

Apple II



# Apple II Business Graphics



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Cambridge, Massachusetts

Apple II

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# Apple II Business Graphics

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# Preface

Apple II Business Graphics is an easy-to-use computer program that clearly displays detailed data in graphic form on the screen of your Apple's monitor. In addition to producing an image on the screen, it can also print copies of graphs and pie charts when an appropriate printer or plotter is connected to the Apple II.

With an Apple II Business Graphics image, you can get an instant overview of a large quantity of information such as operating performance data, coordinate functions, experimental results, or stock market trends. Apple II Business Graphics lets you enter, manipulate, and store data, and lets you choose from a variety of graphic images to display the data. With only a few simple commands and keystrokes, Apple II Business Graphics turns numbers into pictures.

To use Apple II Business Graphics, you need to know how to set up your Apple II with two disk drives and a monitor. The Apple BASIC Programming Manual and The Applesoft Tutorial describe that procedure. If you are using a color television set as a monitor, be sure to adjust the color before using Apple II Business Graphics.

This manual teaches you everything else you need to know to use Apple II Business Graphics. The manual has two functions:

- To teach you how to use Apple II Business Graphics.

- To serve as a reference when you know how to use the Apple II and the Business Graphics program.

The first part of the manual includes the introduction and a tutorial, a group of lessons that demonstrate how to use the Apple II and the program. We recommend starting with the tutorial unless you have a lot of experience using an Apple II, in which case you may want to read only the reference sections of the manual as you need information about the commands.

The second part of the manual is for reference. It contains chapters describing the program and its commands. The appendices to the manual present information that is not frequently used--error messages and technical information for advanced programmers. One appendix contains sample sets of commands for drawing a bar graph, a multiple bar graph, a pie chart, and a graph without axes.

The manual also includes a reference card listing all the commands. You can tear out the card for easy reference.

Chapter 1 is a general introduction to the program. Everyone should read Chapter 1. Chapter 2 is a simple, step-by-step tutorial to help you learn the fundamentals of using an Apple II and Apple II Business Graphics.

Chapter 3 describes some of the general concepts and procedures for using Apple II Business Graphics. Chapter 4 describes how you communicate with the program using the keyboard, the commands, and file names. Chapter 5 explains how to set up the program and to use diskette files. Chapter 6 describes the editing commands and how to use the work file, a points file, and a labels file. Chapter 7 explains how to create an image, Chapter 8 discusses business functions and mathematical operations, and Chapter 9 describes Take Files.

The appendices contain information that won't be used very often. Appendix A is a guide to the error messages. Appendix B is a description of control characters and their effects. Appendix C is a set of more detailed technical information on the output devices supported by the program. Much of the information in Appendix C is for advanced programmers. Appendix D explains how to transfer files created by other programs (for example, VisiCalc<sup>®</sup>) so that you can create images using Apple II Business Graphics. Appendix E discusses using the Apple II Pascal system: this appendix is for experienced Pascal users who want to write programs to produce points files. Appendix F contains sample sets of commands for graphs and a pie chart. Appendix G contains printed versions of help screens, listing and explaining the commands.

Throughout this manual, you'll see the symbols explained below. Pay particular attention to the information contained in the paragraphs preceded by these symbols.



This symbol precedes a paragraph that contains especially useful information.



Watch out! This symbol precedes a paragraph that warns you to be careful.



Stop! This symbol precedes a paragraph warning you that you are about to destroy data or harm hardware.

# Chapter 1

# Introduction

- 3 Equipment Required
- 4 Diskettes

# Chapter 1

## Introduction

Apple II Business Graphics is a general-purpose graphics program that can manipulate and store data and can create finely detailed color graphics from that data. To use Apple II Business Graphics, you type simple commands in English and type each data point in terms of its coordinates on a graph—one value for the horizontal axis and one value for the vertical axis.

On a color monitor, Apple II Business Graphics displays high-resolution images using six colors: black, blue, green, orange, violet, and white. It provides eight distinct marks that can be used to differentiate multiple sets of points. Apple II Business Graphics draws line graphs with either solid or dashed lines and can fill in the space beneath these lines to provide area plots. The program also draws vertical or horizontal bar graphs in three formats: single bars, side-by-side bars (as many as four bars for each label), and vertically stacked bars. Any of these images (marks, line graphs, area plots, and bar graphs) can be overlaid to create complex graphic images displaying detailed information and highlighting points of importance.

Apple II Business Graphics also draws multicolor pie charts. You can specify the horizontal and vertical ranges to be used on any of the graphs or have Apple II Business Graphics calculate these ranges automatically from the data you've entered. You can label the graphic image, the horizontal and vertical axes, and specific areas of the graph to suit your requirements.

Apple II Business Graphics can handle continuous or discrete data, as long as the data are entered in the correct format: the value for the horizontal, or x axis, and the value for the vertical, or y axis, with a space in between. These "values" can be either numbers or labels (numeric or alphabetical). Both the images and the data can be saved on a diskette for future reference. In addition, using the INTERCHANGE command, the program can produce an image based on data prepared by certain other computer programs, such as VisiCalc and Apple Plot.

Once entered, the data can be modified or manipulated in a variety of ways. Whole sets of points can be mathematically manipulated with ease. For example, one set of points can be divided by a

constant. Or, for any set of points, Apple II Business Graphics can create a new set of points in which each point is the sum of the preceding points (or the difference between them). For any set of data points you've entered, Apple II Business Graphics can give some statistics about that set of data, such as the mean, minimum, maximum, standard deviation, variance, and sum.

Apple II Business Graphics's curve-fitting capabilities are among its most useful features. Apple II Business Graphics can fit any set of data points to any of five curve functions (a constant, a straight line, a logarithm, a parabola, or a sine function) and will report automatically the standard error that the fitted curve reflects.

Apple II Business Graphics can also help you with forecasting. If you've given Apple II Business Graphics a time line that extends beyond the most current data you've entered, the curve-fitting capability can be used to generate the additional points. Apple II Business Graphics can also project trends into the future on the basis of moving averages.

Apple II Business Graphics includes features that make it easier to use: a "help screen" that displays lists of commands available at that time, and error messages that alert you to special conditions or remind you of the specifics of using the program.

## Equipment Required

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To use Apple II Business Graphics, you need an Apple II or Apple II Plus with 48K of memory, at least two Disk II drives, and either a language card or a 16K add-on memory card. A color monitor enables you to create graphic displays in color. However, a black-and-white monitor can also be used. To make paper copies of graphics, you must use a graphic output device (such as a printer or plotter). Apple II Business Graphics can already use any of the following devices:

- Console (screen and keyboard)
- Apple Silentype®
- Hewlett Packard 7225A/B
- Houston Instruments HILOT™ (DMP 3 or DMP 4)
- Qume Sprint®5/45

Typically, the interface card for the graphic output device will be located in slot #2 inside the Apple II. If you have plugged some other device into slot #2, you may use slot 1, 4, 5, or 7. Depending on the characteristics of each device and the type of graphic output you need, you may need to modify the forms of certain commands; the exact modifications required for each type of device are described in the appendix on using external devices.

In addition to a graphic output device, a conventional (nongraphic) printer may be useful for printing data files or other nongraphic text.



Apple II Business Graphics won't work with certain kinds of 80-column cards in slot #3.

## Diskettes

---

Apple II Business Graphics stores information on diskettes. The program can use any diskette formatted for use by Pascal on a 16-sector Apple II. In addition, the program contains a command that lets you format blank diskettes.

Your Apple II Business Graphics package comes with four diskettes: two copies of the master program diskette (named PLOT: ), a tutorial diskette (named DATA: ), and a blank, unformatted diskette. Whenever Apple II Business Graphics is operating, you must leave PLOT: in disk drive 1 unless otherwise indicated.

DATA: goes in disk drive 2. Its main function is to help you learn about Apple II Business Graphics. When you want to store more data than you can fit on DATA: , you can take DATA: out of drive 2 and replace it with a properly formatted blank diskette or with any diskette containing properly formatted information.



Although you won't need a blank diskette to do the examples in the tutorial, before you start working with your own files, you should format the blank diskette provided in the Apple II Business Graphics package. Formatting is described in the chapter on setting up. We recommend keeping a few blank, formatted diskettes on hand.

## Chapter 2

# The Tutorial

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- 6 Booting the Diskette
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## Chapter 2

# The Tutorial

In this chapter we will lead you step by step through an example using Apple II Business Graphics. This example shows you many of the commands and techniques for entering data, creating images from that data, and using some of the program's other features.



The best way to become adept at using Apple II Business Graphics is by using its commands. To get the most out of this tutorial, do all the examples as you read about them.

## Creating a Presentation

---

You are faced with the following situation: you are preparing an important presentation on oil use in the United States. You have figures for the country's oil consumption, production, and imports during the 18 years from 1960 to 1978. You want to display this information clearly so that the people watching your presentation will easily understand the important aspects of your analysis. Using Apple II Business Graphics, you can quickly make a graph of oil imports as a percentage of total oil consumption.

### Booting the Diskette

Be sure that the Apple II has its disk controller card in slot 6. If the Apple II is connected to a Silentype printer, its interface card should be in slot 1 (for this example).

Place the diskette labeled PLOT: in drive 1 and the diskette labeled DATA: in drive 2. PLOT: must remain in drive 1 unless Apple II Business Graphics specifically instructs you to remove it.

Close the disk drive doors and turn on the Apple II. The disk drive whirs for about 45 seconds while the Apple II reads the program into its memory. During this time, Apple II Business Graphics takes inventory of the peripheral devices that are attached to the system. It also checks the contents of the disk drives.

When the Apple II finishes booting the program, it displays the Apple II Business Graphics title page and copyright. If it does not, consult the manual that came with your disk drives and try again.

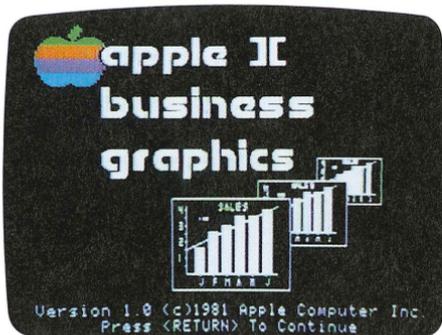


Figure 2-1. Title Page

Press the RETURN key to begin using the program. You should now see

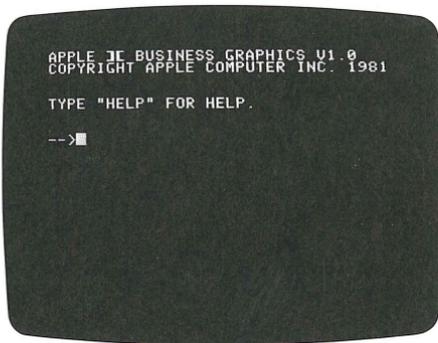


Figure 2-2. Photo of System Prompt and Cursor

The characters on the bottom line of the screen are the system prompt "-->" and the cursor █. The system prompt tells you that the system is waiting for you to type a command. The white block immediately to the right of the system prompt is the cursor. The cursor shows where the next character you type will appear.



To give information to Apple II Business Graphics, use the Apple II keyboard in almost the same way you would use a typewriter. One important difference is that you must press the RETURN key to tell Apple II Business Graphics that you have finished entering a command or piece of data. We'll remind you to press the RETURN key the first few times you need to.

## Correcting Typing Mistakes

If you make a typing mistake, and you notice it before you press the RETURN key, press the left-arrow key until the cursor is over the leftmost incorrect character, then retype the rest of the entry. To remove an entire line, you may either press the left-arrow key repeatedly or hold down the CTRL key while you type an X. Try out both of these techniques if you are not already familiar with them.

If you accidentally enter a command that has a typing error in it, Apple II Business Graphics responds with an error message such as

```
? UNKNOWN COMMAND, TYPE "HELP" FOR HELP
```

You can type HELP to see a list of commands, or you can simply retype the command.

## Entering Data

Before Apple II Business Graphics can create a graph, you must give it some data to work with. In this example, you will type data on the quantities of oil consumed, produced, and imported in the even years from 1960 through 1978 as listed below:

Year	Consumption (millions of barrels a day)	Production (millions of barrels a day)	Imports (millions of barrels a day)
1960	9.7	8.0	1.8
1962	10.2	8.4	2.1
1964	10.8	8.8	2.3
1966	11.9	9.6	2.6
1968	13.0	10.6	2.8
1970	14.4	11.3	3.4
1972	16.0	11.2	4.7
1974	16.2	10.5	6.1
1976	17.0	9.7	7.3
1978	18.4	10.3	8.4

Figure 2-3. Oil in the U. S.

The first part of this tutorial demonstrates how to use Apple II Business Graphics to take these data and create a bar graph that looks like this:

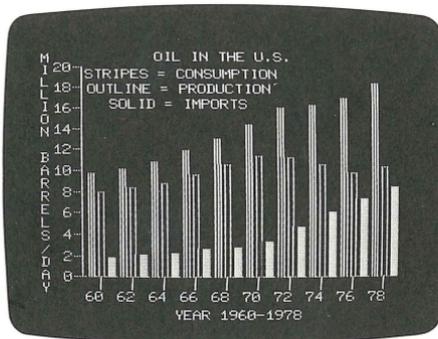


Figure 2-4. Finished Graph

The first step in creating the graph is typing the data for oil consumption. To tell the program that you want to enter some information, type

EDIT

and press the RETURN key. The screen shows a number and a question mark:

1:                    ? ■

The "1:" is the number of the entry. The question mark is the edit prompt, telling you that Apple II Business Graphics is waiting for you to type some data.



The Apple distinguishes between letters and numbers that look alike on a typewriter: O is a letter and Ø is a number, L is a letter and 1 is a number. Be sure that you type letters when you mean letters and numbers when you mean numbers.

For this example, you'll plot the years along the horizontal axis of the graph, and the amounts of oil along the vertical axis. So, you will always type the year first, followed by data on the quantity of oil. To save room on the horizontal axis, you'll only use the last two digits when specifying the year.

In 196Ø, the U.S. consumed 9.7 million barrels of oil per day. To give this information to Apple II Business Graphics, type

"6Ø", 9.7

and press RETURN. The last two lines on the screen should look like this:

```

1:          ? "60",9.7
2:          ? █

```

The quotes around the 60 tell Apple II Business Graphics to enter the year as a label instead of as a number. (We'll explain more about labels later.) The first label on the horizontal axis of the graph will be "60". By indicating to the program that the first entry has a label for the horizontal coordinate, you tell the program that all the rest of the entries will have labels on the horizontal axis as well. So, although you could type quotes for all the labels for the rest of the entries, you don't have to type quotes around the two digits for the years.

Now type the rest of the data for oil consumption, so that the screen looks like this:

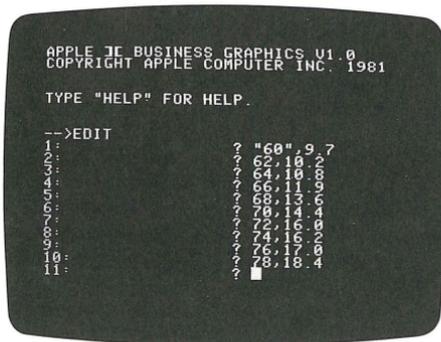


Figure 2-5. Oil Consumption Data

To end this part of the editing session, type

```
END
```

and press RETURN. The message

```

10 LABELS LOADED
10 POINTS LOADED

```

confirms that the program interpreted all ten years as labels and all ten amounts as points to be plotted above those labels. After you end this part of the editing session, the screen displays the system prompt --> .

## Correcting a Mistake

If you compare the numbers in Figure 2-3 and the numbers in Figure 2-5, you'll see that entry 5 is wrong. The vertical coordinate should have been 13.0 instead of 13.6. We'll assume that you used the numbers in Figure 2-5 and typed the wrong vertical coordinate. To correct that mistake, you need to edit the data. Type

EDIT

The first entry should return to the screen:

```
1: 60      9.7  ? █
```

Move the cursor to line 5 by pressing RETURN until the last line on the screen is

```
5: 68      13.6 ? █
```

To correct the entry, use the change command. Type

```
CHANGE 68, 13.0
```

and press RETURN. Although the screen doesn't immediately show the change, the program has corrected the value for entry 5. End this editing session by typing

```
END
```

and pressing RETURN. Note that you are again given information about the number of points and labels loaded and that the system prompt is displayed.

## Checking the Data

Use the LIST command to review all the data points you entered. Type

```
LIST
```

and press RETURN. After the disk drive whirs for a while, you'll see

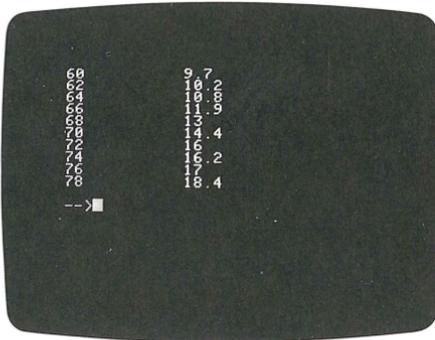


Figure 2-6. Listing of Data Points

A quick comparison with Figure 2-3 shows that the data are correct. You have now completed a set of data points.

# Drawing a Graph

---

The program has saved all of the data you have entered so far. It stores labels, points, and other information in an area of memory called the "work file". To plot the current contents of the work file on the screen, use the DRAW command. Type

DRAW BAR

and press RETURN. The program creates a bar graph of the oil consumption information. If you have a color screen, the graph's axes are green and the bars are all violet. If you have a black and white screen, you see striped bars. Notice that the program automatically labels both axes for you: the horizontal axis with the labels you typed in, and the vertical axis with numbers that it selects. The black and white version of the graph looks like this:

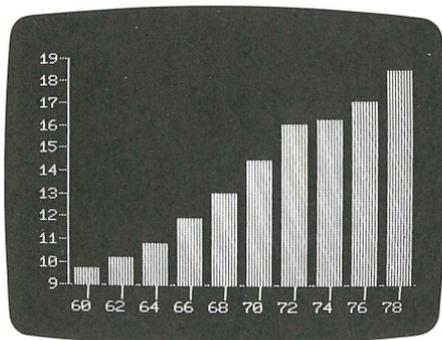


Figure 2-7. The First Bar Graph

## Adding Titles

---

This bar graph isn't very informative yet. To make it clearer, add some titles. To add a horizontal title "YEARS 1960-1978", type

SET HORIZ TITLE "YEARS 1960-1978"



Did you automatically press the RETURN key after typing the command? Good! From now on, we'll assume that you will remember to press RETURN at the end of each command or data entry.

Notice that the commands appeared on the screen as soon as you pressed a key to type the command. Apple II Business Graphics keeps track of two displays: the command screen and the graphics screen. After you type a command that tells the program to draw more

graphics, the graphics display returns to the screen. In this case, the disk drive whirs again, and the title appears at the bottom of the graph.

Now add a vertical title. Type

```
SET VERT TITLE "MILLION BARREL/DAY"
```

The graphics display shows the bar graph with that title added.

## Switching from Graphics to Commands

---

Press the spacebar to see the commands display. To look at the graphics display again, type

```
SET SCREEN
```

## Saving Data Points on a Diskette

---

The work file only maintains one set of points at a time. Thus, before you can enter the data for oil production, you must save the oil consumption information on the diskette. Type

```
SAVE POINTS DATA:CONS
```

Both disk drives spin, and the system prompt returns to the screen. The program has saved your data points in a file named CONS (for "consumption") on the diskette named DATA: .

To verify that the file really exists, type

```
LIST CATALOG
```

If DATA: contains 20 or more files, some of their names won't appear on the screen at first. In that case, the message at the bottom of the screen says

```
PRESS <RETURN> TO CONTINUE, <ESC> EXITS
```

Press RETURN to continue. The file POINTS DATA:CONS (the last file listed on the screen) is the one that you just created.

# Clearing the Work File

---

To clear the work file so you can enter new data, type

CLEAR

If clearing the work file would destroy data that have not been saved, the program verifies that you really want to erase the data. It asks

DO YOU WANT TO CLEAR THE CURRENT DATA?

Type

YES

to indicate that you do want to get rid of the old data. This clears all information from the work file. Now type

LIST

The program responds:

? THERE ARE NO POINTS LOADED

because you have cleared all the data from the work file. Now type

LOAD DATA:CONS

The program responds:

1Ø LABELS LOADED

1Ø POINTS LOADED

Now use the LIST command to see the data from DATA:CONS .



After you type END, the program responds with the message:

```
10 LABELS LOADED
10 POINTS LOADED
```

Check the figures to make sure that you didn't make any typing mistakes. If you did make a mistake, edit the data using the CHANGE command again to correct the mistake.

## The Default Volume

---

There are two ways to save this set of points in the file PROD on the diskette named DATA: . The first is to type

```
SAVE POINTS DATA:PROD
```

The second way is helpful if you plan to save a number of files on DATA: . First, type

```
SET DEFAULT VOLUME DATA:
```

Apple II Business Graphics will save all new files on, and take all files off of the volume named DATA: until you tell it otherwise. "Volume" is the computerese term for something that you store information on. It could be a diskette or a hard disk. Now, save the file by typing

```
SAVE POINTS PROD
```

Until you reboot the program or change the default volume, you won't have to type the volume name DATA: . Type

```
LIST CATALOG
```

to check that DATA:PROD is there.

## Editing the Data

---

For the final graph, you need to add data on imports. Once again, type

```
CLEAR
```

to remove the data from the work file, then type the amounts of oil imported into the U.S. and save it in a file. Figure 2-10 shows the command screen after you type the commands and data on imports.

```

HELP DATA: CURVES
HELP DATA: MATH
HELP DATA: SCREEN
TAKE DATA: DEMO
POINTS DATA: CONS
POINTS DATA: PROD
101 BLOCKS USED; 106 BLOCKS FREE

--> CLEAR
--> EDIT
1: ? "60" 1.8
2: ? ? ? 2.1
3: ? ? ? 2.3
4: ? ? ? 2.5
5: ? ? ? 2.7
6: ? ? ? 3.4
7: ? ? ? 4.7
8: ? ? ? 6.1
9: ? ? ? 7.3
10: ? ? ? 8.4
11: ? ? ? ?
10 LABELS LOADED
10 POINTS LOADED
-->

```

Figure 2-10. Data on Oil Imports



Be sure to put quotes around the 60 in entry number 1, so the program recognizes the years as labels. If you forget to use quotes, you must edit the data and retype the line. Once you have entered data one way (as numbers or labels), if you want to change it, you must clear the data and retype it.

As before, correct any errors you have made, then type

```
SAVE POINTS IMPO
```

## Drawing a Pie Chart

Using the oil import data that is still in the work file, the program can draw a pie chart. Type the command

```
DRAW PIE
```

Each year's slice is marked with a label. The size of each slice is proportional to the amount of oil imported in that slice's year.

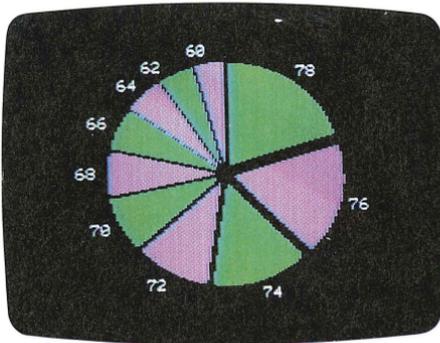


Figure 2-11. Pie Chart

Note the alternating colors. A later chapter of this manual explains how to use up to 5 colors in a graph. Figure 2-12 shows a pie drawn in the five colors.

