provided:

- PC-NFS

- pc101 keymaps for sco386 and sysV386

- Sun for Type-3, Type-4, and Sun386i

- vt100 and vtxxx for VT100 and VT terminals using the lk201 keyboard

- wyse-pce and wyse50

> [TIP]   In the following tables, when hyphens are used between keys, for example, CTRL-J, you hold down the CTRL key while you press the hyphenated key(s) simultaneously.

Keyboard maps

1-2-3 for UNIX System V supports a variety of keyboards. Your documentation package contains a template that you can place on your keyboard that lists the function for each key.

For a listing of the keyboard maps for the different keyboards, see the following keymaps. If you want to see a complete map of a supported keyboard, use the **keyedit** utility, which displays a complete keyboard map for each selected keyboard. Instructions on using **keyedit** are in the *Configuration Guide*.

Function	PC-NFS	sco386-101	sysV386-101
ABS	F4 Ctrl-X 4	F4	F4
ALT	Ctrl-F	Ctrl-F	Alt Ctrl-F
BACKSPACE	~~Backspace~~	~~Backspace~~	~~Backspace~~
BIG LEFT	Ctrl-A Left Arrow Ctrl-F Tab	Ctrl-A Left Arrow Shift-Tab Ctrl-F Tab	Ctrl-A Left Arrow Shift-Tab Ctrl-F Tab
BIG RIGHT	Ctrl-A Right Arrow	Ctrl-A Right Arrow	Ctrl-A Right Arrow
CALC	Ctrl-X 9	F9	F9
COMPOSE	Ctrl-F F1 Ctrl-F Ctrl-X 1	Ctrl-F F1 Ctrl-F1	Ctrl-F F1
DEL	Del	Del	Del
DOWN	Down Arrow	Down Arrow	Down Arrow
EDIT	F2 Ctrl-X 2	F2	F2
END	End	End	End
ENTER	Enter Ctrl-J (New Line)	Return Ctrl-J (New Line)	Return Ctrl-J (New Line)
ESC	Esc Ctrl-6	Esc F11	Esc F11
FILE	Ctrl-A End	Ctrl-A End	Ctrl-A End
FIRST CELL	Ctrl-A Home	Ctrl-A Home	Ctrl-A Home
FIRST FILE	FILE Home	FILE Home	FILE Home
GOTO	Ctrl-X 5	F5	F5
GRAPH	Ctrl-X 0	F10	F10
HELP	F1 Ctrl-X 1	F1	F1
HOME	Home	Home	Home
INS	Ins	Ins	Ins
LAST CELL	End FIRST CELL	End FIRST CELL	End FIRST CELL
LAST FILE	FILE End	FILE End	FILE End
LEFT	Left Arrow	Left Arrow	Left Arrow
NAME	F3 Ctrl-X 3	F3	F3

(continued)

Function	PC-NFS	sco386-101	sysV386-101
NEXT FILE	FILE NEXT SHEET	FILE NEXT SHEET	FILE NEXT SHEET
NEXT SHEET	Ctrl-A Pg Up	Ctrl-A Pg Up	Ctrl-A Pg Up
PG DN	Pg Dn	Pg Dn	Pg Dn
PG UP	Pg Up	Pg Up	Pg Up
PREV FILE	FILE PREV SHEET	FILE PREV SHEET	FILE PREV SHEET
PREV SHEET	Ctrl-A Pg Dn	Ctrl-A Pg Dn	Ctrl-A Pg Dn
QUERY	Ctrl-X 7	F7	F7
RECORD	Ctrl-F F2 Ctrl-F Ctrl-X 2	Ctrl-F F2 Ctrl-F2	Ctrl-F F2
REFRESH	Ctrl-L Ctrl-R	Ctrl-L Ctrl-R	Ctrl-L Ctrl-R
RIGHT	Right Arrow	Right Arrow	Right Arrow
RUN	Ctrl-F F3 Ctrl-F Ctrl-X 3	Ctrl-F F3 Ctrl-F3	Ctrl-F F3
SCROLL LOCK	Ctrl-X S Ctrl-X s	F12	F12
TAB	Tab	Tab	Tab
TABLE	Ctrl-X 8	F8	F8
UNDO	Ctrl-F F4 Ctrl-F Ctrl-X 4	Ctrl-F F4 Ctrl-F4	Ctrl-F F4
UP	Up Arrow	Up Arrow	Up Arrow
WINDOW	Ctrl-X 6	F6	F6
ZOOM	Ctrl-F Ctrl-X 6	Ctrl-F F6 Ctrl-F6	Ctrl-F F6