To add a title to this chart, type

SET TITLE "OIL IMPORTS 1960-1978"

This title is known as a general title. It is always centered at the top of the graphics screen. Unlike horizontal and vertical titles, it is not saved in a points file.

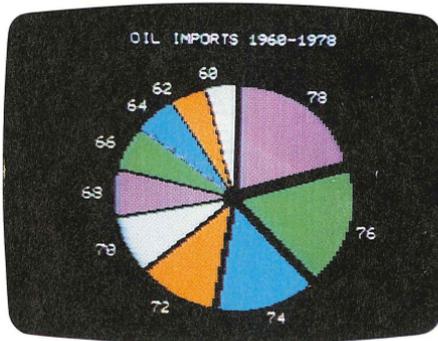


Figure 2-12. Pie Chart with General Title

# Plotting Multiple Data Sets

Now that the data are saved in the files DATA:CONS , DATA:PROD , and DATA:IMPO , you can put them all together in a single graph.

Figure 2-13 shows multiple data sets in contrasting colors. Type

```
CLEAR
```

to clear the work file. Then, plot the amounts of oil consumption. For this example of plotting multiple data sets, we assume that you have set DATA: as the default volume by typing

```
SET DEFAULT VOLUME DATA:
```

The first step in combining the three files in one graph is to load one of the files into the workfile. Load the consumption data by typing

```
LOAD CONS
```

The program responds:

```
10 LABELS LOADED  
10 POINTS LOADED
```

indicating that the program loaded ten labels for the horizontal axis and a point for each of those labels.

## Extending the Vertical Axis

Figure 2-7, the first graph drawn from these data, automatically labeled the vertical axis with values from 9 to 19 because the oil consumption values are all in that range. However the oil imports data contain many values that are less than 9. These values wouldn't appear on the screen if the axis starts at 9. However, if

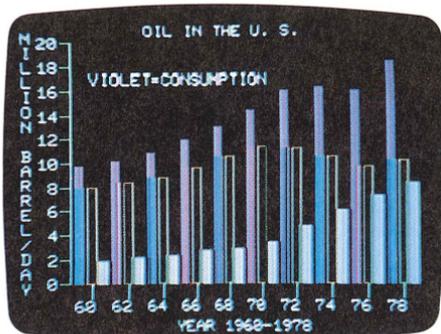


Figure 2-13. Contrasting Colors

the vertical axis were labeled with values from 0 to 20, all of the points would appear. To set the range of the vertical coordinates to include values from 0 to 20, type

```
SET VERTICAL RANGE 0 20
```

## Multiple Bars for a Year

Figure 2-4 shows three columns for each of the years, so the graph for these data will have three bars for each year. To tell Apple II Business Graphics that you want three sets of data drawn as bars in the same graph, type

```
DRAW BAR 3
```

When you specify that you want a graph to contain three bars for each label, Apple II Business Graphics automatically draws thinner bars that are properly placed over the labels for the years.

## Contrasting Colors

If your Apple II is connected to a black and white monitor, the bars for the different sets of data appear on the screen as different shades of white and gray. You can specify that you want the bars filled or unfilled for both a black and white screen and a color screen. A filled shape is a solid color; an unfilled shape is an outline. When you type commands that specify different colors, the black and white screen shows different shades of gray.



Even if you are using a black and white monitor, we recommend that you type the color commands as an experiment.

If your Apple II is connected to a color monitor, the first set of bars is drawn in violet. For contrast, tell the program to draw the second set of bars as orange outlines by typing

```
SET COLOR ORANGE  
SET FILL OFF
```

A later chapter tells about the options for colors.

## Loading More Points

To bring the next set of points into the work file without changing the labels or range, type

```
LOAD POINTS PROD
```

To use LOAD POINTS, the work file must already contain a set of labels. The new points are matched to the proper labels. When the points are matched to the labels, the message

```
10 POINTS LOADED
```

appears without a message about labels being loaded. Tell the program to display the new set of points by typing

```
DRAW BAR
```

Since the program already knows that you want three sets of data on this graph, it isn't necessary to use the 3 in the DRAW BAR command. The color screen should look like the one shown in figure 2-13.

## More Color

To highlight the third set of data, oil imports, tell the program to draw those bars with a different color. For example, to specify solid white bars, type the commands

```
SET COLOR WHITE  
SET FILL ON
```

The next figure drawn will be filled in and white. Load the points from the imports file by typing

```
LOAD POINTS IMPO
```

To add those points to the graph and complete the data portion of the graph, type

```
DRAW BAR
```

## Explanatory Labels

---

At this point, the graph needs labels to tell you what the graph shows and what the three types of bars represent. As with the pie chart, you can set a general title by typing

```
SET TITLE "OIL IN THE U.S."
```

The title is centered at the top of the graphics screen.

## Long Commands and CTRL-A

Some of the commands for putting titles on a graph may be longer than 40 characters. When a command is more than 40 characters long, it won't all appear on the screen at one time. Without pressing the RETURN key, type

```
SET HORIZONTAL FLOATING TITLE "VIOLET = CONSUMPTION"
```

When you have typed more than 40 characters, the rest of the characters aren't immediately visible. However, the command screen is 80 characters wide, and you can see the other half of the screen by typing the letter A while holding down the CTRL key. To return to the left half of the screen, type CTRL-A again. Press CTRL-A a

few times to learn how it works. Figure 2-14 shows the left half and the right half of the screen that you should see when you press CTRL-A.

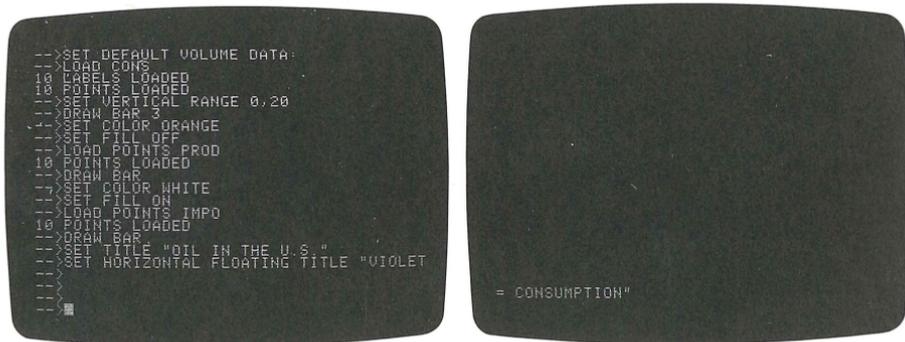


Figure 2-14. Left Half and Right Half of Command Screen

If you press CTRL-A by accident, the screen may go blank. To return the commands to the screen, press CTRL-A again.

## Preparing a Legend

The final product should have a legend or key explaining the meaning of each bar. The easiest way to make a legend is to use "floating titles". A floating title is a title that you can put anywhere on the screen. Here are two ways to use floating titles to make a legend, one for a color screen and one for a black and white screen.

### A Color Legend

You should already have typed this:

```
SET HORIZONTAL FLOATING TITLE "VIOLET = CONSUMPTION"
```

If you are using a color monitor, press RETURN. Otherwise, skip ahead to the section, A Black and White Legend.

### Moving A Floating Title

After you type the SET HORIZONTAL FLOATING TITLE command, a rectangular box appears on the screen. You can move this box to any place on the screen.

Now use either the U, D, R, L keys or the I, M, K, J keys to move the box up, down, right, or left respectively.

To move the box	Press	or	Press
up	U		I
down	D		M
left	L		K
right	R		J

The first time you press a direction key, the box moves one dot. The distance the box moves doubles each time you press that key. If you press a different key, the amount of motion returns to one dot.

When you have placed the box where you want the floating title to appear, press the RETURN key. The message appears where the box used to be.

Use the same procedure to place the rest of the legend on the graphics screen, using the commands

```
SET HORIZONTAL FLOATING TITLE "ORANGE = PRODUCTION"
SET HORIZONTAL FLOATING TITLE "WHITE = IMPORTS"
```

to set the other floating titles.

## A Black and White Legend

To prepare a legend if you have a black and white screen (or a Silentype), use the back-arrow key to change the command on your screen so that it looks like this:

```
SET HORIZONTAL FLOATING TITLE "STRIPES = CONSUMPTION"
```

Press RETURN and a rectangular box appears on the screen. You can move this box to any place on the screen. When the box is where you want the title to be, press RETURN. Now use either the U, D, R, L keys or the I, M, K, J keys to move the box up, down, right, or left respectively.

To move the box	Press	or	Press
up	U		I
down	D		M
left	L		K
right	R		J

The first time you press a direction key, the box moves one dot. The distance the box moves doubles each time you press that key. If you press a different key, the amount of motion returns to one dot. When you have placed the box where you wish the floating title to appear, press the RETURN key. The message appears where the box used to be.

Use the same procedure to place the rest of the legend on the graphics screen, using the commands

```
SET HORIZONTAL FLOATING TITLE "OUTLINE = PRODUCTION"  
SET HORIZONTAL FLOATING TITLE "SOLID = IMPORTS"
```

## Saving the Image

The graphic work is complete. Save this image in a file called DATA:OIL by typing

```
SAVE SCREEN OIL
```

This causes the image that is on the graphic screen to be stored on the diskette as a screen file. A screen file does not keep track of the horizontal or vertical labels, nor does it keep track of the points plotted on the graph: it is merely an image of the screen, which can be retrieved at a later time for a presentation or for printing.

## Printing the Graph

If the Apple is connected to a Silentype printer in slot 1, you can print a copy of the graphic image on it by typing these commands:

```
SET SLOT 1  
WRITE SCREEN SILENTYPE
```

Figure 2-15 shows the graph printed on the Silentype.

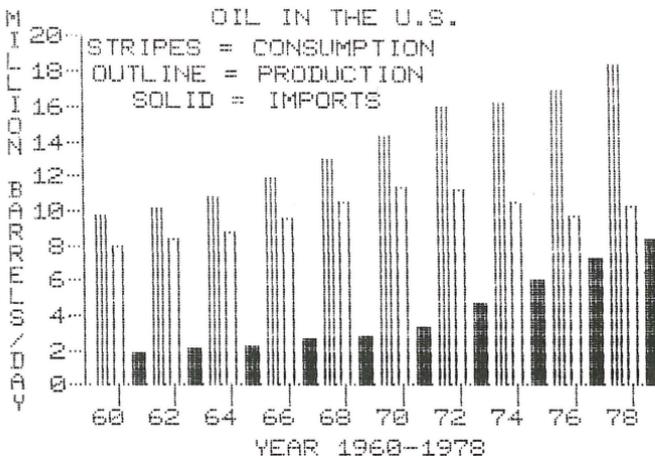


Figure 2-15. Silentype-printed Graph



It is very important that you always remember to set the slot before writing to the Silentype. Setting the slot is comparable to turning the Silentype on. If you don't set the slot, and you try to use the WRITE command, Apple II Business Graphics will stop running and you will be forced to reboot the PLOT: diskette to run the program again. You will lose any data that were only in the work file.

If you have some other peripheral device plugged into slot 1, you may plug the Silentype into slot 2, 4, 5, or 7, in which case you should use that slot number in the SET SLOT command.

## Manipulating Data

---

Apple II Business Graphics has many commands for the mathematical manipulation of data. The following example uses some of those commands to create a plot of oil imports as a percentage of the amount of oil consumed in the even years 1960 through 1978.

The formula for imports as a percentage of consumption is

```
100 * IMPORTS / CONSUMPTION
```

To prepare that graph, you will tell the program to retrieve the import values, multiply each one by one hundred, then divide each year's value by the amount consumed in that year.

First clear the work file by typing the CLEAR command. If the default volume is no longer set to DATA: , type

```
SET DEFAULT VOLUME DATA:
```

Now load the data from DATA:IMPO by typing

```
LOAD IMPO
```

To multiply each data point by 100, type

```
MULTIPLY 100
```

To verify that the values were multiplied, type

```
LIST
```

The screen should look like this:

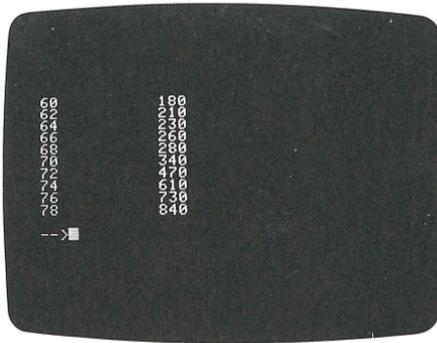


Figure 2-16. Imports Multiplied by 100

The file DATA:CONS contains the set of data points for oil consumption. To divide each data point in the work file by the corresponding point in the file DATA:CONS, type

DIVIDE BY CONS

To see the graph of the final results of the division, type

DRAW LINE

The screen should show this graph:

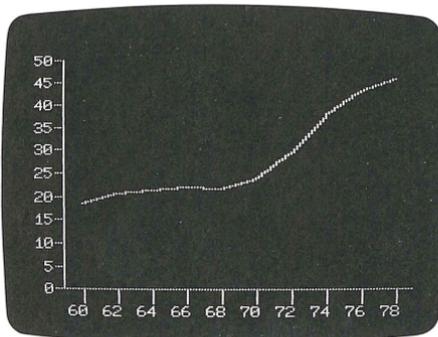


Figure 2-17. Graph Showing Imports/Consumption

This tutorial has presented a brief introduction to the general process of using Apple II Business Graphics and given you experience using some of the commands. The rest of the manual serves as a reference on how to use the program and the commands.

## Chapter 3

# How the Program Works

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# Chapter 3

## How the Program Works

This chapter introduces you to the different ways that Apple II Business Graphics can display information, the terminology you will need to name the different parts of the display, and the ways that information is stored by the program.

When you are using Apple II Business Graphics, you will always see one of two screens: the command screen, which consists of up to 24 lines of your commands and the program's responses to your commands; or the graphics screen, a high resolution image which you can manipulate as you wish.

### The Elements of a Graph

The graphic image that you will probably use most often is the graph. A sample graph, with all of its parts named, is shown below:

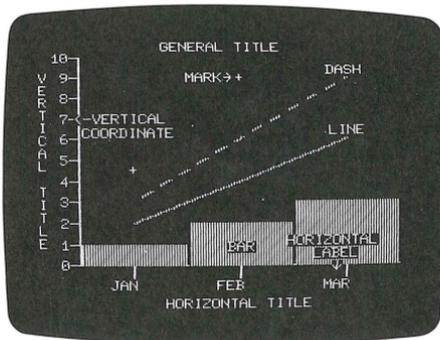


Figure 3-1. The Elements of a Graph

## Information for Graphs

Before Apple II Business Graphics can draw a graph, you must give the program some information to place on that graph. Apple II Business Graphics stores information as a set of points, each point consisting of a horizontal coordinate and a vertical coordinate.

You type each point horizontal coordinate first, followed by a comma, followed by the vertical coordinate. For example, if you want to graph the number of truckloads of paper your company shipped last week, the points you type might look like this:

```
MON,4  
TUES,2  
WED,7  
THURS,5  
FRI,0
```

If you tell the program to draw this information, the days of the week appear as labels across the bottom of the screen, and the number of truckloads as vertically positioned coordinates.

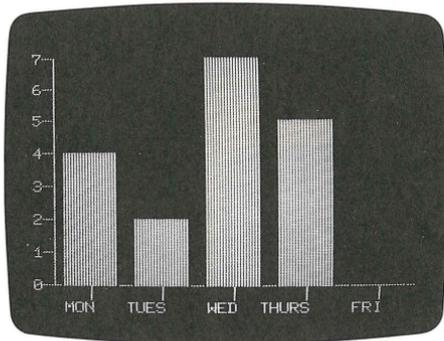


Figure 3-2. Truckloads of Paper Shipped

The program places the information with respect to the coordinates and labels on the axes.

## The Axes

The axes of a graph are its skeleton; without the axes, the program has no framework within which to place information. The horizontal, or X, axis is commonly used for labels (months, years, names, or places), but it can also be used for numerical information. The vertical, or Y, axis is usually used for numerical information, but can also be used for labels.

Once you have given the program some information to draw, it selects a range for each of the two axes. For example if you draw a graph of your sales for three months (22 units in January, 31 units in February, and 28 units in March), the computer automatically selects a range of 22 through 31 for the axis used for "units" and a range of January through March for the axis used for "months".



The program does not "know" the order of days in a week or months in a year. You must enter labels in the order that you want them to appear on the graph.

If you know that you are going to place other data on a graph (data that fall outside of the range selected by the program), you can set the range of either axis to whatever values you want. Use the SET RANGE command, described in the chapter about creating an image.

## Labels and Numbers

Each axis is partitioned into segments whose boundaries are marked by short lines called tic marks. An axis with labels assigned to it has one tic mark corresponding to each label; if there is not enough room on that axis, the program omits some of the labels. An axis with numerical data assigned to it has a number associated with each tic mark. The number of tic marks placed on that axis is determined by the program. Figure 3-3 shows how the program places sets of labels and numbers on the two axes.

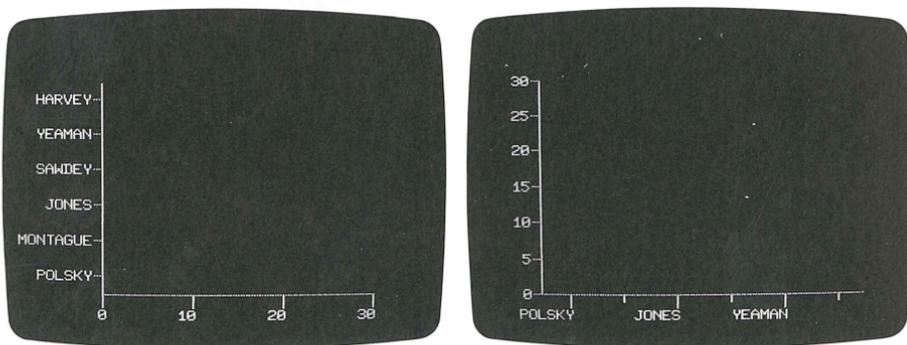


Figure 3-3. Labels and Coordinates

If you place many long labels on the horizontal axis, some of the labels are omitted, but no tic marks are left out. If you place the labels on the vertical axis, more labels can appear, but there is less room for data to be plotted. You must use your judgement to decide which is best. Apple II Business Graphics provides a command that sets the maximum label length. Using it, you can fit all of

the labels on an axis, but some of them will be abbreviated, as shown in Figure 3-4.

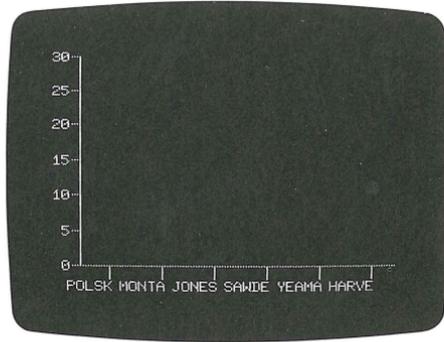


Figure 3-4. A Shorter Label Length

## Titles: Fixed and Floating

A graph without titles is like a product without a name: if people can't ask for a product, they have difficulty buying it. Similarly, if a graph has no titles, it is difficult to "buy", or make sense of, the data it contains.

Most graphs have at least three titles: a horizontal title, a vertical title, and a general title. Apple II Business Graphics lets you place these titles and others on your graphs.

The horizontal title is always centered beneath the horizontal axis. It generally describes the graph's horizontal data. For example, YEAR, MONTH-1980, SALES REPRESENTATIVES, and INVESTMENTS are all typical horizontal titles.

The vertical title is written vertically and centered vertically on the left of the vertical axis. It explains what appears on its axis. Typical vertical titles are COSTS, RISK FACTOR, and REVENUES: \$1,000'S.

The subject of a graph can be explained with a general title. Apple II Business Graphics centers the general title at the top of the graphics screen.

With Apple II Business Graphics, any part of the graphics screen can contain a horizontal or a vertical title. If your graph has several sets of data that need labeling, or if there are important transition points you would like to mark, you can use horizontal or vertical "floating" titles. The words on the graph in Figure 3-5 were placed there using floating titles.

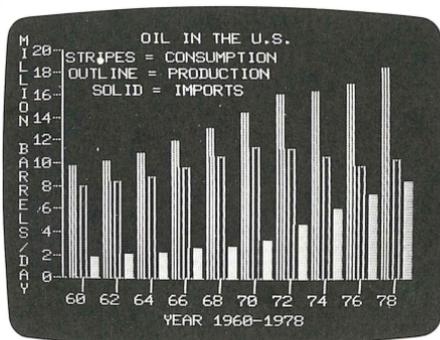


Figure 3-5. Floating Titles

When you give the program a floating title to place on the graph, a box the size of the title appears in the center of the screen. You use some of the keys on the keyboard to move the box exactly where you want it. When you press the RETURN key, the title appears at the spot you selected. You can also specify coordinates for the floating title.

Floating titles can also be used on a graphics screen that has no axes. This would be useful, for example, to create a title page or a flow diagram for a presentation.

## Drawing Graphs

Apple II Business Graphics allows you to place data on the graphics screen in many different ways. There are eight different marks with which you can plot points on the screen, including crosses, squares, and dots. You can draw a line in any of Apple II Business Graphics' six colors, and you can also use any of its five types of dashed lines. You can fill in the area beneath a line with any of the six colors, or you can display data as a horizontal or vertical bar graph. Bar graphs and areas can both be drawn as outlines. The graph in Figure 3-6 has examples of many of the different ways of representing data.

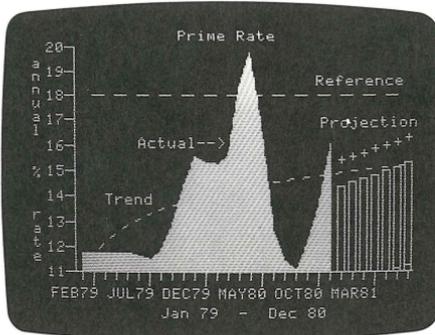


Figure 3-6. Marks and Lines



Remember, however, that regardless of how you want to display the data on the screen, it is always internally represented in the same way; that is, as a set of points.

## The Elements of a Pie

Information can also be displayed as a pie chart. When Apple II Business Graphics makes a pie chart, it draws one slice of the pie for each point in the data set. Each slice is labeled with the horizontal label or value of that point. The size of each slice is proportional to the vertical value of its point.

There are commands that allow you to select the color of each slice, and you can choose between filled-in slices and hollow slices (for those who like their pies without filling). If a label fits on the inside of an unfilled slice, it is placed there. If not, it is placed on the outside edge of the pie. If a label won't fit on the outside edge of the pie, it is omitted. Here is a pie with different types of slices.

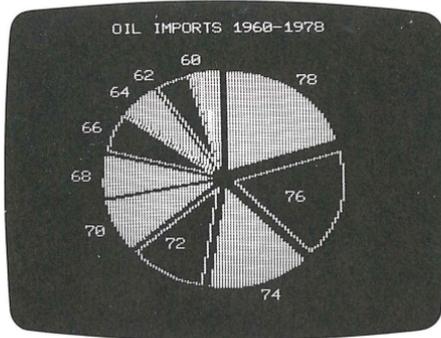


Figure 3-7. A Sample Pie

Once again, no matter how you choose to draw the pie, the data it is drawn from is always represented internally as a set of points.