Function	Sun (Type-4)	Sun (Type-3)	Sun (Sun386i)
ABS	F4	F4	F4
ALT	Alt	Alternate	Ctrl-F
BACKSPACE	Backspace	Backspace	Backspace
BIG LEFT	Ctrl-A Left Arrow (Ctrl-A R10) Alt Tab	Ctrl-A Left Arrow (Ctrl-A R10) Alternate Tab	Ctrl-A Left Arrow (Ctrl-A R10) Ctrl-F Tab
BIG RIGHT	Ctrl-A Right Arrow (Ctrl-A R12)	Ctrl-A Right Arrow (Ctrl-A R12)	Ctrl-A Right Arrow (Ctrl-A R12)
CALC	F9	F9	F9
COMPOSE	Alt F1 Alt R2 Alt Help	Alternate F1 Alternate R2	Ctrl-F F1 Ctrl-F R2
DEL	Del Delete R6	Delete R6	Del Delete R6
DOWN	Down Arrow (R14)	Down Arrow (R14)	Down Arrow (R14)
EDIT	F2	F2	F2
END	End (R13)	R13	End (R13)
ENTER	Return Enter Line Feed (Ctrl-J)	Return Line Feed (Ctrl-J)	Return Enter Line Feed (Ctrl-J)
ESC	Esc R4 F11	Esc R4	Esc R4 F11
FILE	Ctrl-A End (Ctrl-A R13)	Ctrl-A R13	Ctrl-A End (Ctrl-A R13)
FIRST CELL	Ctrl-A Home (Ctrl-A R7)	Ctrl-A R7	Ctrl-A Home (Ctrl-A R7)
FIRST FILE	FILE Home	FILE Home	FILE Home
GOTO	F5	F5	F5
GRAPH	F10 R1	R1	F10 R1
HELP	F1 R2 Help	F1 R2	F1 R2
HOME	Home (R7)	R7	Home (R7)

(continued)

Function	Sun (Type-4)	Sun (Type-3)	Sun (Sun386i)
INS	Ins R5	R5	Ins R5
LAST CELL	End FIRST CELL	End FIRST CELL	End FIRST CELL
LAST FILE	FILE End	FILE End	FILE End
LEFT	Left Arrow (R10)	Left Arrow (R10)	Left Arrow (R10)
NAME	F3	F3	F3
NEXT FILE	FILE NEXT SHEET	FILE NEXT SHEET	FILE NEXT SHEET
NEXT SHEET	Ctrl-A PgUp (Ctrl-A R9)	Ctrl-A R9	Ctrl-A PgUp (Ctrl-A R9)
PG DN	PgDn (R15)	R15	PgDn (R15)
PG UP	PgUp (R9)	R9	PgUp (R9)
PREV FILE	FILE PREV SHEET	FILE PREV SHEET	FILE PREV SHEET
PREV SHEET	Ctrl-A PgDn (Ctrl-A R15)	Ctrl-A R15	Ctrl-A PgDn (Ctrl-A R15)
QUERY	F7	F7	F7
RECORD	Alt F2	Alternate F2	Ctrl-F F2
REFRESH	Ctrl-L Ctrl-R	Ctrl-L Ctrl-R	Ctrl-L Ctrl-R
RIGHT	Right Arrow (R12)	Right Arrow (R12)	Right Arrow (R12)
RUN	Alt F3	Alternate F3	Ctrl-F F3
SCROLL LOCK	Scroll Lock (R3)	R3	Scroll Lock (R3)
TAB	Tab	Tab	Tab
TABLE	F8	F8	F8
UNDO	Alt F4 Undo (L4)	Alternate F4 L4	Ctrl-F F4 Undo (L4)
UP	Up Arrow (R8)	Up Arrow (R8)	Up Arrow (R8)
WINDOW	F6	F6	F6
ZOOM	Alt F6	Alternate F6	Ctrl-F F6