## The Work File

---

As you enter points, titles, and ranges for the axes of your graph, the program stores them into a part of the Apple's memory called the work file.

Points are entered into the work file as horizontal and vertical coordinate pairs. These coordinate pairs may be entered in any of these four forms:

<u>Horizontal</u>	<u>Vertical</u>
number	number
number	label
label	number
label	label

Every point entered into the work file must be of the same type as the first point. The differences between numbers and labels are explained in the chapter on working with files.

When you perform mathematical manipulations on your data, when you use the curve-fitting capabilities of Apple II Business Graphics, and when you use other program functions, the program holds certain data in the work file.

The area of the Apple's memory reserved for the work file can only hold a limited amount of data. When this area has been filled, Apple II Business Graphics can move part of the work file onto the

diskette named DATA: . Since the Apple II Business Graphics program takes up most of the DATA: diskette, the amount of work file space is still quite limited.



If you are going to be working with a large number of data points (50 or more), or you are editing a take file, you will have to use the SET VIRTUAL FILE command.

SET VIRTUAL FILE allows you to name the file to be used as the work file and the diskette it will reside on. A virtual file may contain as many points as fit onto an empty diskette (over 3500).



If you use up more than half of a diskette for storage of the work file, you will need a third disk drive to be able to save the data into a points file.



Although part of your work file may reside on a diskette, this does not mean that your data has been permanently stored. Only by using the SAVE command can you create a permanent record. The work file is volatile memory; data entered or manipulated in the work file is not retained when you stop using Apple II Business Graphics or turn off the Apple II.



Once you have used a diskette as a virtual file, you must leave that diskette in the same disk drive until you finish that session with Apple II Business Graphics.

## Diskette Files

---

A file is a container for data (for example, a set of points stored on a diskette). Apple II Business Graphics uses four types of files to store data about graphs and pies: points files, labels files, screen files, and take files. Each of these types of files are described briefly in the following pages. Full explanations are included later in the manual.

### Points Files

After you have entered a set of data points into the work file, you will usually want to save them for later use. Sets of data must be stored in files called points files.

In addition to data points, a points file contains the horizontal and vertical titles you have set. It does not contain the general title or floating titles. When you save a work file, it is saved as a points file.

## Labels Files

A labels file contains a list of labels for one of the axes on a graph. Labels files are useful for putting data in order and for overlapping sets of data points. You will most often use a labels file to set the range of labels for one of the axes. For example, if you have a points file of data for January through June, and a points file of data for July through December, and you want to put data from both files on the same graph, you will need to use a labels file that has labels for January through December. After you load this labels file into the work file, you can then load points from both point files. The points are matched to the proper labels.

There are two types of labels files: horizontal labels files and vertical labels files. You create a labels file by saving the labels from the work file into a horizontal or vertical labels file.

## Vertical Labels

If your work file contains points of the type

```
number label
```

you can save the labels into a vertical labels file.

## Horizontal Labels

Similarly, if your work file contains points of the form

```
label number
```

you can only save the labels into a horizontal labels file.

## Either Horizontal or Vertical Labels

If your points are of the type

```
label label
```

you can save labels into either type of labels file.

## No Labels

If your work file contains points of the form

```
number number
```

it is not possible to save anything into a labels file (because there are no labels).



Once you have saved labels in either a horizontal or vertical labels file, that file can be used only for the same type of label.



Once you have saved labels in a labels file, there is no way to tell if it is a horizontal or a vertical labels file (except by trying to load it and getting an error message). It is a good idea to use a name for the file that tells you that the labels are horizontal or vertical (for example, starting the file name with H or V).

## Screen Files

Screen files contain the information needed to display an exact copy of an image you've previously created. This is very useful for presentations of one or two graphic images.

A screen file contains no data that can be manipulated later. When you save the image of a graph or pie in a screen file, the part of the Apple II's memory containing the graphic image is stored directly on the diskette. No information about points or labels is stored.

When you load a screen file, the image goes into the graphic image part of the Apple II's memory. No information is placed in the work file. You can, however, add a general title and floating titles to the image.

## Take Files

To prepare a more extensive set of graphic images, you can use a take file. The take file allows you to prepare an automatic presentation. The take file stores a series of commands to the program. When you run a take file, the program responds to the commands from the take file as if you were typing them.

When you are making several similar graphs, it is often useful to preserve the titles and axis ranges for later use. You can save settings for the range of the horizontal axis, the range of the vertical axis, the general title, the horizontal and vertical titles, and the horizontal and vertical label lengths as settings in a take file. The settings do not contain any data about floating titles or any mathematical manipulations you may have performed.



## Chapter 4

# Communicating with the Program

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# Chapter 4

## Communicating with the Program

Apple II Business Graphics is controlled by an extensive, yet easy to use, command language. You type commands in the form of simplified English sentences. As you learn the commands, you can abbreviate them to a few letters.

This chapter explains how to use the keyboard, how to give commands to the program, and how to name diskettes, files, and devices such as printers and plotters.

### Using the Keyboard

---

You use the keyboard with Apple II Business Graphics just like you use the keyboard with most other Apple II programs. In addition, you can type special characters that perform various functions or print characters not usually available from the keyboard. To type these "control characters", hold down the key labeled CTRL and press another key. These control characters are described below and summarized in the appendix on control characters.

### Correcting Errors

If you make a typing error, use the left-arrow key to move the cursor on top of the leftmost incorrect character, then retype the rest of the command.

If you want to cancel an entire line, you have two choices. You can repeatedly use the left-arrow to move the cursor to the beginning of the line to be retyped. Alternately, if you type CTRL-X (press X while holding down the key labeled CTRL), the cursor moves back to the beginning of the line, erasing all characters in its path.

## Entering Commands

After typing in a command or data entry, press the RETURN key. This tells the program that you have finished making the entry.

If you receive the error message

? UNKNOWN COMMAND, TYPE "HELP" FOR HELP

you may have accidentally pressed a non-printing character such as the right-arrow key. Try typing the command again.

## Seeing More of the Screen (CTRL-A)

On occasion, a command may be longer than 40 characters, causing the characters to disappear past the right edge of the screen. The Apple keeps track of 80 characters for each of the 24 lines on the screen. Most often, you see only the 40 characters on the left. The two ways to see the other half of the screen are by typing either CTRL-Z or CTRL-A.

The first technique causes the characters that you can see to move to the left when the command gets close to the right edge of the screen. The result is that the cursor and the last 36 characters you typed are always visible. When you press RETURN to enter a command, you see the left side of the screen again. To turn on this screen-extending technique, type CTRL-Z.

The second method simply shows you the right half of the screen. To see the characters in columns 41 through 80 of the screen, type CTRL-A. To return to the left half of the command screen, type CTRL-A again.



Sometime, you may accidentally type CTRL-A. If you notice that the screen is blank when it shouldn't be, type CTRL-A to return to the left half of the command screen.

CTRL-A turns off CTRL-Z. If you use both techniques, it is necessary to retype CTRL-Z each time you use CTRL-A.

## Lowercase

Apple II Business Graphics has a way for you to write titles on your graphs and charts in lowercase or uppercase letters. Once you have turned on the lowercase feature, all uppercase letters are displayed on the screen as inverse video capital letters (black on white), and lowercase letters are displayed as normal capital letters (white on black). When letters are printed on the graphics screen, they appear as normal uppercase and lowercase. (That is, no inverse letters are printed.)

## Turning on Lowercase (CTRL-E)

Apple II Business Graphics starts out producing only uppercase letters. When you type CTRL-E, you "Enable" (turn on) the lowercase feature.

## Shift-Lock (CTRL-E)

Once you have typed CTRL-E the first time to turn on the lowercase feature, CTRL-E works as a toggle switch. If you type CTRL-E again, all subsequent letters that you type appear in uppercase (inverse video). Type CTRL-E yet again to return to lowercase.

## Capitalize Word (CTRL-W)

If you want to capitalize a single letter, type CTRL-W. After you type CTRL-W, the next character you type (assuming it is a letter) appears in uppercase. Subsequent letters appear in lowercase.

CTRL-W turns off the shift-lock set by CTRL-E. Thus, if you type CTRL-E to enter a series of capital letters, type CTRL-W to make one last capital letter before returning to lowercase.

## Turning Off Lowercase (CTRL-T)

Typing CTRL-T turns off the lowercase feature. All subsequent letters you type will be in uppercase, and appear on the screen and printer as normal capitals. Use this if you do not want uppercase and lowercase titles, and you don't like the appearance of a screen filled with inverse video characters.



Control characters used as part of an Apple II Business Graphics command sometimes cause the program to give an error message. To avoid this, either press RETURN after using a control character, or only use the control characters in titles.

## More Screen Control

There are two control characters that give you additional control over what appears on the screen. You may not need to use them often, but you should know about them so you know what to do if you accidentally press one of them.

## Stoplist (CTRL-S)

When you type CTRL-S, the program stops sending characters to the screen. The program will do nothing until you type CTRL-S again.

## Console Off (CTRL-F)

When you type CTRL-F, the program stops sending characters to the screen, but it continues to operate normally. After pressing CTRL-F you can still give the program commands, and the program still

responds to the commands, but nothing appears on the screen. The program resumes sending characters to the screen when you press CTRL-F again.

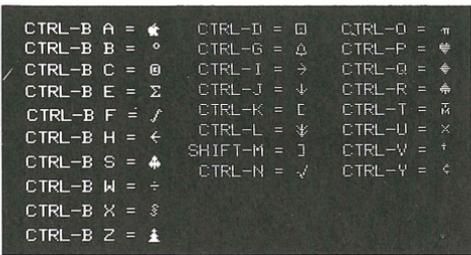
## If Characters Stop Appearing

If the characters you type don't appear on the screen, it is possible that you accidentally typed CTRL-A, CTRL-S, or CTRL-F.

To recover, first type CTRL-A. If the command screen doesn't return, press CTRL-A again; then type CTRL-S. If the cursor moves and the missing characters appear, you can continue entering commands. If the cursor does not move, type CTRL-S again. Now try pressing CTRL-F followed by the RETURN key. The program should now be operating normally.

## Special Characters

Twenty-six special characters are available, which are not printed on the tops of the keys on the keyboard. Figure 4-1 shows the characters and which control character to type to produce the special character.



CTRL-B A = ◀	CTRL-D = □	CTRL-O = π
CTRL-B B = °	CTRL-G = Δ	CTRL-P = ♀
CTRL-B C = ∅	CTRL-I = →	CTRL-Q = ⚡
CTRL-B E = Σ	CTRL-J = ↓	CTRL-R = ⚡
CTRL-B F = ∫	CTRL-K = Ⓛ	CTRL-T = ⚡
CTRL-B H = ←	CTRL-L = ⚡	CTRL-U = ×
CTRL-B S = ♣	SHIFT-M = 1	CTRL-V = †
CTRL-B W = ÷	CTRL-N = √	CTRL-Y = ⏪
CTRL-B X = \$		
CTRL-B Z = ⚡		

Figure 4-1. Special Characters

You don't need to use these characters for any of the Apple II Business Graphics commands; however, you can use any of them in the titles and labels on your graphs.

# Commands

---

When you are using Apple II Business Graphics, the program will always be in one of five conditions, summarized in Figure 4-2:

<u>Graphics Mode</u>	<u>Command Mode</u>
1. Waiting for a command	3. Waiting for a system command
2. Processing a command	4. Waiting for an editing command
	5. Processing a command

Figure 4-2. Five Conditions for Apple II Business Graphics

If the system prompt (`-->`) is on the screen, the program is waiting for you to type a graphic or system command.

If the edit prompt (?) is on the screen, the program is waiting for you to enter an edit command or some data. The edit prompt appears after you have typed an EDIT command.

If there are commands on the screen, but there is no system or edit prompt, the program is processing a command. Wait for a prompt to appear before typing in your next command.

If an image on the screen is still changing, the program is drawing on the graphics screen. Wait for the drawing to stop and the disk drives to stop whirring before typing the next command. Once an image is drawn, the screen holds that image until you press a key.

## Types of Commands

Apple II Business Graphics has two basic types of commands:

system commands, which you can use when you see the system prompt (`-->`) or when a graphics display is on the screen, and

editing commands, which you use when the prompt is (?)

You cannot use system commands when the edit prompt is on the screen, and you cannot use edit commands when the system prompt is on the screen or when the graphic display is on the screen.

## Command Structure

Apple II Business Graphics is controlled by a set of English-language commands with the general form of

VERB (MODIFIER) (NOUN) (MODIFIER(S))

Parenthetical command elements are not used in all commands. So, all commands must have a verb, but some commands won't have a noun or

modifiers. For example, in the command

```
SET HORIZONTAL RANGE 0,10
```

SET is the verb, RANGE is the noun, and HORIZONTAL, 0, and 10 are modifiers. The command

```
SWAP
```

however, uses only a verb. The form you should use is almost always obvious from what you want the command to do.

## Verb

The first word in all Apple II Business Graphics commands is a verb. The verb tells the program what to do. EDIT, DRAW, MULTIPLY, SET, and SAVE are some commonly used verbs.

## Noun

The noun in a command is the object of the verb. LINE and SCREEN are commonly used nouns, for example:

```
DRAW LINE  
CLEAR SCREEN
```

## Modifiers

A modifier gives the program more information on how to carry out a command. For example, the modifier ORANGE in the command

```
SET COLOR ORANGE
```

tells the program to draw the next object in orange. Some commands have optional modifiers. In the command

```
SET HORIZONTAL RANGE 0,10
```

the modifier HORIZONTAL is optional. The command

```
SET RANGE 0,10
```

has the same effect. On the other hand, if you wish to set a vertical range, you must specify VERTICAL.

In the general form of commands described in the rest of this manual, we follow three conventions to show when modifiers are optional: lower case, brackets <>, and parentheses ().

In the general form of commands, all lowercase letters are optional. A default modifier (one that need not be included when typing the command) is written entirely in lowercase letters. For example, the general form of CLEAR HORIZONTAL LABELS is

## Clear horizontal Labels

This means that even if you omit the word "horizontal" entirely, horizontal labels are cleared.

A modifier that can take more than one form is given in the brackets "<" and ">". For example, the general form of the SET COLOR command is given as

```
SEt COLOR <color>
```

In this case the choices for the modifier <color> are Green, Violet, White, Orange, BLUe, BLAck, and None. The different choices for a modifier of this type are given when the command is described.

Finally, a modifier that is optional is placed in parentheses "(" and ")". For example, the general form of the DRAW AXIS command is

```
DRaw AXis (<axis type>)
```

For this command there are several choices of <axis type>, but only one of them is the default. If you do not specify an <axis type>, the program draws axes of the default type. In contrast, there is no default modifier for the SEt COLOR <color> command. If you omit the modifier <color>, the program beeps and places an error message on the command screen.

## Abbreviating Commands

Apple II Business Graphics accepts abbreviated versions of most commands. A command is abbreviated by dropping letters from the end. For example, the HELP command can be given as HELP, HEL, HE, or even H, but not as HLP or HL.

The rule for abbreviating is that the program can interpret a command given in the shortest unambiguous form. For example, no commands other than HELP begin with the letter H.

In the rest of this manual, for the general form of a command, the shortest abbreviation of that command is shown in capital letters. Optional letters are shown in lowercase. The general form of the HELP command is

```
Help
```

The general form of each command is given in the section describing that command, on the reference card in the back of the manual, and on the help screens described in subsequent chapters.

The options for modifiers are also abbreviated according to the same rules and conventions. For example the options for the modifier <color> are Green, Violet, White, Orange, BLUe, BLAck, and None.

If a word in a command is given entirely in lowercase letters, the whole word may be omitted from the command.

When you type an ambiguous command, the program beeps and sends you the message

```
? COMMAND NOT UNIQUE
```

For example, the program sends this message when you type the command

```
SET COLOR BL
```

because BL could mean BLACK or BLUE.

## Naming Files

---

One of the modifiers used by many of the Apple II Business Graphics commands is <file>, which can be the name of a file on a diskette, the name of a printer, or the name of some other external storage device. This section explains the different ways that you can name files and storage devices. A <file> is designated by its <volume number> or <volume name>, followed by its <file name>, for example:

Volume name  
DATA:

File name  
CONS

## Diskette Names

The name of a diskette, also called its volume name, is usually assigned when you format a diskette. It may be up to seven characters long. A diskette name must begin with a letter, and it may contain any characters except " ", "+", "=", "§", "?", "\*", ",", and ":". Each diskette name must be followed by a colon.

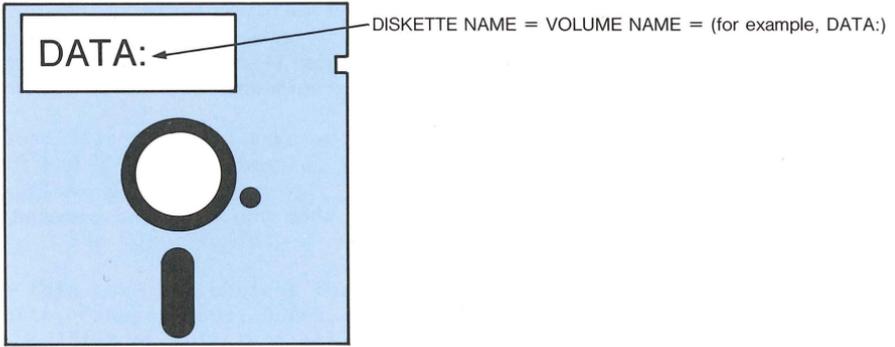


Figure 4-3. Diskette Name = Volume Name

Some valid diskette names are

PLOT:  
 DATA:  
 DEMO1:  
 STAT.81:

Invalid diskette names are

<u>Invalid Name</u>	<u>Reason Why It's Invalid</u>
24T:	Begins with a number
DEMO\$:	Has a "\$" in it
PLOT2	Has no colon at the end

## Drive Numbers

Disk drives have volume numbers. You may use a disk drive's volume number, for example, if you don't remember the name of the diskette in that drive. These numbers are:

<u>Location</u>	<u>Volume Number</u>
Slot #6, Drive #1	#4:
Slot #6, Drive #2	#5:
Slot #4, Drive #1	#9:
Slot #4, Drive #2	#10:
Slot #5, Drive #1	#11:
Slot #5, Drive #2	#12:

We recommend that you put labels on the disk drives, showing the volume numbers. Figure 4-4 shows disk drives with small labels to help you remember which drive has which volume number.

You can use the volume number in the command

```
SET Default Volume <volume name>
```

For example, to set the default volume to whatever diskette is in slot #6, drive #2, type

```
SE DEF V #5:
```



You should be careful when you use disk drive numbers. It is possible to accidentally save data on the wrong diskette, making that data hard to locate later on.

You can also use volume numbers to indicate the location of a particular file. (See the examples under File Names below.)

## File Names

All information stored on diskettes is organized into units called files. Whenever you store information on or take information from a diskette, you must give a file name as well as a diskette name.

File names

are no more than 8 characters long

can have any characters in them except \$, [, =, ?, :, or " ".

are usually attached to a volume name (unless you have set a default volume).

Examples of file names are:

```
DATA:CONS  
MYDISK:RECORDS  
D1:STOCKS  
#5:VLABELS
```

All of the above are valid examples of the <file> used by many Apple II Business Graphics commands.

File names and diskette names always appear on the screen in uppercase letters. If you enter them using lowercase letters, the program automatically converts them to uppercase.

## Slot <File> Names

Some of the Apple II Business Graphics commands let you send information to various peripheral devices, including printers and plotters. The name of a peripheral device is determined by the slot it is in.

<u>Device</u>	<u>Name</u>
Display screen and keyboard	CONSOLE:
Output device in Slot #1 (typically a Silentype printer)	PRINTER:
Output device in Slot #2 (typically a plotter)	REMOUT: (remote output)
Disk drives in Slot #4, #5, #6	described above
External device in Slot #7	#7:

Commands that can send information to PRINTER: , REMOUT: , or #7: refer to these as slot <file> names.

Figure 4-4 shows an Apple II system with most of these devices plugged into their slots. Each device is labeled with its name and its device number.

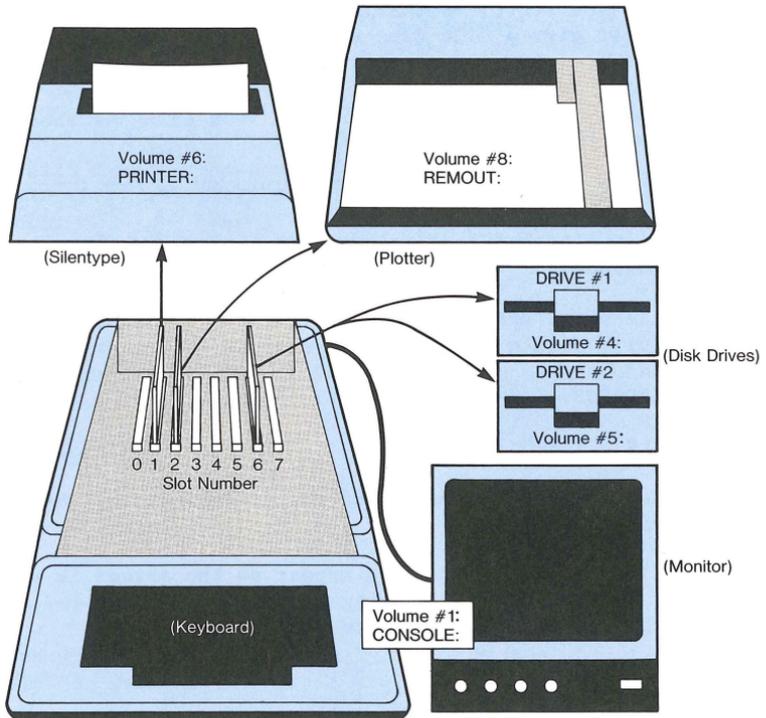


Figure 4-4. Devices

Use device names exactly as you use file names.

# Moving On

---

Now that you have learned about the terms and conventions that the program uses, you are ready to go through the rest of this manual. The chapters in this manual present material as follows.

**Chapter 5: SETTING UP.** This chapter describes a number of commands that you will often use at the beginning of a graphing session.

**Chapter 6: WORKING WITH FILES.** This chapter describes the different types of data that the program can store, how you enter data into the program, and how you can combine and modify existing sets of data. It also tells how to save data on a diskette.

**Chapter 7: CREATING AN IMAGE.** This chapter is all about graphic images such as graphs and pie charts. It tells you how to create them, how to save them, and how to print them.

**Chapter 8: MANIPULATING THE DATA.** This chapter describes the program's mathematical capabilities and how to use them.

**Chapter 9: TAKE FILES.** This chapter tells what a take file is, what you use one for, and all the special commands you can use with take files.

We recommend that you read through the entire manual at least once with the possible exception of Chapter 9. (If you are a programmer, you'll probably want to read Chapter 9, too). After this first reading, you should be familiar enough with the manual to use it for reference.



Don't be intimidated by the length of the reference part of the manual. It is likely that you will only use about 10 per cent of the information most of the time, looking through the other 90 per cent from time to time for special effects.