Function	vt100	vtxxx
ABS	PF1 4	F8
		PF1 4
ALT	Ctrl-F	Ctrl-F
	PF2	PF2
BACKSPACE	Backspace	Backspace
BIG LEFT	Ctrl-A Left Arrow	Ctrl-A Left Arrow
	PF1 Left Arrow	PF1 Left Arrow
	Ctrl-A PF2 4	Ctrl-A PF2 4
	PF1 PF2 4	PF1 PF2 4
	Ctrl-F Tab	Ctrl-F Tab
	PF2 Tab	PF2 Tab
	Shift-Tab	Shift-Tab
BIG RIGHT	Ctrl-A Right Arrow	Ctrl-A Right Arrow
	PF1 Right Arrow	PF1 Right Arrow
	Ctrl-A PF2 6	Ctrl-A PF2 6
	PF1 PF2 6	PF1 PF2 6
CALC	PF1 9	F13
		PF1 9
COMPOSE	Ctrl-F PF1 1	Ctrl-F Help
	PF2 PF1 1	PF2 Help
		Ctrl-F PF1 1
		PF2 PF1 1
DEL	Delete	Remove
	PF2 .	PF2 .
DOWN	Down Arrow	Down Arrow
	PF2 2	PF2 2
EDIT	PF1 2	F6
		PF1 2
END	PF2 1	Select
		PF2 1
ENTER	Return	Return
	Line Feed (Ctrl-J)	New Line (Ctrl-J)
ESC	Esc	Esc
	PF4	PF4
		F20

(continued)

| TIP | For ease of use on the Wyse and VT terminals, the PF1 key is always assigned to the ALT key and PF2 is always assigned to the CTRL key. |

Function	vt100	vtxxx
FILE	Ctrl-A PF2 1 PF1 PF2 1	PF1 Select Ctrl-A PF2 1 PF1 PF2 1
FIRST CELL	Ctrl-A PF2 7 PF1 PF2 7	Ctrl-A Find PF1 Find Ctrl-A PF2 7 PF1 PF2 7
FIRST FILE	FILE Home	FILE Home
GOTO	PF1 5	F9 PF1 5
GRAPH	PF1 0	F14 PF1 0
HELP	PF1 1	Help PF1 1
HOME	PF2 7	Find PF2 7
INS	PF2 0	Insert Here PF2 0
LAST CELL	End FIRST CELL	End FIRST CELL
LAST FILE	FILE End	FILE End
LEFT	Left Arrow PF2 4	Left Arrow PF2 4
NAME	PF1 3	F7 PF1 3
NEXT FILE	FILE NEXT SHEET	FILE NEXT SHEET
NEXT SHEET	Ctrl-A PF2 9 PF1 PF2 9	Ctrl-A Prev Screen PF1 Prev Screen Ctrl-A PF2 9 PF1 PF2 9
PG DN	PF2 3	Next Screen PF2 3
PG UP	PF2 9	Prev Screen PF2 9
PREV FILE	FILE PREV SHEET	FILE PREV SHEET
PREV SHEET	Ctrl-A PF2 3 PF1 PF2 3	Ctrl-A Next Screen PF1 Next Screen Ctrl-A PF2 3 PF1 PF2 3

(continued)

Function	vt100	vtxxx
QUERY	PF1 7	F11 PF1 7
RECORD	Ctrl-F PF1 2 PF2 PF1 2	Ctrl-F F6 PF2 F6 Ctrl-F PF1 2 PF2 PF1 2
REFRESH	Ctrl-L Ctrl-R	Ctrl-L Ctrl-R
RIGHT	Right Arrow PF2 6	Right Arrow PF2 6
RUN	Ctrl-F PF1 3 PF2 PF1 3	Ctrl-F F7 PF2 F7 Ctrl-F PF1 3 PF2 PF1 3
SCROLL LOCK	PF3	PF3
TAB	Tab	Tab
TABLE	PF1 8	F12 PF1 8
UNDO	Ctrl-F PF1 4 PF2 PF1 4	Ctrl-F F8 PF2 F8 Ctrl-F PF1 4 PF2 PF1 4
UP	Up Arrow PF2 8	Up Arrow PF2 8
WINDOW	PF1 6	F10 PF1 6
ZOOM	Ctrl-F PF1 6 PF2 PF1 6	Ctrl-F F10 PF2 F10 Ctrl-F PF1 6 PF2 PF1 6