## Chapter 5

# Setting Up

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- 56 Formatting Diskettes
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- 58 Naming Files: A Shortcut
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- 59 Entering Large Sets of Data
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- 60 Set Slot
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# Chapter 5

## Setting Up

This chapter describes tools: commands whose uses may not be obvious, but whose use can save you time. You will typically use these commands at the beginning of a graphing session, which is why we're describing them before the other commands.

### Getting Help

---

You may not always remember the exact form of a command. The HELP command can remind you. When a diskette with the HELP commands is on line and the diskette is the default volume, typing

Help

displays the list of HELP commands shown in figure 5-1:

Help AXIS	Help LABELS
Help BUSINESS	Help MATH
Help CURVES	Help POINTS
Help DATA	Help SCREEN
Help DRAW	Help SETUP
Help EDIT	Help TAKE
Help EXIT	Help TITLES

Figure 5-1. Help Commands

When you type a HELP command, the program displays on the screen a set of commands and explanations. You may need to type CTRL-A to see part of the screen. If you type CTRL-E before typing HELP, the screen shows the commands in inverse video, indicating uppercase. Type CTRL-T after looking at the commands to return the display to normal video.

The appendix on HELP commands contains a printed version of all the HELP screens for the commands in figure 5-1. In addition, each chapter's HELP commands appear at the beginning of that chapter. For example, the HELP command that shows you this chapter's commands is:

Help SETUP

After you type Help SETUP, you can look at the commands shown in Figure 5-2, which gives both the uppercase and the general form of the command.

FORMAT

Format

INTERCHANGE

INterchange

SET DEFAULT VOLUME <volume name>

SEt DEFault Volume <volume name>

SET VIRTUAL FILE <file>

SEt Virtual File <file>

SET SLOT <slot number>

SEt SLOt <slot number>

SET DEVICE <device name> <number>

SEt DEvice <device name> <number>

LIST CATALOG (<file>)

LIst Catalog (<file>)

DELETE (<file type>) <file>

DElete (<file type>) <file>

Figure 5-2. Help SETUP Commands

# Formatting Diskettes

Before Apple II Business Graphics can save information on a diskette, the diskette must be formatted. FORMAT prepares a diskette for storing information by placing a magnetic outline for the storage of information on the diskette.



We recommend that you keep several blank, formatted diskettes available at all times. When you use the FORMAT command, everything else in memory is destroyed. If your last formatted diskette fills up while you are creating a graph, you could lose the information in the work file.



If your last formatted diskette fills up, and you have no blank, formatted ones, it is possible to create more room on the diskette using the DELETE command. See the section on the DELETE command for more details.

## Using the Format Command

Before using the FORMAT command, be sure that the diskette named PLOT: is in disk drive 1, and that the diskette named DATA: is in disk drive 2, and that the default volume is DATA: . Type the command

Format

After a few moments, the screen should say

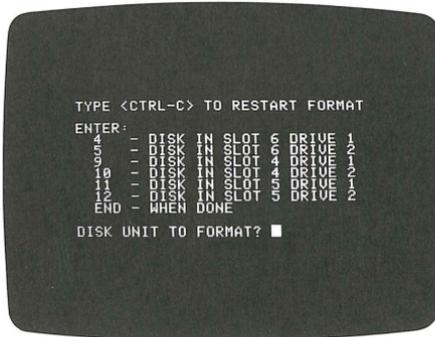


Figure 5-3. Format Menu

Place the diskette that you want to format into a disk drive and close the door. If you have only two drives, you must remove

PLOT: . If you have more than two disk drives, you can leave both  
PLOT: AND DATA: in place.

 DATA: must stay in drive 2 while you are formatting diskettes.

Type the number of the drive that contains the diskette to be formatted, then press the RETURN key. The program asks you

VOLUME NAME?

Type the diskette's name (e.g., COSTS, SALES, PROJ, etc.) and press RETURN.

 Never give the same volume name to more than one diskette. If you do, the program cannot tell them apart and may accidentally destroy one or both of them.

A volume name contains up to six characters and may not contain any of the characters " ", "+", "=", "\$", "?", "\*", ",", or ":". Although volume names have the character ":" at the end, do not type that colon when naming a new volume. The program automatically adds it for you.

If the diskette in the drive that you indicated is already formatted, and is named BLANK:, for example, the program asks the question:

DESTROY BLANK: (YES OR NO)?

Type Y or N in response. If you type N, the program redisplay the format menu so that you can try again, using a diskette that is empty or one whose contents you want to erase. If you type Y, the program asks

COPY HELP FILES (YES OR NO)?

Type Y or N in response. If you type N, the program reformats the diskette, destroying any information that was stored on it, and assigns the new volume name to the diskette. If you type Y, the program formats the diskette, then transfers a copy of the help files and the formatting files from DATA: onto the new volume.

The formatting process takes about 30 seconds, after which the program redisplay the format menu. If you want to format another diskette, repeat the above procedure. If you don't want to format another diskette, put PLOT: back in drive 2, then type

End

to conclude your formatting session.

If you notice that you have made an error in typing the drive number or the new volume name, or if you change your mind about destroying the contents of the diskette, you can type

CTRL-C

and the program returns you to the format menu. However, once the formatting begins, there is no way to stop it.

## Naming Files: A Shortcut

---

Many of the Apple II Business Graphics commands require you to type a file name. Generally, you must attach a volume name to the beginning of each file name; for example, a file named SALES on the diskette named DATA: is called

DATA:SALES

If most of the files you are using reside on a single diskette (as is usually the case), you can use the SET DEFAULT VOLUME command to save some time.

### Set Default Volume

The SET DEFAULT VOLUME command sets a volume name that is added automatically to the beginning of every file name that does not already have a volume name on it (that is, each file name that does not have a colon in it). The volume whose name is set must be in one of the disk drives when you type the command. The command takes the form

SET DEFault Volume <volume name>

For this command, the volume name may be written with or without its colon. The forms

SET DEFAULT VOLUME DATA:  
SE DEF V DATA:

are both valid ways to set the default volume to DATA: . And

SET DEF V #5:  
SET DEF VOLUME #5:

are both valid ways to set the default volume to drive #5.



Setting the default volume to a drive number lets you switch the diskettes in that drive without reassigning the default volume, but it also makes it possible for you to save data onto the wrong diskette.

After setting a default volume name, refer to a file on another diskette in the normal manner; that is, by placing the diskette (or drive) name in front of the file name.

## Entering Large Sets of Data

---

As you enter data into the program, it is stored in the work file. The work file is stored partially in electronic memory, and partially on the DATA: diskette. Because the DATA: diskette is so full, the work file cannot hold more than 90 data points. If you are planning to enter more than 50 points as a single set of data, we recommend that you use the SET VIRTUAL FILE command.

### Set Virtual File

The SET VIRTUAL FILE command tells the program to use a file on a diskette other than DATA: as the work file. The command takes the form

```
Set Virtual File <file>
```

The file name requires a volume name unless you have used SET DEFAULT VOLUME to assign a default volume name. For example, you could use the command

```
SET VIRTUAL FILE PLANS:VFILE
```

or you could use the two commands

```
SET DEFAULT VOLUME PLANS  
SE V F VFILE
```

to tell the program that you want the work file to be kept in the file DATA:VFILE.



Although the work file is stored temporarily on a diskette, it is still not in permanent memory. If you turn off the computer or use the FORMAT command, for example, you will lose the information in the work file. Always save the information in a permanent file, as described in the following chapters, before using other program functions.



A virtual file won't appear in the catalog produced by the LIST CATALOG command.

The number of points in a virtual file depends on how many other files are on the diskette. The number of points can be calculated from the formula:

$$\#POINTS = 14 * (BLOCKS - 1) - 1$$

An empty (but formatted) diskette has 274 free blocks and can thus hold 3,821 data points. To find out the number of free blocks on a diskette, use the LIST CATALOG command, described later in this chapter. The catalog will show you the largest number of contiguous blocks on the diskette, which will tell you how many data points the virtual file could hold.

## Set Slot

---

Apple II Business Graphics communicates with external devices through any of the Apple II's connector slots. When you first use Apple II Business Graphics, the program is set to send graphic output to a device in slot #2. You can tell the program to send information to and receive information from a device in a different slot using the command

```
SEt SLoT <slot number>
```

For example, if you have a Silentype printer in slot #1, you must type the command

```
SEt SL 1
```

before the program can send information to the printer.



We strongly recommend that the first thing you do when you start using Apple II Business Graphics is to set the slot (if necessary). If you don't set the slot and you send information to a device, the program stops running, and you lose all the data in the work file.

Information about which devices can be in which slots is given in the appendix on using external devices.

## Set Device

---

The SET DEVICE command tells Apple II Business Graphics which type of output peripheral device will be used for subsequent draw and list commands. It also sets the operating characteristics for that device (such as number of colors or number of pens). It does not determine which slot the device is in: you must use SET SLOT for that. The command takes the form

```
SEt DEvIce <device> (<number>)
```

The device may be any one of the devices supported by Apple II Business Graphics. The device names and descriptions follow.

<u>Device</u>	<u>Description</u>
Console	The Apple II's keyboard and screen
HP 7225A/B	HP 7225A/B Plotter with serial interface #17603A
HIplot	Houston Instrument's DMP-3, -4 with serial interface
Qume	Qume Sprint 5/45, Sprint 5/55
Silentype	Apple's Silentype printer

If, for example, after using the Silentype, you want to send output to the console, or if you want to change the program's use of color, use the command

```
SET DEV CONSOLE (<number>)
```

If you omit the number, or if you use  $\emptyset$ , the console resumes its normal mode of operation; that is, drawing things in black and white (if you have a black and white monitor), or drawing things in green and violet alternately (if you have a color monitor). If you use the number 1, the program cycles between five different colors. The use of colors is fully explained in the chapter, *Creating an Image*. The operating details of all the devices supported by Apple II Business Graphics are given in the appendix on internals.

## Listing Devices

---

To see the names of the devices that can be SET or that you can WRITE to, type

```
LIst Devices
```

The screen displays the name of the devices and also the mode of the command (SET or WRITE). Figure 5-4 shows a typical display produced by typing the LIST DEVICES command.

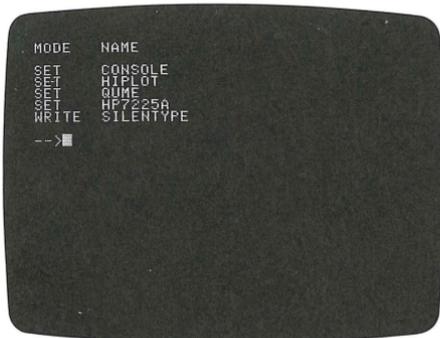


Figure 5-4. List Devices

The WRITE command is explained in the chapter on creating an image.

## Using Diskette Files

---

Apple II Business Graphics uses five different types of files: points files, labels files, screen files, take files, and help files. So that it can use diskette space efficiently, and so that it can avoid confusion between the types of files, the program uses a different storage format and a different naming convention for each of the file types. You can create and delete files of the first four types; the fifth type, help files, are only used when you type a help command.

### A Catalog of Files

To see the catalog of the files on all the diskettes that are currently in disk drives, use the LIST CATALOG command, whose general form is

```
LIst CAtalog (<file>)
```

The <file> is the destination for the listing. The three possible destinations are the screen, a printer, or a diskette file. If you don't type a file name, the catalog is displayed on the screen. To send the listing to a printer, use the <file> name of the slot that your printer is plugged into (as explained in the previous chapter). For example, to send the listing to a Silentype printer in slot #1, use the command

```
LI CA PRINTER:
```

If you type a diskette file name as the destination, a listing is placed on a diskette, but not in a form that you can retrieve (unless you have Apple II Pascal: refer to the appendix on using the Pascal system.)

Here is a sample listing of the catalog of two diskettes.

```
SCREEN PLOT:STARTUP
  16 BLOCKS USED; 0 BLOCKS FREE

SCREEN FIG3:FIT
POINTS FIG3:OLD
TAKE FIG3:TEST1
TAKE FIG3:TEST2
  26 BLOCKS USED; 244 BLOCKS FREE
```

Figure 5-5. A Sample Catalog

A catalog lists the points, labels, screen, take, and help files on all the diskettes in disk drives. The listing above shows the files from the diskettes named PLOT: and FIG3:. PLOT contains a screen file called STARTUP. FIG3: contains four files: a screen file named FIT; a points file named OLD; and two take files, named TEST1 and TEST2.

A catalog also tells how much of the diskette space is used by files and how much diskette space is free. Details on the space used by files of different types are in the appendix on using files.



If you have more than two disk drives, and you want a listing only of the contents of diskettes in some of the drives, open the doors of the other disk drives (except for the one containing PLOT: ) before you type LI CA.

You can use a listing of the files on diskettes to keep an inventory of all the Apple II Business Graphics files that you have. You can also use it along with the DELETE command to conserve valuable diskette space. The DELETE command lets you remove unwanted files from your diskettes.

## Removing Files

You can remove a file from a diskette with the DELETE command, which has the general form

```
DElete (<file type>) <file>
```

The types of files that you can remove are

- Points
- Labels
- Screen
- Take

If you don't specify a file type, the program deletes the points file named <file> if there is one. If you want to delete a file of a type other than points, you must specify the type. For example, you could delete the files listed in the catalog in Figure 5-5 with the commands

```
DE S FIG3:FIT
DEL FIG3:OLD
DELETE TAKE FIG3:TEST1
DE T FIG3:TEST2
```

Once you delete a file, it cannot be retrieved.

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# Chapter 6

## Working with Files

This chapter describes how to use Apple II Business Graphics commands to create and edit files. It explains how to use the editing commands and how to create, load, edit, and save a work file, a points file, and a labels file.

### Getting Help

---

This chapter's information is summarized in a set of HELP screens, which you can see by typing the commands: Help EDIT, Help DATA, Help POINTS, and Help LABELS. The first of these is the command

Help EDIT

This command displays a summary of the program's editing commands. Use these commands after you have typed an EDIT command, when an edit prompt line is on the screen. Figure 6-1 lists the commands displayed by Help EDIT, showing both the uppercase form and the general form, which requires a prefix character.

```
        PREFIX <prefix character>
<old prefix character>Prefix <new prefix character>

        TOP
<prefix character>Top

        BOTTOM
<prefix character>Bottom

        UP (<number>)
<prefix character>Up (<number>)

        DOWN (<number>)
<prefix character>Down (<number>)

        CHANGE (<x coordinate>) (<y coordinate>)
<prefix character>Change (<x coordinate>) (<y coordinate>)

        INSERT (<x coordinate>) (<y coordinate>)
<prefix character>Insert (<x coordinate>) (<y coordinate>)

        APPEND (<x coordinate>) (<y coordinate>)
<prefix character>Append (<x coordinate>) (<y coordinate>)

        DELETE
<prefix character>DElete

        CLEAR
<prefix character>CLear

        END
<prefix character>End
```

Figure 6-1. Help Edit Commands

The second help screen is the

#### Help DATA

screen. It shows you all of the commands that you use to enter, review, and save points and labels. Figure 6-2 show the uppercase and general form of these commands.

```
EDIT
Edit

LIST (<file>)
LIst (<file>)

LIST STATISTICS
LIst Statistics

SAVE <file>
SAve <file>

CLEAR
CLear

LOAD <file>
LOad <file>

APPEND <file>
APpend <file>
```

Figure 6-2. Help Data Commands

The third help screen for this chapter is the

#### Help POINTS

screen. It shows you all of the commands that you use to enter, review, and save points. Figure 6-3 show the uppercase and general form of these commands.

```
EDIT POINTS
Edit Points

LIST POINTS (<file>)
LIst Points (<file>)

SAVE POINTS <file>
SAve Points <file>

LOAD POINTS <file>
LOad Points <file>

APPEND POINTS <file>
Append Points <file>
```

Figure 6-3. Help Points Commands

The last of this chapter's help screens is the

#### Help LABELS

screen. It shows you all of the commands that you use to enter, review, and save labels. Figure 6-4 show the uppercase and general form of these commands.

EDIT HORIZONTAL LABELS  
Edit horizontal Labels

EDIT VERTICAL LABELS  
Edit Vertical Labels

LIST HORIZONTAL LABELS (<file>)  
LIst horizontal Labels (<file>)

LIST VERTICAL LABELS (<file>)  
LIst Vertical Labels (<file>)

SAVE HORIZONTAL LABELS <file>  
SAve horizontal Labels <file>

SAVE VERTICAL LABELS  
SAve Vertical Labels <file>

CLEAR HORIZONTAL LABELS  
CLear horizontal Labels

CLEAR VERTICAL LABELS  
CLear Vertical Labels

LOAD HORIZONTAL LABELS <file>  
LOad horizontal Labels <file>

LOAD VERTICAL LABELS <file>  
LOad Vertical Labels <file>

APPEND HORIZONTAL LABELS <file>  
APpend horizontal Labels <file>

APPEND VERTICAL LABELS <file>  
APpend Vertical Labels <file>

Figure 6-4. Help Labels Commands

# The Editing Commands

---

If you have read the tutorial, you know how simple it is to enter a set of points into the Apple II Business Graphics work file. You type an EDIT command (EDIT, EDIT POINTS, EDIT HORIZONTAL LABELS, or EDIT VERTICAL LABELS), and the program places an edit prompt line on the screen. For example, you see the edit prompt line

```
1:          ? █
```

if you type an EDIT command when the work file is empty. The number at the left is the number of the current entry, the entry that you can currently type. The question mark is the edit prompt. It tells you that Apple II Business Graphics expects you to type a new entry or to type an editing command. Editing commands are commands such as CHANGE or INSERT with which you can alter the data in the work file.

The edit prompt line shows that there is already data in the work file by displaying an edit prompt line such as

```
3: MAR      999  ? █
```

This edit prompt line tells you that the third entry in the work file has the horizontal label MAR and the vertical value or label 999.

Whichever of the four EDIT commands you use, Apple II Business Graphics goes into a state known as edit mode. The program indicates that it is in edit mode by placing the edit prompt line on the screen. If the edit prompt line does not display an entry, you can type a new entry. In any case, you can type an editing command. For example, the edit prompt line

```
12:         ? █
```

has no entry between the entry number and the edit prompt, thus you can type a new entry, or you can type an editing command.

If there is an entry between the entry number and the edit prompt, then you can only type an editing command. For example, the edit prompt line

```
9: NOV      ? █
```

contains a single entry, NOV, which is a label, so you can type only an editing command.

Before you learn about the different EDIT commands, you should know a little more about the way Apple II Business Graphics stores information in the work file.

## Points and Labels in the Work File

Whenever you add data to the work file, from a file using a LOAD command or from the keyboard after you type an EDIT command, Apple II Business Graphics places this data into one or more lists. The work file's three lists are

a list of points: a sequence of coordinate pairs

a list of horizontal labels: a sequence of labels

a list of vertical labels: also a sequence of labels

The order of entries in a list is the order in which they were placed in the work file.

The commands that let you view, save, or remove the entries in any list are:

```
LList (<file>)  
SAve <file>  
CLear
```

## Entering Data

There are four different ways that you can place information in the work file. The first method is referred to as entering data, because its use results in the entry of both points and labels. When you add a point to the work file using this method, the point's coordinates are placed at the end of the list of points. If the point has a horizontal label, the label is placed at the end of the list of horizontal labels if it is not already in the list. Likewise, if the point has a vertical label, the label is placed at the end of the list of vertical labels if it is not already in the list. You can use this general method of entering new data into Apple II Business Graphics, by typing one of the following commands

```
Edit  
LOad <file>  
Append <file>
```

This method is fully described in the section on using the work file.

## Entering Points

The second method is referred to as entering points and is described in the section on using a points file. This method adds coordinate pairs to the end of the list of points. The labels of any points entered using this method must already be in a label list. That is, if an entered point has a horizontal label, that label must be in the list of horizontal labels; and if an entered point has a vertical label, that label must be in the list of vertical labels.

You type points in this manner using one of the commands

```
Edit Points
LOad Points <file>
Append Points <file>
```

The primary uses of this method are to display multiple sets of points on one set of labels and to remove points from the work file, leaving the labels intact.

## Entering Labels

The third and fourth methods are referred to as entering labels. They affect only the contents of the lists of horizontal and vertical labels, respectively. You can add horizontal labels to the list of horizontal labels or add vertical labels to the list of vertical labels using the commands

```
Edit horizontal Labels
Edit Vertical Labels

LOad horizontal Labels <file>
LOad Vertical Labels <file>

APpend horizontal Labels <file>
APpend Vertical Labels <file>
```

Both these methods are explained in the section on using a labels file. You would use one of these two methods, for example, to add labels onto which future points are to be placed using the GENERATE POINTS command, described in the chapter on Manipulating the Data.

The following sections tell how to type new entries. The editing commands are explained after that.

## New Entries

If you just typed in one of the EDIT commands, and the work file is empty, Apple II Business Graphics displays the edit prompt line

```
1: ? █
```

This tells you that the program is waiting for you to type the first entry of the type that you are currently editing, or to enter an editing command.

If you have been in edit mode for a while, typing in entries or editing commands, and Apple II Business Graphics displays the prompt line

```
23: ? █
```

you can type the 23rd entry of the type you are currently editing, or you can enter one of the editing commands.

The EDIT command with which you entered edit mode determines the sort of entry that you may type. If you entered edit mode using EDIT or EDIT POINTS, you must type a coordinate pair. A coordinate pair consists of a horizontal coordinate, followed by at least one space or a comma, followed by a vertical coordinate. The entry

13,99

places the point with horizontal coordinate 13, and vertical coordinate 99 into the list of points. After you place this point in its list by pressing RETURN, a new edit prompt line appears. As before, you may either type another entry or type an editing command.

If you entered edit mode using EDIT HORIZONTAL LABELS or EDIT VERTICAL LABELS, you must type a label or an editing command. For example, if you see an edit prompt line such as

12: ? ■

you can type a label such as

DEC

or you can type an editing command. The different rules for typing in labels and numbers are explained next.

## Labels and Numbers

If you are entering coordinate pairs, each coordinate you type can be a number or a label. Thus, you can enter four types of data points into the work file. These are

number	number
number	label
label	number
label	label

Every point entered into the work file must have the same type as the first point. If the first point you enter into the list of points is

JAN,64

this point has a horizontal label and a vertical number. All subsequent entries are cast into this mold. If your second entry is

1Ø,15

the program interprets the 1Ø as a label, not a number. If, however, your second entry is

10,JAN

the program responds with the error message

? INVALID NUMBER

because its attempt to interpret JAN as a number was unsuccessful. If you wish your first entry in the list of points to have a numeric label on one of the axes, put it in single or double quotes. For example, to place the label "1980" on the horizontal axis, type it like this

"1980",1500

The program interprets all subsequent horizontal numbers as labels.

If you want a label to appear in double quotes, put single quotes around the double quotes. For example

'"A"',312

puts a first point with horizontal label "A" into the list of points. If you want a label to appear in single quotes, put double quotes around the single quotes.

If you entered edit mode using EDIT HORIZONTAL LABELS or EDIT VERTICAL LABELS, every entry is interpreted as a label. If you want a label to appear in quotes, put the other type of quotes outside of the quotes you want.

## Numbers vs. Labels

Apple II Business Graphics allows you to do most mathematical manipulations on numbers but not on labels. Likewise, the program lets you do other things to labels but not to numbers. You should take the following hints into account when you are planning a graph.

 Mathematical manipulations can only be performed on numbers. If you type the coordinates of both axes as labels, you sacrifice the ability to perform any mathematical operations on the data.

 Most of the program's mathematical manipulations are performed on the vertical coordinates. Although it is possible to switch all the horizontal coordinates with the vertical coordinates (see the SWAP command), perform the manipulations, then switch back, it is easier to place numeric coordinates on the vertical axis.



Before Apple II Business Graphics places numeric information on a graph, it chooses the coordinates to appear on the axis by dividing the numeric information into convenient intervals. If you want the numbers that you type to appear as the coordinates on an axis, type them as labels (in quotes). This is especially recommended for years and days of the month. For the same reason, bar graphs are more informative when the axis from which the bars extend has labels as coordinates.

## Abbreviating Edit Commands

Unlike the other Apple II Business Graphics commands, you must generally type each editing command in its entirety. For example, if you want to delete several points from the list of points, you must type the entire command

DELETE

to remove each point. However, you can set a prefix for the edit commands, which lets you use abbreviated versions.

Using the PREFIX command, you set a prefix character, which you then type before each editing command. When a prefix character is set, you can abbreviate each editing command to its shortest unique form. You set the prefix character using the command

PREFIX <prefix character>

The <prefix character> can be any character you want. For example, you can make the prefix character a period by typing the command

PREFIX .

After you have set the prefix character to "." you may abbreviate the DELETE command, for example, to any of the following

.DELETE  
.DELET  
.DELE  
.DEL  
.DE

You can't abbreviate DELETE any further because the abbreviation

.D

could also refer to the DOWN editing command.

The PREFIX command is also useful if you want to type a point whose horizontal label is the same as one of the editing commands. If you enter the point

TOP, 12

without a prefix character set, you will see the first entry of the list that you are currently editing displayed on the screen (because the TOP command displays the entry at the top of the list). If a prefix character is set, and you don't place it before the entry, the entry cannot be interpreted as an editing command.

The prefix remains in effect until you turn the computer off, reboot Apple II Business Graphics, or use the FORMAT or INTERCHANGE commands.

You can remove the prefix altogether by setting the prefix to " ". For example, the command

```
.P
```

removes the "." as the prefix.

## Looking at Entries

Before you can change an entry, the entry must be displayed in the last line on the command screen. The following commands are used to display the entry you want to change.

## Seeing the Next Point

To display the next entry in the list you are editing, simply press the RETURN key. If you press the RETURN key when the last entry of the list is displayed, the edit prompt line displays the number of the first empty entry. If you press RETURN again, the first empty entry is displayed again.

Assume that you are editing points, and there are 11 points in the work file, the last having coordinates NOV 53. When the last entry is displayed, you see this:

```
11: NOV    53    ? █
```

If you press RETURN, you will see the number of the first empty entry, like this

```
12:                ? █
```

The program is waiting for you to type a new entry, or an editing command.

## Moving to the Top

To display the first entry in the list you are currently editing, use the TOP command. It takes the form

TOP

or if the prefix is set

<prefix character>Top

For example, to display the first entry when the prefix character is set to ";", type

;T

## Moving to the Bottom

To display the last entry in the list you are currently editing, use the BOTTOM command. This command takes the form

BOTTOM

or if the prefix is set

<prefix character>Bottom

For example, if there are 50 points in the list of points, and the 50th point has horizontal coordinate 37 and vertical coordinate 23, type

BOTTOM

and Apple II Business Graphics displays

50: 37 23 ? ■

as the last line on the command screen.

## Moving Up

The UP command lets you display any entry that is before the current entry in the list you are editing. It takes the form

UP (<number>)

or if the prefix is set

<prefix character>Up (<number>)

For example, if the current entry is entry 11, and you want to see the ninth entry, type

UP 2

If the number you use is higher than the number of the current entry, the first point in the list you are editing is displayed.

The UP command without a number is equivalent to the command

```
UP 1
```

## Moving Down

To display an entry that is below the current entry in the list you are editing, use the DOWN editing command. It takes the form

```
DOWN (<number>)
```

If you have set a prefix character, it takes the form

```
<prefix character>Down (<number>)
```

If the number you give is greater than the number of entries that are below the current entry, the first empty entry is displayed. For example, if the list you are editing has 10 entries in it and you try to move down 100, you'll see

```
11:          ? █
```

If you type the DOWN command without a number, the next entry is displayed.

## Changing an Entry

You can change the value of the current entry using the editing command, CHANGE. If you used the EDIT or EDIT POINTS command to start editing, this editing command takes the form

```
CHANGE <x coordinate> <y coordinate>
```

If you are editing labels, the CHANGE command takes the form

```
CHANGE <label>
```

If the prefix is set, you must use the form

```
<prefix character>Change <x coordinate> <y coordinate>
```

or if you are editing labels

```
<prefix character>Change <label>
```

If you entered edit mode using the EDIT command, the CHANGE command causes the current entry in the point list to change. If the current entry contains labels, the CHANGE command also causes the corresponding labels in the lists of labels to change.

If you entered edit mode with the EDIT POINTS command, the lists of labels cannot change. For example, if you are editing points, and the first entry of a list of points is displayed as

```
1: 12/25/84 45 ? ■
```

and you type

```
CHANGE 12/24/84,55
```

Apple II Business Graphics can only make this change if the new label 12/24/84 is already in the list of horizontal labels. Otherwise it gives you the error message

```
? UNKNOWN HORIZONTAL LABEL
```

If you entered edit mode using EDIT HORIZONTAL LABELS or EDIT VERTICAL LABELS, and you use the CHANGE command to change a label, the new label replaces the old one in the proper list of labels. If any entry in the list of points contains the label that you replaced, the old label is replaced by the new label.

## Inserting Points

To place a new entry between two entries that are already in the work file, use the INSERT command. The entry you insert is placed before the currently displayed entry, and is given that entry's number. The number of the displayed entry is increased by one, and the entry is redisplayed.

If you entered edit mode with the command EDIT or the command EDIT POINTS, this editing command takes the form

```
INSERT <x coordinate> <y coordinate>
```

If you entered edit mode with either EDIT LABELS command, the command takes the form

```
INSERT <label>
```

If the prefix is set the command takes the form

```
<prefix character>Insert <x coordinate> <y coordinate>
```

or

```
<prefix character>Insert <label>
```

For example, if the entry currently displayed is

```
3: APR 33 ? ■
```

and you type the command

INSERT MAR 10

The third entry in the list of points becomes MAR 10, and the entry currently displayed becomes

```
4:  APR      33  ?
```

Notice that the number of the old third entry (and each subsequent entry) has increased by one.

If you are editing points, you can only insert points whose labels are already in a label list.

## Adding an Entry to the End

To place a new entry at the end of the list you are currently editing, use the APPEND command. It takes the form

```
APPEND <x coordinate>, <y coordinate>
```

or if you are editing labels, it takes the form

```
APPEND <label>
```

If the prefix is set this command takes the form

```
<prefix character>Append <x coordinate> <y coordinate>
```

or

```
<prefix character>Append <label>
```

The APPEND command has the same effect regardless of the entry that is currently displayed--it places a new entry at the end of a list. If you are editing points with 13 points currently in the list of points, and you have set the prefix character to ".", to append the point with coordinates 23 and 11, type the command

```
.A 23,11
```

and the program displays the prompt line

```
15:                ?
```

Since the list of points previously had 13 entries, the point appended becomes the 14th entry, and (empty) entry 15 is displayed.

If you entered edit mode using the EDIT command, new entries are added to the list of points, and if the labels are not already in the lists of labels, they too are added. If you are editing points, the labels of all appended points must already be in a list of labels.

## Removing Points

To remove the entry that is currently displayed, use the DELETE command. The entry numbers of all subsequent entries decrease by one. This command takes the form

DELETE

or if the prefix is set, the form

<prefix character>Delete

This command only causes one entry to be removed: the current entry. For example, if the 13th entry is currently displayed, and the prefix is set to ";", type

;DE

and the old 13th entry goes away. Apple II Business Graphics then displays the new 13th entry (the old 14th entry).

If you entered edit mode with the EDIT command, the labels of deleted entries are removed from the lists of labels as well as from the list of points. If you are editing POINTS, the lists of labels do not change.

If you are editing labels, and you delete a label that is used by one or more entries in the list of points, all points that use that label are effectively deleted. If you use the command LIST POINTS, the word "UNKNOWN" appears where the deleted label previously was. To assign a label to a point with an unknown label, you type EDIT or EDIT POINTS, and use the CHANGE command.

## Clearing the Work File

You can remove all the entries from the lists you are currently editing using the command

CLEAR

or if the prefix is set

<prefix character>Clear

If you have changed the work file since the last time you saved it as a points file, the program asks you with a beep

DO YOU WANT TO CLEAR THE CURRENT DATA?

Answer Y to clear the work file, or N to continue editing.



Clearing the work file has no effect on the diskette files.

## Ending an Editing Session

When you have finished entering the points for your graph, terminate the editing session by typing

END

If you have set the prefix, use the form

<prefix character>End

For example, if the prefix is set to ".", the command

.E

causes the editing session to end. The program then asks for your next system command by displaying the system prompt.

## Using the Work File

---

The commands in this section are used to enter and save the data in the work file. All of these commands affect the labels in the label lists as well as the contents of the list of points.

### Editing Data

To enter data into Apple II Business Graphics from the keyboard, use the command

Edit

This command lets you enter a new set of data, add points to those already in the work file, or change the points that are already in the work file, all from the keyboard. If you enter edit mode using the EDIT command, all the points you enter, change, or remove, affect the contents of the label lists as well as the point list.

To transfer a set of data from a file on a diskette, use the LOAD command described below. To add the data in a file to the data that is already in the work file, use the APPEND command. To transfer data from a Pascal text file, a DOS text file, a VisiCalc print or DIF file, or an Apple Plot file, use INTERCHANGE to place the data into an Apple II Business Graphics points file, then use the LOAD or APPEND commands. The INTERCHANGE command is described in an appendix.

### Saving the Data

To place a copy of the points and labels that are currently in the work file in a file on a diskette, use the command

SAve <file>

This command creates a points file with the file name you specify. If you have set the horizontal or vertical titles, they too are saved in the points file. Titles are explained in the next chapter. For example, you can save the points and labels in the work file in a file named SALES on a diskette named JAN84: by typing

```
SA JAN84:SALES
```

Because the SAVE command is not an edit command, it doesn't need a prefix for the abbreviated version.

Once you have saved the data on a diskette, you can create a new set of data, modify the data that is in the work file, or bring a different set of data into the work file and modify that.



Notice that when you save contents of the work file on a diskette, the work file remains intact. You can verify this using the LIST command.

If you try to save a file using a file name that already exists, the program beeps and asks you

```
FILE ALREADY EXISTS, CONTINUE (Y OR N)?
```

If you want to erase the old file and save the new one, type Y. If you want to keep the old file, type N. You may then save the new file using a different file name.

If the diskette is full, you will get a message saying

```
DISK FULL
```

Put a diskette with some room on it in the disk drive and try saving your file again.

## Clearing the Work File

If the work file is not empty, and you want to enter a new set of data, you must throw away the old data before you can enter a new set of data. You can remove everything (points, labels, titles, settings, and the current screen) from the work file using the command

```
CLear
```

If you have changed any of the data in the work file since the last time you saved it, the program beeps and asks you

```
DO YOU WANT TO CLEAR THE CURRENT DATA?
```

If you want to throw away your most recent changes, answer Y (without pressing RETURN). If you want to save the data before clearing the work file, type N (without pressing RETURN).



The CLEAR command removes everything from the work file, including points, labels, settings, titles, and the screen. If you want to clear the points, leaving other things intact, you must use the CLEAR editing command while you are editing points. If you want to remove a list of labels, use a CLEAR LABELS command.



Clearing the work file has no effect on the diskette files.

## Loading Data from a Diskette

To move a copy of the points and labels in a points file from diskette to the work file, use the command

```
Load <file>
```

The LOAD command places all points into the work file's list of points, and all labels into one of the lists of labels. It throws away all data that was previously in the work file. If the work file has not been saved since you last changed it, the program asks you

```
DO YOU WANT TO CLEAR THE CURRENT DATA?
```

If you want to save the contents of the work file before you load the new file, type N (without pressing RETURN). If you don't want to save the points in the work file, answer Y (without pressing RETURN), and the points from the file you named will all be placed in the work file's point and label lists.

Some points files have horizontal and vertical titles stored in them. If the points file you load has any titles, they are placed in the work file too. Horizontal and vertical titles are explained in the next chapter.

After you load a points file into the work file, the original points file is still on the diskette. To verify this, use the LIST CATALOG command.

If you want to load one set of points onto the labels that are already in the work file or onto another set of points, use the LOAD POINTS command, described later in this chapter.

## Appending Data from a Diskette

To add the contents of a points file on a diskette to the lists of points and labels that are currently in the work file, use the APPEND command. This command takes the form

```
APpend <file>
```

When you use this command, each point in the file named is added to

the end of the list of points. Each label, if not already in a list of labels, is added to the end of the appropriate list of labels.

This command can be used, for example, to place several sets of data into the work file at once. If all these sets of data are to appear on the same graph, the command DRAW AXIS causes Apple II Business Graphics to draw axes that can accommodate all the points and labels from all the sets of data.

## Using a Points File

---

The EDIT POINTS command lets you change the points that are in the work file without affecting the labels in the work file's label list.

Assume, for example, that your work file contains the yearly campaign expenditures of your favorite politician, with dollars as vertical coordinates, and years as horizontal coordinates. You can SAVE POINTS into a point file for later use, DRAW AXIS so that the program makes room for all the points on the graph, use EDIT POINTS to delete the points for the non-election years (without deleting the labels), and then draw a graph of the politician's expenditures in election years. You can next LOAD POINTS from the original file, use EDIT POINTS to delete the points for the election years (without deleting the labels), and then draw this set of points on the same graph. You have quickly created a graphic image of the politician's spending in election years versus non-election years.

## Editing Points

You can enter, alter, or delete the points in the work file using the command

### Edit Points

If you entered edit mode using the EDIT POINTS command, you use all normal editing commands to review and change the points. You can set the prefix, move up, move down, move to the top, move to the bottom, change, insert, append, delete, and even clear. The only difference between EDIT POINTS and EDIT is that using EDIT POINTS, the labels in the work file cannot and will not change.

If you enter or change a point, the new point's label must already be in a label list. If you delete a point, that point's label remains in its label list.

## Looking at the Points

There is a command that lets you see or print a list of the points in the work file. Its general form is

```
Llist points <file>
```

If you don't specify a file, the listing is displayed on the screen. If you specify one of the slot <file> names, the listing is sent to the device in that slot. For example, if you have a Silentyper in slot #1, use the command

```
LI P PRINTER:
```

to get a listing of the points.

If there are titles assigned to either of the two axes, these titles are printed at the top of the listing, horizontal title followed by vertical title.

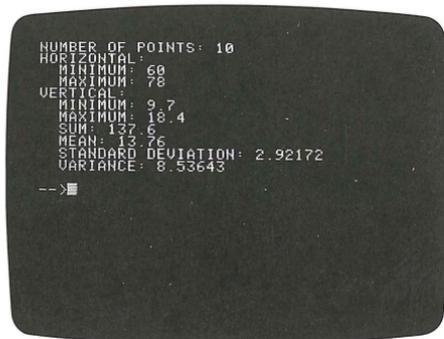
If you specify a disk file, the listing is saved as a take file. See the chapter on take files for more information.

## Analysis of the Data

You can find out some simple statistics about the data in the work file by typing

```
Llist SStatistics
```

The program responds with the number of points in the file, the maximum and minimum labels (if there are any), the maximum and minimum values (if there are any), and the sum, mean, standard deviation and variance of those values. Here is a sample listing of statistics:



```
NUMBER OF POINTS: 10
HORIZONTAL:
  MINIMUM: 60
  MAXIMUM: 78
VERTICAL:
  MINIMUM: 9.7
  MAXIMUM: 18.4
SUM: 137.6
MEAN: 13.76
STANDARD DEVIATION: 2.92172
VARIANCE: 8.53643
-->
```

Figure 6-5. A Sample Listing of Statistics

## Saving a Points File

You can save the points and labels in the work file in a points file on a diskette using the command

```
SAve points <file>
```

This command is identical to the SAVE <file> command described earlier. It causes all the points and labels in the work file to be saved in a points file, along with the horizontal and vertical titles, if there are any. It does not save labels that have no points assigned to them.

If you try to save a points file using a name that already exists, the program beeps and asks you

```
FILE ALREADY EXISTS, CONTINUE (Y OR N)?
```

If you SAVE POINTS to a <file> other than a diskette file, for example, a printer, the data will not be in a recognizable form.

## Removing a Points File

You can remove a points file from a diskette using the command

```
DElete points <file>
```

This command is identical to the DELETE <file> command described earlier. To see the names and sizes of all the files on diskettes that you have in your disk drives, use the command

```
LIsT CAtalog <file>
```

## Getting Points from a Diskette

If you want to bring points into the work file without destroying the labels that are already in the work file, you must use the LOAD POINTS command. This command does destroy the points that are currently in the work file. This is the command that you use to place multiple sets of data onto a single graph. You can take points from a point file on a diskette and place them in the work file using the command

```
LOad Points <file>
```

The program reads points, one by one, from <file>, entering each into the work file if and only if that point's labels are already in the work file. This means that if your work file is empty, you cannot use LOAD POINTS to load a point file that has labels.

An example of the use of LOAD POINTS is in the chapter on Creating an Image in the section on drawing multiple bars.

# Using a Labels File

---

This section tells you how to change the labels in a list of labels without affecting the points that are in the work file.

Suppose that the work file contains records of the number of paper cups used in your office over the last 10 months, with the number of cups on the vertical axis, and labels for each month on the horizontal axis. You want to estimate your paper cup consumption for the next two months. Use the EDIT LABELS command to create labels for the next two months, then use the program's curve fitting capabilities to predict points for those months. Without EDIT LABELS, you couldn't have created a space in the work file for these new points.

## Changing the Labels

To edit the labels in one of the two label lists, use one of the following commands:

```
Edit horizontal Labels
Edit Vertical Labels
```

If you have changed the image on the screen since the last time you saved it, the program asks

```
DO YOU WANT TO CLEAR THE SCREEN?
```

This is because data with new labels cannot be drawn on the old graph.

Answer this with Y to throw away the current image or N so that you can save it with the SAVE SCREEN command. If you answer Y, the program then places the edit prompt on the screen.

```
l: <label> ?
```

You use all the normal edit subcommands to review and change the labels. You can set the PREFIX, move UP, move DOWN, move to the TOP, move to the BOTTOM, CHANGE, INSERT, APPEND, CLEAR and even DELETE. The only difference between EDIT LABELS and EDIT is that you have one coordinate to change or enter, and this one coordinate is a label. As before, your editing session ends when you type END in its normal or prefixed form.

## Looking at the Labels

There are two commands that let you see or print lists of the labels in the work file. These are

```
LIst horizontal Labels (<file>)
LIst Vertical Labels (<file>)
```

If you don't specify whether you want to list the horizontal labels

or the vertical labels, the horizontal labels are listed (if there are any). If you don't include a file name, the list is printed on the screen. If you want to send the listing to a device in one of the slots, use the proper slot <file> name. For example, to get a listing of the vertical labels on a Silentype that is in slot #1, use the command

```
LI V L PRINTER:
```

If the axis whose labels you are printing has a title, the title is printed at the top of the listing.

If you specify a diskette file, the listing is stored as a take file. See the chapter on take files for more information.

## Saving a Labels File

There are two commands that you can use to save labels files: one is used to save horizontal labels into a file, the other to save vertical labels into a file. If the axis whose labels you are saving has a title, the title is saved too. These commands are:

```
SAve horizontal Label <file>
SAve Vertical Label <file>
```

If you don't specify whether the labels file is to be horizontal or vertical, the default is horizontal.

Each labels file contains the labels for one of the two axes: only horizontal labels can be stored in a horizontal labels file, and only vertical labels can be stored in a vertical labels file.



There is no way to see if a labels file is a horizontal labels file or a vertical labels file. Thus it is a good idea to give a labels file a name that indicates the type of label it contains.

If you try to save a file using a name that already exists, the program beeps and asks you

```
FILE ALREADY EXISTS, CONTINUE (Y OR N)?
```

Type Y or N, depending on whether or not you want to erase the old file.

Note that you can swap labels from one axis to the other, and that you can also load labels from a points file.

## Removing a Labels File

To remove a labels file from a diskette, use the command

```
DElete Label <file>
```

This command causes either type of labels file to be removed from the diskette. Use the LIST CATALOG command to see the labels files on all the diskettes that are currently in closed disk drives.

## Clearing Labels from the Work File

If you want to use the same coordinates that your current graph uses on one of its axes, but place new labels on the other axis, you should use one of the two commands that clears labels from the work file. These are:

```
CLear horizontal Labels
CLear Vertical Labels
```

If you type the command

```
CLear Labels
```

the horizontal labels are cleared. If you have changed the labels since last time you saved them, the program asks you

```
DO YOU WANT TO CLEAR THE CURRENT DATA?
```

(that is, do you want to clear the new labels from the work file). Respond with a N if you want to save the data, or a Y if you want to throw it away. If you have placed a graph on the screen, the program also asks

```
DO YOU WANT TO CLEAR THE SCREEN?
```

This is because data with new labels cannot be drawn on the old graph.

When you clear the labels from one of the axes, the points in the work file each lose one of their coordinates. To make up for this loss, Apple II Business Graphics assigns numeric coordinates, consecutive integers beginning at 1, to take their places. Figure 6-6 shows a set of points, before and after clearing:

Before CLear Label		After CLear Label	
LOW	DRESS	1	DRESS
MED	PAY	2	PAY
HIGH	FOLD	3	FOLD

Figure 6-6. Before and After Clear Label Command

CLEAR LABEL leaves all titles intact.

## Getting Labels from a Diskette

You can take either horizontal or vertical labels files from a diskette, and place them in the proper list of labels in the work file using the commands

```
L0ad horizontal Labels <file>
L0ad Vertical Labels <file>
```

If there are already labels in the work file, the program asks you

```
DO YOU WANT TO CLEAR THE CURRENT DATA?
```

If you press Y the old labels are cleared from an axis. If you graphed the old data, it also asks you

```
DO YOU WANT TO CLEAR THE SCREEN?
```

You must answer Y for the labels to be loaded. Since the program had to clear the old labels before it could load the new ones, the points in the work file temporarily have no labels. As new labels are read in, they are assigned to the points one by one. Thus, the first point gets the first label, the second point gets the second label, and so on, until there are no more points or no more labels.

If the labels file contains a title, this will be added to the proper axis.

## Appending Labels

To add the labels in a labels file to the labels already in a list of labels, use one of the commands

```
APpend horizontal Labels <file>
APpend Vertical Labels <file>
```

Both of these commands read labels from a file one by one. If a label is not already in the proper list of labels, it is added to the end. No points are added to the list of points.

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# Chapter 7

## Creating an Image

This chapter is all about graphic images such as graphs and pie charts. It tells you how to create them, how to save them, and how to print them.