Function	wyse50	wyse-pce
ABS	F4 PF1 4	F4
ALT	Ctrl-F PF2	Alt Ctrl-F
BACKSPACE	Backspace Remove (F13)	Ctrl-B
BIG LEFT	Ctrl-A Left Arrow Shift-Tab PF1 Left Arrow Ctrl-A PF2 4 PF1 PF2 4 Shift-PF2 4 Ctrl-F Tab PF2 Tab	Ctrl-A Left Arrow Ctrl-F Tab Shift-Tab
BIG RIGHT	Ctrl-A Right Arrow PF1 Right Arrow Ctrl-A PF2 6 PF1 PF2 6 Shift-PF2 6	Ctrl-A Right Arrow
CALC	F9 PF1 9	F9
COMPOSE	Ctrl-F F1 PF2 F1 Shift-F1 Ctrl-F PF1 1 PF2 PF1 1 Shift-PF1 1	Ctrl-F F1 Shift-F1
DEL	Del Delete PF2 .	Del Delete
DOWN	Down Arrow PF2 2	Down Arrow
EDIT	F2 PF1 2	F2
ENTER	Return	Return
ESC	Esc F11	Esc F11

(continued)

TIP   For ease of use on the Wyse and VT terminals, the PF1
key is always assigned to the ALT key and PF2 is always
assigned to the CTRL key.

Function	wyse50	wyse-pce
END	PF2 1	End
FILE	Ctrl-A PF2 1 PF1 PF2 1 Shift-PF2 1	Ctrl-A End Shift-End
FIRST CELL	Ctrl-A Home PF1 Home Shift-Home Ctrl-A PF2 7 PF1 PF2 7 Shift-PF2 7	Ctrl-A Home Shift-Home
FIRST FILE	FILE Home	FILE Home
GOTO	F5 PF1 5	F5
GRAPH	F10 PF1 0	F10
HELP	F1 PF1 1	F1
HOME	Home PF2 7	Home
INS	Ins Insert (F12) PF2 0	Ins Insert
LAST CELL	End FIRST CELL	End FIRST CELL
LAST FILE	FILE End	FILE End
LEFT	Left Arrow PF2 4	Left Arrow
NAME	F3 PF1 3	F3
NEXT FILE	FILE NEXT SHEET	FILE NEXT SHEET
NEXT SHEET	Ctrl-A Prev PAGE PF1 Prev PAGE Ctrl-A PF2 9 PF1 PF2 9 Shift-PF2 9 Next Scrn (F16)	Ctrl-A Pg Up
PG DN	Next PAGE (LineFeed) PF2 3	Pg Dn

(continued)

Function	wyse50	wyse-pce
PG UP	Prev PAGE PF2 9	Pg Up
PREV FILE	FILE PREV SHEET	FILE PREV SHEET
PREV SHEET	Ctrl-A Next PAGE PF1 Next PAGE Ctrl-A PF2 3 PF1 PF2 3 Shift-PF2 3 Prev Scrn (F15)	Ctrl-A Pg Dn
QUERY	F7 PF1 7	F7
RECORD	Ctrl-F F2 PF2 F2 Shift-F2 Ctrl-F PF1 2 PF2 PF1 2 Shift-PF1 2	Ctrl-F F2
REFRESH	Ctrl-R	Ctrl-R
RIGHT	Right Arrow PF2 6	Right Arrow
RUN	Ctrl-F F3 PF2 F3 Shift-F3 Ctrl-F PF1 3 PF2 PF1 3 Shift-PF1 3	Ctrl-F F3
SCROLL LOCK	PF3	F12
TAB	Tab	Tab
TABLE	F8 PF1 8	F8
UNDO	Ctrl-F F4 PF2 F4 Shift-F4 Ctrl-F PF1 4 PF2 PF1 4 Shift-PF1 4	Ctrl-F F4
UP	Up Arrow PF2 8	Up Arrow

(continued)

Function	wyse50	wyse-pce
WINDOW	F6 PF1 6	F6
ZOOM	Ctrl-F F6 PF2 F6 Shift-F6 Ctrl-F PF1 6 PF2 PF1 6 Shift-PF1 6	Ctrl-F F6

.