### Getting Help

---

The contents of this chapter are summarized in four different help screens: Help SCREEN, Help AXIS, Help DRAW, Help TITLES. To see the first of these screens, type

Help SCREEN

This screen shows you all of the commands that you use to view the graphics screen, to save it, and to control what appears on it. Figure 7-1 lists the uppercase and general forms of the commands shown by Help SCREEN.

```
CLEAR SCREEN
Clear Screen

SET SCREEN
SEt SScreen

LOAD SCREEN
LOad Screen

SAVE SCREEN <file>
SAve SScreen <file>

WRITE SCREEN SILENTYPE
WRite Screen SilentyPe

SET FILL ON
SEt Fill ON

SET FILL OFF
SEt Fill OFF

SET COLOR <color name>
SEt Color <color name>
    color name = Green
                White
                Violet
                Orange
                BLUe
                BLAck
                None
```

Figure 7-1. Help Screen Commands

There is a group of commands that you can use to control the appearance of the axes on a graph. You can see a list of these commands by typing

Help AXIS

Figure 7-2 shows the uppercase and general form of the commands that you see with the Help AXIS command.

```
DRAW AXIS (<type>)
DRaw AXIs (<type>)          type = 0 through 3

SET HORIZONTAL RANGE <low value> <high value>
SEt horizontal Range <low value> <high value>

SET VERTICAL RANGE <low value> <high value>
SEt Vertical Range <low value> <high value>

LIST SETTINGS
LIst SETtings

CLEAR HORIZONTAL RANGE
CLear horizontal Range

CLEAR VERTICAL RANGE
CLear Vertical Range

SET HORIZONTAL LABEL LENGTH <number>
SEt horizontal Label Length <number>    number = 0 through 11

SET VERTICAL LABEL LENGTH <number>
SEt Vertical Label Length <number>     number = 0 through 11
```

Figure 7-2. Help Axis Commands

Another help screen shows you the draw commands. To see these commands, type

Help DRAW

Figure 7-3 lists the uppercase and general form of the Help DRAW commands.

DRAW AXIS (<type>)

DRAw AXis (<type>)

DRAW MARK

DRAw Mark

SET MARK <mark number>

SEt Mark <mark number>

mark number = -3 through 4

DRAW LINE

DRAw Line

SET DASH <dash number>

SEt Dash <dash number>

dash number = 0 through 4

DRAW VERTICAL BAR (<number of bars per label>)

DRAw Vertical Bar (<number of bars per label>)

DRAW HORIZONTAL BAR (<number of bars per label>)

DRAw horizontal Bar (<number of bars per label>)

number of bars per label = 1 through 4

DRAW PIE (<number of colors> <total area> <aspect ratio>)

DRAw Pie (<number of colors> <total area> <aspect ratio>)

Figure 7-3. Help Draw Commands

The last help screen for this chapter shows you the commands that are related to the titles on the screen. To see this help screen, type

Help TITLE

Figure 7-4 lists the uppercase and the general form for the Help TITLE commands.

SET TITLE <title>  
SEt Title <title>

CLEAR TITLE  
CLear Title

SET HORIZONTAL TITLE <title>  
SEt Horizontal Title <title>

CLEAR HORIZONTAL TITLE  
CLear Horizontal Title

SET VERTICAL TITLE <title>  
SEt Vertical Title <title>

CLEAR VERTICAL TITLE  
CLear Vertical Title

SET HORIZONTAL FLOATING TITLE <title> (<x> <y>)  
SEt horizontal Floating Title <title> (<x> <y>)

SET VERTICAL FLOATING TITLE <title> (<x> <y>)  
SEt Vertical Floating Title <title> (<x> <y>)

POSITIONING KEYS:

Up = U or I  
Down = D or M  
Left = L or J  
Right = R or K

Figure 7-4. Help Titles Commands

# The Graphics Screen

---

To place images on the screen use the draw commands. These are:

DRAW MARK  
DRAW LINE  
DRAW DASH  
DRAW BAR  
DRAW AREA  
DRAW PIE

Before you can use a draw command, you must put some data points in the work file. Once you have placed an image on the screen using the draw commands, you can place titles anywhere on the image.

You will normally make your first copy of a graph or pie on the screen. If you want to save the screen's image on a diskette, use the SAVE SCREEN command, described later in this chapter.

If you want to transfer the image on the screen to a Silentype printer, you must first use the SET SLOT command to tell the program where the printer is (as described in the chapter on setting up), followed by the WRITE SCREEN command which transfers the image directly to the Silentype. The WRITE SCREEN command is discussed later in this chapter.



If you want to place the image on a plotter or some other type of graphic device, you must use the SET SLOT command to tell the program where the plotter is, then use the SET DEVICE command to tell the program what kind of graphic output device you are using. Then use the drawing commands, just as if you were drawing the image on the screen.

If you type drawing commands to place an image on a plotter, there is always the chance that you will make a mistake and ruin the plot. To minimize the possibility of a ruined plot, you can create a take file. A take file is a file of commands that the program uses as if the commands were being typed directly from the keyboard.

First, you create a take file that draws the image you want on the screen. When the take file is perfected, use the SET SLOT and SET DEVICE commands to indicate the graphic device, and then use the take file to place the image on that output device. Take files are described in their own chapter.

The next sections describe commands that control the graphics screen.

## Clearing the Screen

There are two types of drawing commands: those that add to what is already on the screen, and those that cannot take effect until the image that is already on the screen has been removed. If you type a

command of the latter type, and there is something on the screen, the program will ask you

DO YOU WANT TO CLEAR THE SCREEN?

You can also clear the screen using the command

Clear Screen

This command is useful for take files since you cannot respond to a question that is asked while a take file is running. Confirmation is not required for a take file.

## Setting the Screen

In the course of creating an image, you will occasionally want to look at the graphics screen before typing the next command. You can do this using the command

SEt SScreen

This command does not affect what is on the graphics screen; it simply lets you look at the graphics screen instead of the command screen.

## Saving the Screen as a File

If you want to save a copy of the image that is currently on the graphics screen in a file on a diskette, use the command

SAve SScreen <file>

This command creates a file of type screen named <file>. You should only use this command to send the image to a diskette file. There are other commands for displaying the screen on other graphic devices. A screen file requires 16 blocks of diskette space. You may use the LIST CATALOG command to check that a diskette has 16 empty, contiguous blocks.

When you the SAVE SCREEN command, only the image is stored; to save the data, you must use the SAVE POINTS, SAVE LABELS, and SAVE SETTINGS commands already described.

## Loading the Screen from a File

To display or print an image that is stored on diskette, you must use the command

LOad SScreen <file>

The <file> must be a screen file. This command does not load any information other than an image.

The LOAD SCREEN command puts the contents of <file> in the area of the Apple's memory that is used for storage of the graphic image, which can be used for graphic overlays. The image is then displayed on the screen.

## Printing the Screen on a Silentype

If you want to print a copy of the graphics screen on your Silentype printer, SET SLOT to the slot that the Silentype is in, then use the command

```
WRITE Screen Silentype
```

The program takes about a minute and a half to print the screen on the Silentype. You cannot type the next command until the Silentype has finished printing. If you want to print one of your screen files on the Silentype printer, a file named DEMO:INCOME, for example, type the commands

```
LO SC DEMO:INCOME  
WRITE S S
```

## Setting Colors

If you have a color monitor, many of the drawing commands place colored images on the screen. When you first turn the program on, the elements of a graph are drawn in two colors: green and violet. The first element (usually the axes) is drawn in green, the second in violet, the third in green, and so on. If you use SET DEVICE CONSOLE 1, the program cycles through five colors: green, violet, white, orange, and blue, in that order. If you want to control which color will be drawn next, use the command

```
SEt Color <color>
```

The possible values of <color> are

```
Green  
Violet  
White  
Orange  
BLUe  
BLACK  
None
```

The tutorial include a picture of a pie that uses the five colors that the program cycles through. (BLACK and NONE don't show on the screen.)

When you use the SET COLOR command, the next object you draw is placed on the screen in the color you set. If you don't set the color again, the program returns to its color cycle starting with the color green.

Here are some examples of the SET COLOR command

```
SET COLOR BLU
SE CO G
SE CO O
```

If you draw something over a color that is already there, the new color will cover the old one. For example, if you type these commands

```
SE CO G
DR B
SE CO O
DR B
```

the bars are drawn first in green, then in orange.



Due to the limitations of color graphics on the Apple II, you will occasionally get discoloration when two colors are on or near each other. THIS NORMALLY WILL NOT HAPPEN ON OTHER GRAPHIC DEVICES.

If you draw something with the color none, nothing on the graphics screen will change. The color none is especially useful for drawing axes for an axisless plot.



If you are working with a black and white screen and a Silentype printer, you can get the best color contrast using white and any other color.

## Setting Filling

Some objects, specifically areas, bars, and pie slices, are drawn as solid, filled in, figures. If you want figures to be outlined instead of filled in, you can use the

```
SET Fill <fill option>
```

command. The fill options are

```
OFF or Ø
```

to draw an outline, and

```
ON or 1
```

to resume the drawing of filled in figures. Examples are:

```
SE F OF
SET FIL Ø
SE FI ON
SET FILL 1
```

The first two commands cause figures to be drawn as outlines; the second two cause objects to be filled in.



The FILL command affects all areas, bars, and pie slices you draw until you use the FILL command again.

A particularly effective use of the FILL command is to first draw a figure with FILL ON, and then to draw the same figure with FILL OFF. The result is a filled in figure with an outline around it.

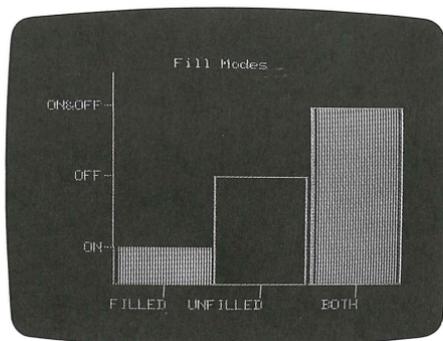


Figure 7-5. The Different Fill Modes

## Drawing the Axes

When you type the first draw command for an image, the program first draws the axes. If you want to draw the axes without placing any data on the screen (for example, to see how the program set the ranges of the two axes), you can use the command

```
DRAW AXIS (<type>)
```

Apple II Business Graphics gives you four different axis types to choose from. These are:

- 0 no grid lines
- 1 vertical grid lines
- 2 horizontal grid lines
- 3 horizontal and vertical grid lines

An axis that has no grid lines is the default. These are all valid commands:

```
DRAW AXIS  
DRAW AX 0  
DR AX 3
```

Here are some sample axes, showing the four types of grids.

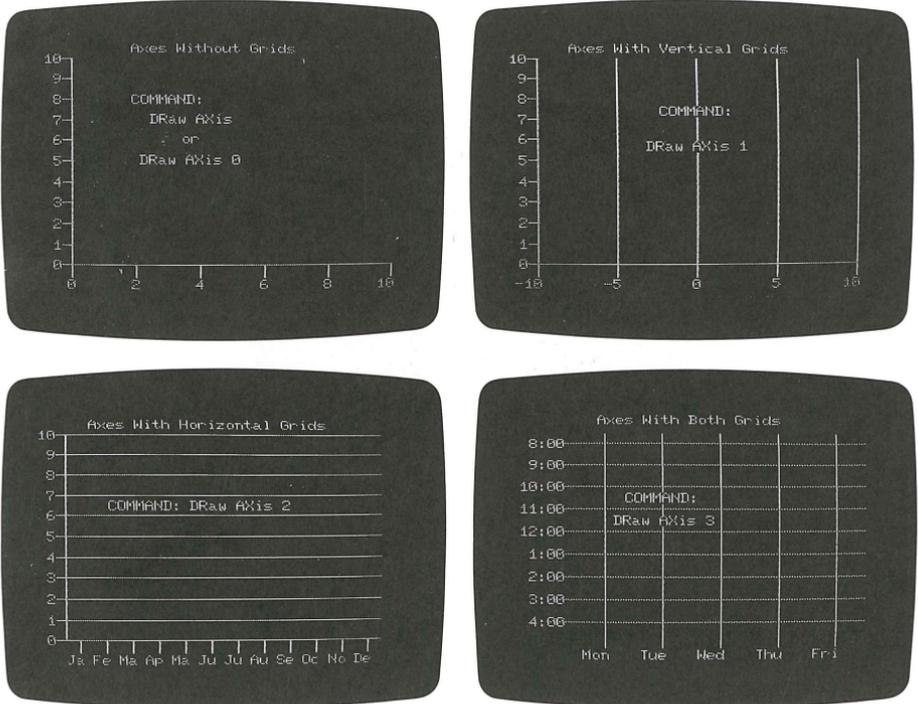


Figure 7-6. Different Axes



If you want to draw a graph that has no axes, set the color to none, then draw the axes. To create a title page for a graphic presentation, use a graphic screen with no axes along with the title drawing commands.

## The Graph's Coordinates

When you tell the program to draw a graph, it automatically chooses the coordinates that appear on the two axes. The coordinates used depend on the values of the points in the work file, on whether the coordinates are numbers or labels, and on the way that the most screen space can be used for the graph.

There are two types of commands you can use to alter the appearance of the coordinates on the axes: range commands, which select what portion of the points in the work file will be drawn; and labeling commands, which set the lengths of the labels on the axes.

## Setting Ranges for the Axes

If you only want to display a portion of the points in the work file, you can set the range for each of the two axes using the commands:

```
SEt horizontal Range <low value> <high value>
SEt Vertical Range <low value> <high value>
```

These are both deferred commands: you must clear the screen before the new ranges will be displayed.

If you set the range on an axis having numerical coordinates, the <low value> must be greater than or equal to the lowest value on that axis, and the <high value> must be less than or equal to the highest value on that axis.

If you set the range on an axis having labels, the <low value> must be one of the labels on that axis, and the <high value> must be one of the labels that is to the right of (horizontally) or above (vertically) the <low value>.

For example, if your work file contains points with horizontal labels Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday, you can use the command

```
SE H RA MONDAY FRIDAY
```

to display data for the weekdays. If your work file contains points with vertical values between 1 and 50, you can choose to display the points with values of 25 or less with the command

```
SET VERT RANG 1 25
```

Here are two graphs, one before, and one after the range setting commands given above.

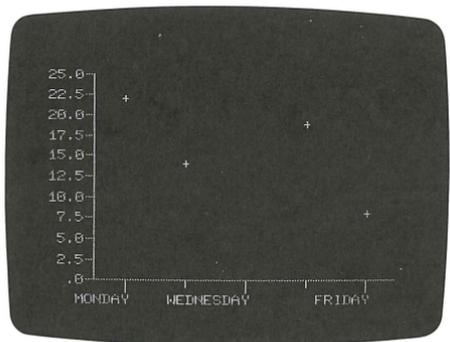
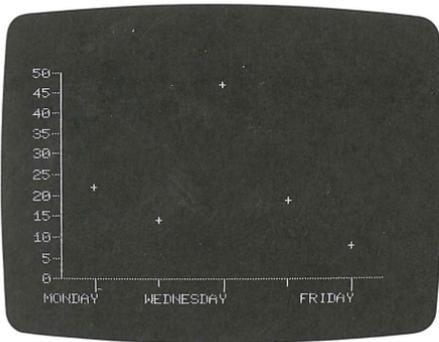


Figure 7-7. Before and After Range Setting



When you set a numerical range, the work file must contain points having at least two values within that range. If the work file does not contain two values in that range, drawing commands will have no effect.

Setting a range immediately affects drawing, line fitting, and point generation.

## Viewing the Ranges

You can see the ranges that are set using the command

```
List Settings (<file>)
```

If you do not name a file, this command places the ranges and all the other current settings on the screen. If you specify a file, a take file is created. See the chapter on take files for information on this use of LIST SETTINGS. If you list the settings when the work file is clear, you see the following settings:

```
CLEAR HORIZONTAL RANGE
CLEAR VERTICAL RANGE
CLEAR TITLE
CLEAR HORIZONTAL TITLE
CLEAR VERTICAL TITLE
SET HORIZONTAL LABEL LENGTH 11
SET VERTICAL LABEL LENGTH 11
```

## Clearing the Range

Once you have set the range of one or both of the axes, you can restore the ranges that the program sets automatically. Type

CLear horizontal Range

CLear Vertical Range

Both of these commands have deferred effects: you must clear the screen before the new ranges will appear on a graph.

## Label Lengths

Due to the limited amount of space on any graph, the program truncates any labels that contain more than 11 characters. If you enter a label that is 12 or more characters, the program only uses the first 11 characters.

When you use one of the draw commands to place a graph on the screen, the program prints the maximum number of labels that it can fit on the axis at regular intervals, each marked by a long tic mark. The labels that it cannot fit on the axis are marked by short tic marks.

The vertical axis can hold no more than 16 labels. The graphs below demonstrate what happens when you have more than 16 labels.

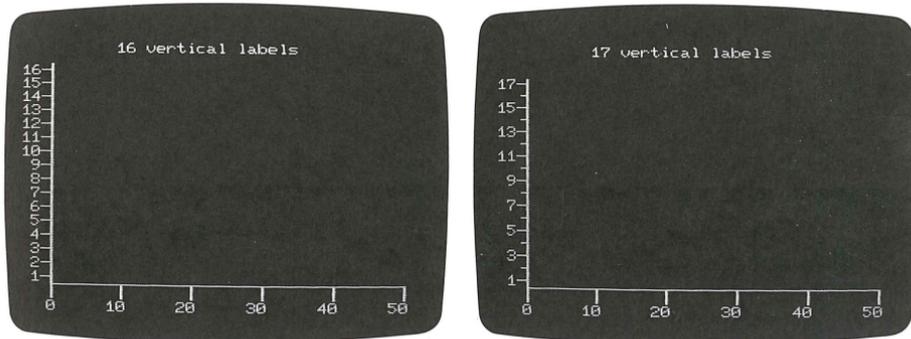


Figure 7-8. Too Many Vertical Labels

The horizontal axis can hold no more than 33 characters worth of labels. Depending on the label length and the number of labels in the horizontal range, it may hold fewer. The chart below illustrates the maximum number of labels of each length that will fit on each axis.

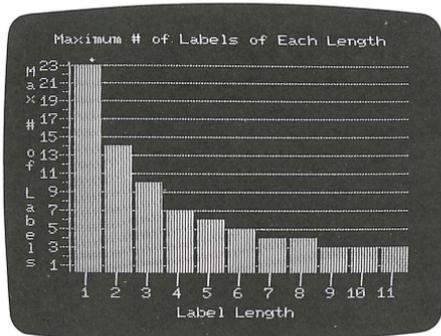


Figure 7-9. The Maximum Number of Horizontal Labels

## Setting Label Lengths

So that you can fit the maximum number of meaningful labels onto each graph that you make, Apple II Business Graphics has the commands

SET horizontal Label Length <number>

SET Vertical Label Length <number>

Both of these commands have deferred effects: the label lengths on the screen do not change until you redraw the axes using the draw axis command, or until you clear the screen and use any other draw command.

You cannot set either label length to a value greater than 12 or less than 0. If you set the labels to a length of 0, no labels appear, and all the tic marks are long.



Sometimes it is necessary to enter long labels and then shorten them using the SET LABEL LENGTH command. If you look at the chart of horizontal label lengths, you see that to fit labels for all of the 12 months on the horizontal axis, you must use a label length of 2. If you enter the name of each month as a two letter abbreviation, however, the points for March and May will be placed above the same label (MA), as will the points for June and July. Thus you must enter the months as labels of at least 3 letters, and then set the label length to 2 before drawing the axes.



There is **no** CLEAR LABEL LENGTH command. If you type CLEAR LABEL LENGTH, the program responds as if you are using the CLEAR LABELS command, and you may lose the labels in the work file.

## Viewing the Label Lengths

To see the label lengths, type

```
Llist SSettings (<file>)
```

If you omit the <file>, the label lengths, and all the other settings, are displayed on the screen. See the chapter, Take Files, for a discussion of listing the settings to a file (that is, saving the settings as part of a take file).

## A Note on Axes

---

Sometimes the axes do not fill as much of the screen as they could. Other times, the bars or tic marks may be clustered on a graph. These effects are due to the limited resolution of the monitor screen. The image on the console appears solid, but it is actually made up of a matrix of small dots. It is often impossible to place a line exactly where it should be drawn, so the program must either make the graph smaller or draw lines slightly out of place.

To minimize the effects of the screen's limited resolution, the program uses two methods to draw axes. It first tries to use an equal number of dots between each tic mark. Because the number of tic marks on an axis cannot usually be divided evenly into the number of dots allotted for that axis, some of the screen's space cannot be used. If this method leaves more than a fourth of the axis empty, the program tries the other method: bunching bars and tic marks into groups. This is not a serious problem unless you draw a large number of tic marks.

## Plotting Points

---

Graphs often show more than one set of data. To distinguish between sets, Apple II Business Graphics provides eight kinds of marks. To place a set of white marks on the screen, type

```
Draw Mark
```

The marks that the program can draw are numbered from -3 to 4. By default, the program cycles through marks 0 through 4, drawing the first set of points with mark 0, the second set with mark 1, and so on. Figure 7-10 shows the 8 different marks.

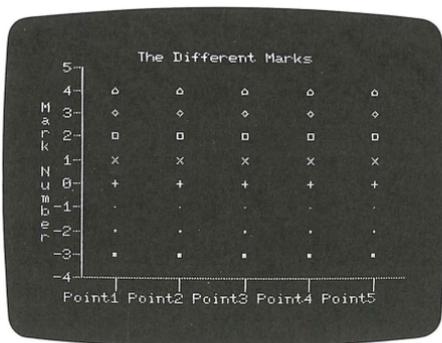


Figure 7-10. The Different Marks

To specify which mark the program will use, type

SET MARK <mark number>

The mark numbers correspond to the symbols shown in the previous chart. The mark you set is only used for the next set of points the program draws. The program varies the mark used for the second set of points after the SET MARK command. If the previous mark drawn was:

-1, -2, or -3, the program uses mark 0.

0, 1, 2, 3, or 4, the program uses the next mark in the cycle.

If you draw mark 0, 1, 2, 3, or 4 on top of a previously drawn mark, the old mark is replaced by the new. If you draw mark -1, -2, or -3 on top of a previously drawn mark, it is added to the mark that already exists. Thus you can create a few extra marks. For example, the commands

```
SET MARK 3                (open diamonds)
DRAW MARK
SET MARK -1              (small dots)
DRAW MARK
```

causes the points in the work file to be drawn on the screen as filled-in diamonds, as shown in figure 7-11.

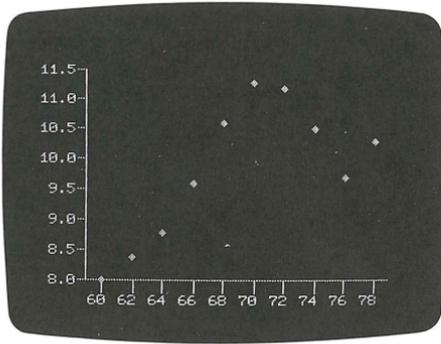


Figure 7-11. Filled-in Diamonds

The commands

SET MARK 2	(open squares)
DRAW MARK	
SET MARK -2	(medium sized dots)
DRAW MARK	

place filled-in squares on the screen, as shown in figure 7-12.

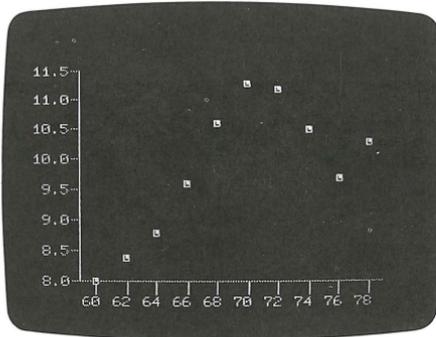


Figure 7-12. Filled-in Squares

# Drawing Lines

---

Apple II Business Graphics can display the points in the work file as a solid line using the command

DRaw Line

If you have a color monitor, the line will be drawn in the color that is next in the color cycle, or in a color that you have set since the last draw command.

The program draws a line starting at the coordinate indicated by the first point in the work file, and connects the rest of the points in sequence. The order of the points in the work file is important in determining the appearance of the line that the program draws.

In addition to its use of displaying data, the DRAW LINE command is also helpful for the design of some graphs. For example, if you want to draw a cartesian graph that has grid lines indicating the origin, you can do the following. Set the ranges for the two axes, such as

```
SE H RA -10 10
SE V RA -20 20
```

then draw a line from the leftmost spot on the horizontal axis to the rightmost spot on the horizontal axis by entering the points

```
-10,0
10,0
```

and then giving the command

```
DRAW LINE
```

Enter the editor using EDIT POINTS, use the edit command

```
CLEAR
```

to delete both points in the work file, then enter the points

```
0,20
0,-20
```

Leave the editor, and type the command

```
DRAW LINE
```

The graph produced is shown below.

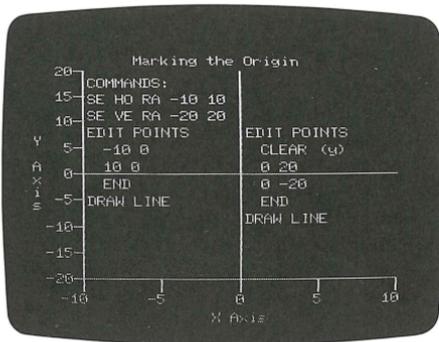


Figure 7-13. Marking the Origin

You can now enter a set of data points and plot it on the graph. You can also use the DRAW LINE command to produce some interesting graphs. The one below has 70 points in it.

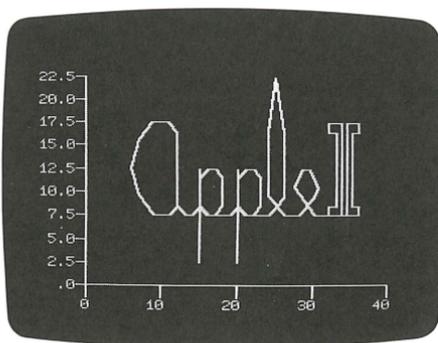


Figure 7-14. A More Interesting Line

# Drawing Dashed Lines

Apple II Business Graphics has five different dashed lines that you can place on graphs. If you are using a black and white screen or printer, the use of dashed lines is a good alternative to the use of colored lines.

The command

```
Draw Dash
```

is used exactly like the draw line command. It causes the points in the work file to be connected, from the first point to the last, with a single dashed line. You can set the type of dash with the command

```
SEt Dash <dash number>
```

in which the dash number is an integer from 0 to 4. The following graph illustrates the five types of dashed lines.

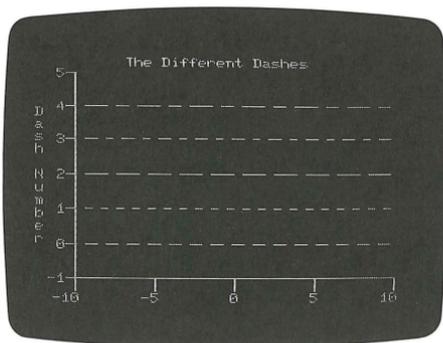


Figure 7-15. Possible Dashes

If you do not set the dash number, the program cycles through the five types of dashed lines, starting with dash 0. If you have a color monitor, the program draws all dashed lines in color, using its normal method of cycling through colors.

# Drawing Bars

One of the best ways of comparing different sets of data is to use a bar graph. With Apple II Business Graphics, you can create horizontal or vertical bar graphs, each displaying as many as four sets of data for each label on the base axis. You create a bar graph with one of the commands

Draw vertical Bar (<number of bars per label>)  
Draw Horizontal Bar (<number of bars per label>)

If you don't specify the type of bar graph you want or the number of bars you want each label to have, the program draws a vertical bar graph that has one bar per label. The bar drawn for each label is just a little narrower than the width allocated for that label; that is, narrower than the length of the axis divided by the number of labels on that axis. Thus the more labels there are on the axis, the narrower the bars are. When a graph has many labels, there won't be any space between the bars.

## Multiple Bars

If you want to compare two to four sets of data on the same bar graph, include the number of bars per label the first time you give the DRAW BAR command. The program remembers how many bars you want to place on the graph and it automatically draws bars for all the sets of data with the right size and in the right position.

For example if you have sets of data in the files DATA:SET1 and DATA:SET2, use the following commands to place them on the same bar graph.

<u>Command</u>	<u>Effect</u>
CLEAR	(clear everything)
LOAD DATA:SET1	(load in first set of points)
APPEND POINTS DATA:SET2	(append second set of points)
DRAW AXIS	(draw axis with range of all points)
LOAD POINTS DATA:SET1	(load first points. Y to clear data)
DRAW BAR 2	(draw bars for first set of points)
LOAD POINTS DATA:SET2	(load second points. Y to clear data SET1)
DRAW BAR	(2 not necessary this time)

Notice that multiple sets of points can be placed in the work file using the APPEND command. The order of the data is important. Load the earlier data first (e.g., JAN-JUN, then JUL-DEC). This allows you to draw the axes with the ranges for all the points that are going to appear on the graph. The next LOAD POINTS command asks you

DO YOU WANT TO CLEAR THE CURRENT DATA?

Type Y and the data from SET2 are thrown out, the data from SET1 are placed back in the work file, and the axes remain on the screen. The DRAW BAR 2 command tells the program that you are going to place two sets of data on the graph, using two bars per label. (The second draw bar command does not need the 2.)

Here is a graph that was drawn using the above commands (preceded by the command, SET DEVICE CONSOLE 1, to cycle through five colors).

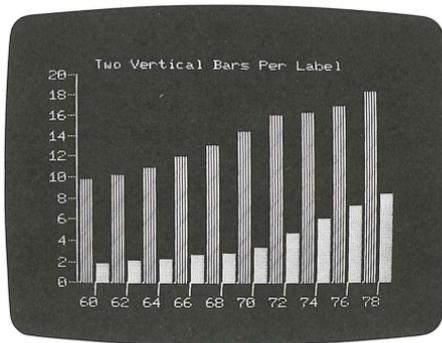


Figure 7-16. Two Vertical Bars Per Label

When you draw more than one set of bars on the same graph, the program uses its normal method of cycling through colors. To get additional contrast, you can set the colors or the filling yourself.

### Bar Graphs with Numerical Axes

Because points are not necessarily evenly distributed on an axis (whereas labels are), bar graphs that have numbers on the horizontal axis may have overlapping bars. The program uses the same formula to determine the size of each bar: the width of each bar is a little less than the length of the axis divided by the total number of bars to appear on that axis. Here is a bar graph that displays such an overlap.

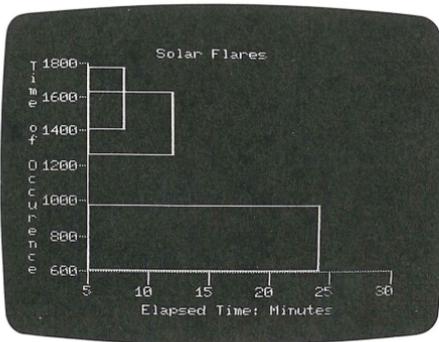


Figure 7-17. Overlapping Horizontal Bars

## Drawing Areas

You can draw a filled in area on a graph using the command

`DRAW AREA`

This command fills in the area between the coordinate  $\emptyset$  on the vertical axis and an imaginary line connecting all the points in the work file. If there is no coordinate  $\emptyset$  on the vertical axis, the area between the imaginary line and the horizontal axis is filled.

For example, to create the following graph, set the ranges like this:

```
CLEAR (answer Y if necessary)
SET HO RANGE  $\emptyset$  1 $\emptyset$ 
SET VE RANGE -1 $\emptyset$  1 $\emptyset$ 
```

Then use edit commands to enter the points

```
 $\emptyset$ ,2 $\emptyset$ 
1 $\emptyset$ ,1 $\emptyset$ 
```

and use the commands

```
DRAW AXIS (so you can set color of first area)
SET COLOR GREEN (a good color for contrast)
DRAW AREA
```

to fill in the graph. Next, use `EDIT POINTS` to create a work file containing these points

0,0  
5,10  
10,0

Then use the commands

SET COLOR WHITE (for better contrast)  
DRAW AREA

EDIT POINTS again, so the work file contains

0,-10  
10,-10

And then

SET COLOR GREEN  
DRAW AREA

For the last time, EDIT POINTS so the work file contains

0,0  
5,-10  
10,0

Then type

SET COLOR WHITE  
DRAW AREA

You should now see the graph shown in figure 7-18.

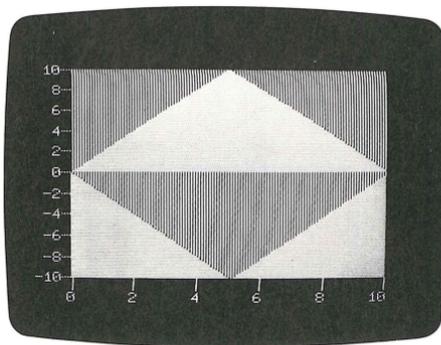


Figure 7-18. Contrasting Areas

# Drawing Pies

---

Apple II Business Graphics can also display information as a pie chart. You can place a pie on the screen (or whatever device is currently set) using the command

```
DRaw PIe (<number of colors> <total area> <aspect ratio>)
```

When you don't include any of the three modifiers, the program displays the data in the work file as a pie chart having one slice for each point in the work file. Each slice is labelled with that point's horizontal coordinate if there is room for it. The percentage of the pie that each slice occupies is determined by the vertical value of that slice's point divided by the sum of all the vertical values in the work file. If the points in the work file have labels as vertical coordinates, the points are assigned consecutive integers as values, starting with the value 1 for point 1.

If you have these points in the work file

```
JAN,10  
FEB,12  
MAR,15  
APR,6  
MAY,6  
JUN,11  
JUL,13  
AUG,10  
SEP,20  
OCT,19  
NOV,22  
DEC,25
```

and type the command

```
DR PI
```

The program draws the following graph (the colors were set to white and green for good contrast.)

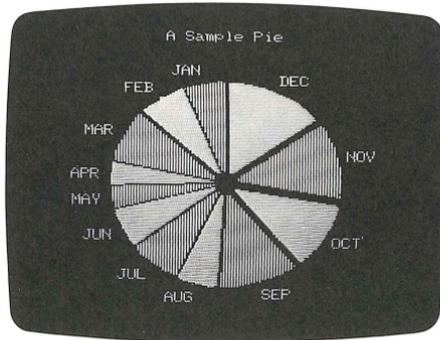


Figure 7-19. A Sample Pie

The only titles that you are able to place on a pie chart are general titles, the ones centered at the top of the chart, and floating titles, which you can place anywhere.

To get the labels printed inside the slices (if there is room for them), type

```
SET FILL OFF
```



The program does not ask you if you want to clear the screen when you give the DRAW PIE command. If you don't want to lose a screen, make sure that you save it before you draw a pie chart.

## Controlling the Colors

To set the color of each slice, you must include the <color count> modifier. You might want to use this, for example, if there is an odd number of slices in the pie chart and the program is alternating between two colors, with the result that the first and last slices are drawn in the same color.

For example, the pie in the previous section was actually drawn using the commands

```
DR PI 2
SET COLOR WHITE
DR PI
```

After you enter the DR PI 2 command, the program uses one color to

draw every other slice of the pie, and then waits for you to enter another DRAW PIE command. The next time you enter the DRAW PIE command, you don't have to specify the <color count>.



You must use the <color count> modifier, for example, to stop the program between colors when you are using a plotter whose pen must be changed.

## Pies with Slices Missing

If the points in the work file are only part of a larger set of data, and you want to leave a portion of the pie empty, you can use the <total area> modifier. If you use the <total area> modifier, you must also use the <color count> modifier; the colors alternate normally if you use a <color count> of 0.

The value of <total area> replaces the sum of the vertical values in the calculation of the pie slice sizes. Thus, if the vertical values in your pie add up to 169, as they do in the set of points used above, and you specify a <total area> of 200, then 31/200ths of the pie are left blank, as below.

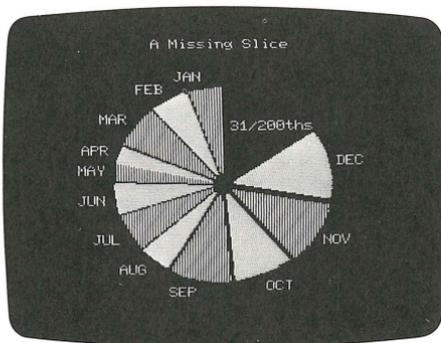


Figure 7-20. Pie with 31/200ths Missing

## Aspect Ratio

The aspect ratio determines how round the pie chart looks. Some pies that look round on the screen, look oval when printed on a Silentyper (and vice versa). An aspect ratio of 2 is wider than it is tall; a value of .5 is taller than it is wide. If the screen version or printed version of pie charts don't look round enough for you, change the aspect ratio. For example, use the following commands to print a rounder pie on the Silentyper:

## Placing Titles on the Graph

---

Apple II Business Graphics can put four different types of titles on a graph:

- general
- horizontal
- vertical
- floating

A general title is centered at the top of the graph; a horizontal title is centered at the bottom of the graph, a vertical title is centered to the left of the graph, and floating titles can be placed wherever you want.

Any of the four types of titles can be written in capital and lowercase letters, and they may contain any of the special characters described in the section on the keyboard. The following sections describe how to create all four types of titles. They also explain you how to save these titles on a diskette.

### The General Title

You create a general title using the command

```
SEt Title <title>
```

If the title is only one word long, it need not be enclosed in quotes. If it is more than one word long, you can surround it with single or double quotes.

If there is no image on the screen when you type SET TITLE, nothing will be drawn, but the new title is stored in the work file. If there is an image on the screen, the program erases the old title, and centers the new title at the top of the screen.

There is room at the top of the screen for a title containing as many as 4Ø characters. If the title contains 4Ø characters, the leftmost character may be covered by the vertical title. A title with 39 characters will always be displayed in its entirety. If your title is longer than 4Ø characters, the centered title will be missing characters, or parts of characters, at both ends.

Here is a graph with a general title.

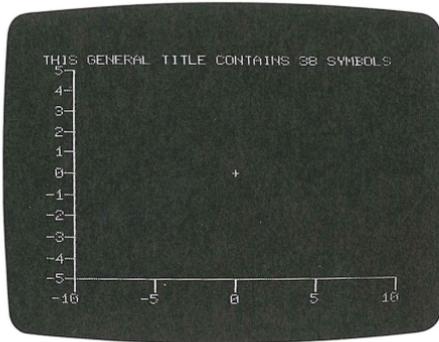


Figure 7-21. A Long General Title

## Viewing a General Title

You can see what the general title is set to using the command

```
LIst SEttings (<file>)
```

If you don't specify a file, the settings are displayed on the screen. This command causes the general title, as well as all the other settings, to be displayed on the screen.

## Clearing a General Title

You can remove the general title from the screen and the work file using the command

```
CLear Title
```

## Horizontal Titles

The horizontal title is used to label the units on the horizontal axis of a graph. You set a horizontal title using the command

```
SEt Horizontal Title <title>
```

The <title> must be enclosed in single or double quotes unless it is only one word long. A horizontal title is placed at the bottom of the screen, centered not in the middle of the screen, but in the middle of the horizontal axis. A horizontal title may contain up to 40 characters. If it contains this many characters, the leftmost

character may be covered by the vertical title. A horizontal title with 39 characters will always be displayed in its entirety.

## Viewing a Horizontal Title

You can see what the horizontal title is set to using the command

```
LIst SETtings
```

or the command

```
LIst Points
```

The LIST SETTINGS command causes the general title, as well as all the other settings, to be displayed on the screen.

The LIST POINTS command causes the horizontal title, the vertical title, and the points in the work file to be displayed, in that order, on the screen

## Clearing a Horizontal Title

You can remove the current horizontal title from the work file and the screen using the command

```
CLear Horizontal Title
```

## Vertical Titles

The vertical title is used to label the units on the vertical axis of a graph. You set a vertical title using one of the commands:

```
SEt Vertical Title <title>
```

The <title> must be enclosed in single or double quotes unless it is only one word. A vertical title is placed at the left of the screen, centered not in the middle of the screen, but in the middle of the vertical axis. A vertical title may contain up to 21 characters. If it contains this many characters, the top and bottom characters may be covered by the general and horizontal titles, respectively. A vertical title with 19 characters will always be displayed in its entirety.

## Viewing a Vertical Title

You can see what the vertical title is set to using the command

```
LIst SETtings
```

or with the command

```
LIst Points
```

The LIST SETTINGS command causes the general title, as well as all the other settings, to be displayed on the screen. The list settings command will be discussed in further detail later.

The LIST POINTS command causes the horizontal title, the vertical title, and the points in the work file to be displayed on the screen in that order.

## Clearing a Vertical Title

You can remove the current vertical title from the work file and the screen using the command

```
CLear Vertical Title
```

## Floating Titles

A floating title is a title that you can place anywhere on the screen. You can determine the position of a floating title in two different ways: with a set of positioning keys, or by specifying coordinates. The horizontal and vertical commands take the form:

```
SEt horizontal FLOating Title <title> (<x> <y>)
```

```
SEt Vertical FLOating Title <title> (<x> <y>)
```

If the title you want to place on the screen is one word, it need not be enclosed in quotes. If the title has spaces in it, you can use either single or double quotes -- as long as you use the same type of quote at the beginning and the end of the title.

If you want to position the title using positioning keys, then you don't need to include x and y coordinates in the command. All the following commands will let you position the title:

```
SE FL TI 1982
```

```
SET HORIZONTAL FLOATING TITLE 'HAROLD "BUD" JOHNSON'
```

```
SET VER FL T "JOHN'S INCOME"
```

## Positioning Keys

When you type in a floating title command, the program places a rectangular box the same height and width as the <title> in the center of the graphics screen. You can use either the U, D, R, L keys or the I, M, K, J keys to move the "floating" box up, down, right, or left respectively. These keys are summarized below.

To move the box	Press	or	Press
up	U		I
down	D		M
left	L		K
right	R		J

The first time you press a direction key the box moves one dot in the direction you indicate; the distance the box moves doubles each consecutive time you press that key. If you press a different key, the distance of motion returns to one.

When you have placed the box where you wish the floating title to appear, press the RETURN key. The title appears where the box used to be. If you decide that you don't want to place the title on the screen, press the key labelled ESC, and the box will go away. When the program places the title on the screen, it sends the coordinates of the title to the command screen in the form

POSITION: XX.XXXX YY.YYYY

in which XX.XXXX and YY.YYYY are the horizontal and vertical coordinates of the title, respectively. The next section explains how to interpret these coordinates.

## Floating Title Coordinates

Floating title coordinates designate a title's exact position on the screen. Both coordinates can have any value between 0 and 100. The screen's coordinates are illustrated below.

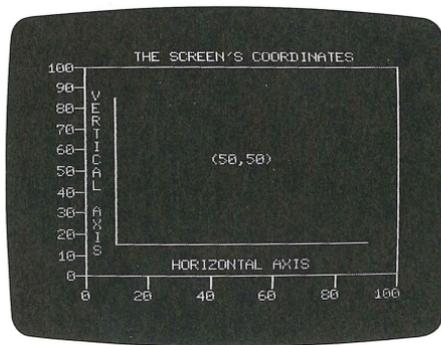


Figure 7-22. The Screen Coordinates

The coordinates of a floating title indicate the position that the lower left corner of the title will occupy on the screen.

## Removing Floating Titles

The only way to remove a floating title is to position a string of blanks the same length as the title over that title. If you remember the coordinates of the title, you can position the string of blanks perfectly. If not, it may take several attempts to erase the title completely.



You can't remove a floating title that has been printed by a plotter.

## Saving Floating Titles

Floating titles are not saved in points files, labels files, or setting files. If you want to preserve an exact copy of a graph, including floating titles, save it in a screen file. If you intend to use the same floating titles on a future graph, you must record the coordinates of each floating title, and then either type the floating titles commands in each time you want to use them, or place the floating title commands into a take file to be used as often as you like. Take files are described in their own chapter.

## Floating Titles with Plotters

The rectangular box that appears on the screen when you are positioning a floating title does not appear on an external device such as a plotter. The position of the print mechanism indicates the current position of the left hand corner of the box. Pressing the letter F causes the print mechanism of the device to outline the box without actually printing it. This feature lets you see the amount of space that the label would require if printed.



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## Chapter 8

# Manipulating the Data

This chapter describes the Apple II Business Graphics commands for performing business functions and mathematical operations on and with the data in the work file and in other data files. The sections of this chapter explain the commands for three categories: Changing the Data, Drawing Curves, and Business Functions.

## Getting Help

---

This chapter's information is summarized in a set of HELP screens, which you can see by typing the commands: Help MATH, Help CURVES, and Help BUSINESS. The first of these is the command

Help MATH

This command displays a summary of the program's commands that perform mathematical operations on data in a file. Figure 8-1 lists the commands displayed by Help MATH, showing both the uppercase form and the general form.

SWAP  
SWap

SHIFT <direction> <number>  
SHift <direction> <number>

ADD <number>  
ADd <number>

ADD <file>  
ADd <file>

DIFFERENCE  
DIFFerence

DIVIDE BY <number>  
DIVide by <number>

DIVIDE BY <file>  
DIVide by <file>

DIVIDE INTO <number>  
DIVide Into <number>

DIVIDE INTO <file>  
DIVide Into <file>

MULTIPLY BY <number>  
Multipl y by <number>

MULTIPLY BY <file>  
Multipl y by <file>

SUBTRACT <number>  
SUBtract <number>

SUBTRACT <file>  
SUBtract <file>

SUBTRACT FROM <number>  
SUBtract From <number>

SUBTRACT FROM <file>  
SUBtract From <file>

SUM  
SUM

Figure 8-1. Help Math Commands

The second help screen is

### Help CURVES

This command displays a summary of the program's commands that approximate the trend of the data, show the equations for the curves, and place the curves on a graph. Figure 8-2 lists the commands displayed by Help CURVES, showing both the uppercase form and the general form.

FIT <curve name>

Fit <curve name>

FIT SINE <low> <high>

Fit Sine <low> <high>

SET CURVE <curve name> <C1> (<C2>) (<C3>)

Set Curve <curve name> <C1> (<C2>) (<C3>)

LIST CURVE <file>

List Curve <file>

DRAW CURVE (DASH)

Draw Curve (Dash)

#### EQUATIONS FOR CURVES:

Constant:  $Y = C1$

LIne:  $Y = C1 * X + C2$

LOgarithm:  $Y = C1 * LN(X) + C2$

Parabola:  $Y = C1 * X^2 + (C2 * X) + C3$

Sine:  $Y = C1 * SIN(C2 * X) + C3$

Figure 8-2. Help Curves Commands

The third help screen is

### Help BUSINESS

This command displays a summary of the program's commands that help analyze your data. Figure 8-3 lists the commands displayed by Help BUSINESS, showing both the uppercase form and the general form.

```
DISTRIBUTE <step size>
DIStribute <step size>

GENERATE POINTS (<from> <to>) (<step size>)
Generate Points (<from> <to>) (<step size>)

SMOOTH MOVING AVERAGE <past periods> <future periods> <from>
SMOoth Moving Average <past periods> <future periods> <from>
```

Figure 8-3. Help Business Commands

## Changing Data

---

Apple II Business Graphics has several commands for modifying all the points in the work file. The commands that operate on numerical data can only operate on numbers that are on the vertical axis. The command that operates on labels can only be used on horizontal labels. So, we describe first a command that lets you interchange the two axes.

### Swapping the Axes

Apple II Business Graphics' mathematical operations can only be used on numerical information that is on the vertical axis. If you want to perform an operation on data that is on the horizontal axis, you must use the command whose general form is

SWap

The SWAP command exchanges the points, labels, titles, ranges, and label lengths on the x axis with those on the y axis. After you perform the necessary operations on the data, you can use the SWAP command to return the modified data to the horizontal axis.

The screen must be clear before Apple II Business Graphics will execute this command. If the screen is not clear, the program beeps and asks you the question

DO YOU WANT TO CLEAR THE SCREEN?

Answer Y or N without pressing the RETURN key.

With a pie chart, the sizes of the slices of the pie are determined by the values on the y axis. If you SWAP labels onto the y axis, and then use the DRAW PIE command, the resulting image may not be what you expected to see.

## Shift

The SHIFT command moves all the points in the work file left or right a specified number of horizontal labels. After you type SHIFT, the horizontal labels are unchanged, but each label has new values.

To use this command, type one of the following.

```
SHift Right <number>
SHift Left <number>
```

You can shift points any reasonable positive number of labels to the left or right. For example, if you the work file contains 20 points, you probably would want to shift 20 or fewer labels to the left or right.

Here are three situations in which you might use the SHIFT command:

1. Suppose you've entered a long data file and skipped an entry value somewhere, throwing most of your data off by one label. A SHIFT command can assign most of the values to the proper labels.
2. Suppose you have a points file containing data for January 1979 through December 1980, stored as horizontal labels and vertical values. Everything is on an upward trend. To compare 1979's performance with 1980's performance, set the horizontal range to JAN-79 through DEC-79 and then give the DRAW MARKS command. Then type SHIFT LEFT 12 followed by another DRAW MARKS command. Your graph now displays comparative performance, month by month, for both years. Since Apple II Business Graphics alternates the mark it uses on succeeding DRAW MARKS commands, each year's data is represented by a distinct mark.
3. Suppose you have two points files both having months as labels on the horizontal axis. One of the files contains advertising expenses; the other, sales revenues. Typically, advertising costs precede sales revenues by a month or two -- let's assume two. Load and plot the advertising costs, then load the sales revenue points, shift them two labels to the left, and plot them. Your graph now displays the relationship between costs and revenues in the same time period.

## An Example of Shift

This example assumes that there is a file DATA:EDIT, containing six points. With the DATA: diskette in drive 2, draw a graph using these commands:

<u>Command</u>	<u>Effect</u>
CLEAR	(if necessary, answer Y to clear data)
LOAD DATA:EDIT	(bring the points into the work file)
DRAW MARKS	(plot the points on the screen)

The screen should contain this image:

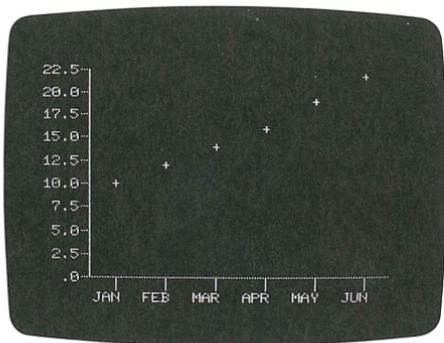


Figure 8-4. Before SHIFT

You are going to shift the data over two months, so edit the horizontal labels to include the months JUL and AUG as shown in Figure 8-5.

```
-->
-->
-->
-->
--> CLEAR
--> LOAD DATA:EDIT
0. LABELS LOADED
0. POINTS LOADED
--> DRAW MARKS
--> EDIT HORIZONTAL LABELS
DO YOU WANT TO CLEAR THE SCREEN? Y
1. JAN ?
2. FEB ?
3. MAR ?
4. APR ?
5. MAY ?
6. JUN ?
7. JUL ?
8. AUG ?
9. END ?
00. LABELS LOADED
-->
```

Figure 8-5. Editing Labels to Include JUL and AUG

Finally type the following commands to display the shifted and unshifted data on the same graph:

```
CLEAR SCREEN
SET HORIZONTAL RANGE JAN AUG
DRAW MARKS
SHIFT RIGHT 2
DRAW MARKS
```

The screen should now show the following image:

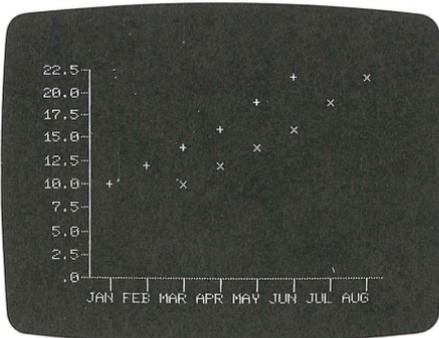


Figure 8-6. Shifted and Unshifted Data

## Add

With the ADD command, you can add a constant to the vertical value of each point in the work file, or you can add the vertical values from another file to the corresponding values in the work file. To add a constant to each vertical value, type

```
ADD <number>
```

The number added may be a real number or an integer. The vertical values in the work file are all increased by <number>.

To add the vertical values from a specific file to the corresponding work file values, use the command

```
ADD <file>
```

## Examples of Add

Let's look at some examples of the use of the ADD command. Suppose that the work file contains these points

```
JAN 10
FEB 15
MAR 20
```

and you type the command

```
ADD 7
```

The work file values become

```
JAN 17
FEB 22
MAR 27
```

Now suppose that there is a file on the DATA diskette that is named GYRE. This file contains the points

```
JAN 2
FEB 3
MAR 4
APR 12
```

Add the values in this file to the values in the work file using the command

```
ADD DATA:GYRE
```

The values in the work file become

```
JAN 19
FEB 25
MAR 31
```

Because the work file did not contain a point with the horizontal label APR, the point APR 12 did not affect the work file's contents.

## Difference

The DIFFERENCE command assigns to the vertical value of each point in the work file the difference between that point's value and the previous point's value.

The general form of this command is

```
DIfference
```

The DIFFERENCE command has the opposite effect of the SUM command, which is described later in this chapter.

## Using Difference

To see how the DIFFERENCE commands works, let's suppose you have the following values in the work file:

```
JAN 10
FEB 12
MAR 14
```

If you type the DIFFERENCE command, the following new values are created:

```
JAN 1Ø
FEB 2
MAR 2
```

The value for JAN does not change because it has no preceding point. FEB is assigned the value of FEB minus the value of JAN, or 2. MAR becomes 2 for the same reason.

## Divide By

This command lets you divide the vertical value of each point in the work file by a constant or by the vertical value of the corresponding point from a specified file. To divide the work file values by a constant, type a command of the form

```
DIVide by <number>
```

The value of <number> is your divisor, the number by which all vertical values in the work file are divided.

You can also use the DIVIDE BY command to divide each point in the work file by the value of the corresponding point in a specified file. This use of the command takes the form

```
DIVide by <file>
```

Any points in the named file not having corresponding points in the work file are ignored.

## An Example of Divide By

Suppose you have the following points in the work file:

```
JAN 1Ø
FEB 15
MAR 25
```

and you type the command:

```
DIVIDE BY 1Ø
```

Your new values become:

```
JAN 1
FEB 1.5
MAR 2.5
```

If you now type in the command

```
DIVIDE BY SALES:MONTH3
```

where SALES is the volume name of the diskette on which the MONTH3 file is stored, and the MONTH3 file contains the following data:

```
JAN 3
FEB 8
MAR 10
```

The vertical values in the work file become:

```
JAN      .333333
FEB      .1875
MAR      .25
```

The value for JAN is .333333, because the work file value of JAN was 1 and the value of JAN in the MONTH3 file was 3, giving the new value of  $1/3 = .333333$ .

## Divide Into

The command DIVIDE INTO can assign to the vertical value of each point in the work file the result of dividing the value of a constant by the vertical value of that work file point, or the result of dividing the vertical value of each corresponding point in a specified file by the value of that work file point.

To assign to each vertical value in the work file the result of dividing the value of a constant by the value of that work file point, use a command of the form

```
DIVIDE INTO <number>
```

To assign to each vertical value in the work file the result of dividing the value of each corresponding point in a specified file by the vertical value of that work file point, use the command

```
DIVIDE INTO <file>
```

## An Example of Divide Into

For example, if the values in the work file are JAN 10, FEB 15, and MAR 25, and you type

```
DIVIDE INTO 4
```

each point in the work file is assigned the result of 4 divided by the old vertical value of that point. The work file points become

```
JAN .4
FEB .2666667
MAR .16
```

The value for JAN is 0.4, because 4 divided by 10 is 0.4, and so on.

As an example of dividing the vertical values of points in a file by the corresponding vertical values in the work file, assume there is a file named SALES:COST whose contents are JAN 10, FEB 12, and MAR 14. If the work file contains the values JAN 10, FEB 15, and MAR 25, and you type the command

```
DIVIDE INTO SALES:COST
```

the points in the work file are assigned the values

```
JAN 1  
FEB .8  
MAR .56
```

because dividing 10 into 10 equals 1; dividing 15 into 12 equals 0.8, and dividing 25 into 14 equals .56.

Points in the specified file that do not have corresponding points in the work file are ignored.

## Multiple By

With the MULTIPLY BY command, you can multiply the vertical value of each point in the work file by a constant or by the value of the corresponding point from a file.

To multiply the vertical value of each point in the work file by a constant, type the command in the form

```
Multiply by <number>
```

The number used in the MULTIPLY BY command can be a real number or an integer.

To multiply the value of each vertical value in the work file by the value of the corresponding point in another file (if there is one), type the command in the form

```
Multiply by <file>
```

## An Example of Multiple By

Here is an example of the MULTIPLY BY command. Suppose the work file contains these values:

```
JAN 10  
FEB 15  
MAR 25
```

Type the command:

```
Multiply .2
```

(which is the same as dividing by 5). The points in the work file become:

```
JAN 2
FEB 3
MAR 5
```

To multiply each value in the work file by the corresponding value in a file named DATA:INTEREST, that contains the points

```
FEB 1.176
MAR 1.174
APR 1.179
```

type

```
Multiply DATA:INTEREST
```

The work file values become:

```
JAN 2
FEB 3.528
MAR 5.87
```

The JAN point is unchanged because there was no point in DATA:INTEREST having JAN as a label. FEB and MAR had matching labels, so the the work file values for these points did change. There was no value in the work file having the label APR, so the point with the horizontal label APR was ignored.

## Subtract

With the SUBTRACT command, you can reduce the vertical value of each point in the work file by a constant or by the value of the corresponding point from another file.

To use the SUBTRACT command, type

```
SUBtract <number>
```

The vertical values will all decrease by <number>, which may be a real number or an integer.

To subtract the value of corresponding points in another file from each vertical value in the work file, type the command

```
SUBtract <file>
```

As with all the arithmetic commands, only the vertical values that have corresponding values in <file> are affected.

## Subtract From

Using the SUBTRACT FROM command, the vertical value of each point in the work file can take on the value of that point subtracted from a constant, or it can take on the value of that point subtracted from the corresponding vertical values in a file.

To use the SUBTRACT FROM command to subtract the vertical values in the work file from a constant, type

```
SUBtract From <number>
```

To reduce each vertical value in the work file by the value of the corresponding point from a file (if there is one), type the command:

```
SUBtract From <file>
```

Again, for the value of a work file point to change, the named file must contain a point having a corresponding horizontal label.

## Sum

The SUM command causes each value in the work file to be replaced by the sum of that point and all the points preceding it.

To use this command, type

```
SUM
```

## An Example of Sum

Assume the following points are in the work file

```
JAN 10  
FEB 15  
MAR 22  
APR 30  
MAY 35
```

If you type the SUM command, these values become:

```
JAN 10  
FEB 25  
MAR 47  
APR 77  
MAY 112
```

You can use the DIFFERENCE command to return all the points to their old values.

# Curves

---

This section describes how you can use Apple II Business Graphics to generate curves and place them on a graph. The program can scale and position any one of five different curves to best fit the points that are currently in the work file. After doing this, the program prints a number on the command screen that estimates how well the curve fits the data. Once you find the curve that fits your data best, you can place this curve on your graph or use this curve to make a prediction of future points.

Apple II Business Graphics also has a command that lets you set the "coefficients" of any of the five curves; using it, you can draw curves that are unrelated to the data in the work file.

These commands and the descriptions of all the different types of curves are given in the following sections.

Apple II Business Graphics can generate and draw five different types of curves: constant, linear, logarithmic, parabolic, and sinusoidal. Descriptions and equations for the different curves are given below.

## The Constant Curve

The constant curve is a horizontal line that crosses the vertical axis at the value of its coefficient. The general equation of a constant curve is

$$Y = C1$$

This means that for every position on the x axis, the y axis has the value of the constant, C1.

When you fit a constant curve to a set of data, the resulting line represents the mean vertical value of all the points in the work file.

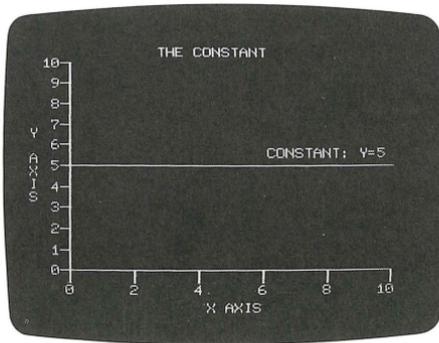


Figure 8-7. The Constant Curve

## The Line

The line, unlike the constant curve, is not necessarily horizontal. The general equation of a line is

$$Y = C_1 \times X + C_2$$

The value of  $C_1$  affects the steepness of the line. The value of  $C_2$  determines the line's vertical position. Here is an example of some lines. Note the relationship between  $C_1$ ,  $C_2$ , and the line they define.

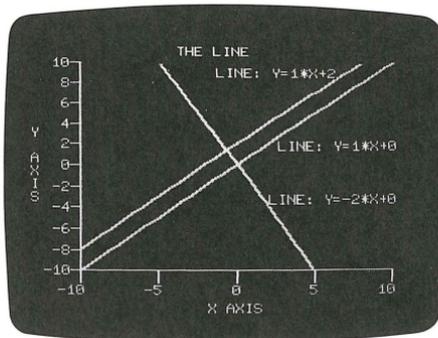


Figure 8-8. The Line

A line can represent a trend if the values on the x axis are time increments. This line may also be referred to as a simple regression line. The x-axis values represent the independent variable, and the y-axis values, the dependent variable.

## The Logarithmic Curve

A logarithmic curve is a decreasing or increasing curve that changes at an ever-decreasing rate. The general formula of a logarithmic curve is

$$Y = C1 \times \text{LN}(X) + C2$$

in which C1 and C2 are constants, and

$$\text{LN}(X) = Z$$

for

$$e^Z = X$$

in which  $e = 2.71828$ , C1 determines the direction and steepness of the curve, and C2 determines the curve's vertical position. Here are some examples of logarithmic curves.

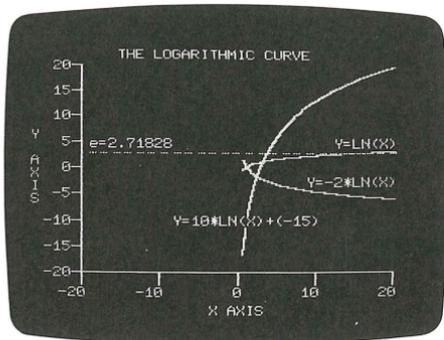


Figure 8-9. The Logarithmic Curve

## The Parabola

A parabola is a second-order function (one in which the y value is determined by the square of the x value as well as the x value itself) that is shaped like a rope hung between two posts. The general equation for a parabola is

$$Y = C1 \times X^2 + (C2 \times X) + C3$$

In general, C1 determines the steepness and direction of the parabola. The  $(C2 \times X) + C3$  portion of the equation is the equation of a line. Every point of the parabola determined by C1 is added to the corresponding point of this line to produce the final parabola. Here are some sample parabolas.

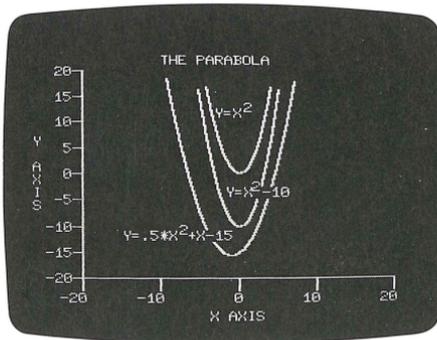


Figure 8-10. The Parabola

## The Sine Curve

A sine curve is a wave form with a specified height and a specified period (the distance on the x axis of one repetition of the wave). The general equation for a sine curve is

$$Y = C1 \times \text{SIN}(C2 \times X) + C3$$

In which C1, C2, and C3 are constants. C1 determines the height of the wave, C2 determines the period of the wave, and C3 determines the wave's vertical offset. Here are a few sample sine curves.

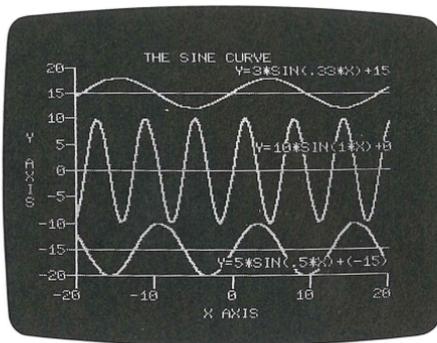


Figure 8-11. The Sine Curve

## Fitting a Curve

The FIT command is used to match the shape of a curve to the data in the work file. This command finds the coefficients that make the specified curve most closely approximate the pattern of the data in the work file.

Using these coefficients, the FIT command uses the normalized standard error equation to estimate how closely this curve fits the data. Apple II Business Graphics then displays an estimation of the closeness of fit on the command screen.

The FIT command, like the other mathematical operators, only works if there are numeric values on the vertical axis. The general form of the command is

```
Fit <curve name>
```

for which <curve name> can be Constant, Line, Logarithm, or Parabola.

## Fitting a Sine Curve

The command to fit a sine curve to the data requires that you specify the range on the x axis to which one period of the sine curve is fitted. The general form of the FIT SINE command is

```
Fit Sine <from> <to>
```

in which <from> and <to> are labels or numbers on the x axis, with <from> less than <to>.



The Normalized Standard Error is determined by dividing the deviation of the points from the curve by the deviation of the points from the average (the standard deviation). The equation is

$$\text{N.S.E.} = \frac{\sqrt{\frac{\sum_{i=1}^N (Y_i - \hat{Y}_i)^2}{N}}}{\sigma}$$

## List Curve

To see the coefficients that the program used when it performed the last FIT CURVE command, use the command

```
List Curve
```

For example, if the last FIT CURVE command was to fit a parabola to the data in figure 8-12, then LIST CURVE has the following results

```
-->LIST CURVE
PARABOLA: Y=-.589285*X^2+6.75357*X+5.3
```

This means that the parabola's three coefficients are

```
C1 = -.589285
C2 = 6.75357
C3 = 5.3
```

## Set Curve

Use the SET CURVE command to create an image of a curve without using the data points in the work file. You can use this command with any of the five types of curves already described. The general form of this command is

```
SEt CURve <curve type> <C1> (<C2>) (<C3>)
```

The number of constants needed to generate each type of curve is given in the following table of equations. The descriptions of each type of curve were given earlier in this chapter.

Curve Name	# Constants Required	Equation
CONSTANT	1	$Y = C1$
LINE	2	$Y = C1 \times X + C2$
LOGARITHM	2	$Y = C1 \times \text{LN}(X) + C2$
PARABOLA	3	$Y = C1 \times X^2 + C2 \times X + C3$
SINE	3	$Y = C1 \times \text{SIN}(C2 \times X) + C3$

## Drawing a Curve

You can draw the last curve that you fit or set using the command

DDraw Curve (Dash)

If you don't use the Dash modifier, the program draws the curve as a solid line. If you have a color monitor, you can set the color of the line or dash to be drawn, and the type of dash to be drawn.

After you have fit several curves to see which one best approximates your data, refit the curve you want and then give the DRAW CURVE command. For example, if you give the commands

DRAW MARK  
DRAW CURVE

after doing the curve fitting example above, the program draws the data in the work file as a set of points, and then draws a parabola with a solid line as shown in figure 8-13.

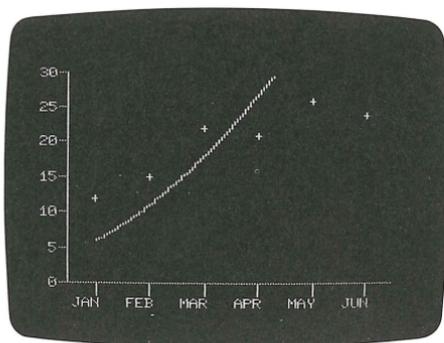


Figure 8-13. A Fitted Parabola

Now that you know how to fit a curve to the points in your work file, you can use this curve to make a forecast of the future points in the data set.

## The Business Functions

Apple II Business Graphics has three different business functions with which you can analyze and forecast your data. The `DISTRIBUTE` command shows you the percentage of data points within specified intervals on your graph; the `GENERATE` command finds the values of points that lie on the last curve that you `FIT` or `SET`; and the `SMOOTH` command lets you use an unweighted average to smooth your data.

### Distribute

The `DISTRIBUTE` command generates a new set of values: each value represents the percentage of the data points that lie within an interval on the vertical axis. The `DISTRIBUTE` command takes the form

```
DIStribute (<interval size>)
```

If you do not specify an `<interval size>`, the program picks a size for the intervals. Typical interval sizes are one, two, five, ten, and so on, depending on the magnitude of the values on the vertical axis. When you specify the `<interval size>`, the program chooses a convenient starting point for the first interval.



The original data are destroyed when you use the DISTRIBUTE command. If you want to preserve the data in the work file, SAVE it before giving the DISTRIBUTE command. Also note: to try different interval sizes, you must LOAD the original data each time you DISTRIBUTE.

## An Example of Distribute

The file DATA:PRIME contains prime rate data for 1979 - 1980. Let's use DISTRIBUTE to see what percentage of the year the prime rate spent within intervals that are two prime points wide. Use the following commands to display the prime rate data on the screen.

```
CLEAR
LOAD DATA:PRIME
DRAW LINE
SET TITLE "PRIME RATE"
```

The graph on your screen should look like this:

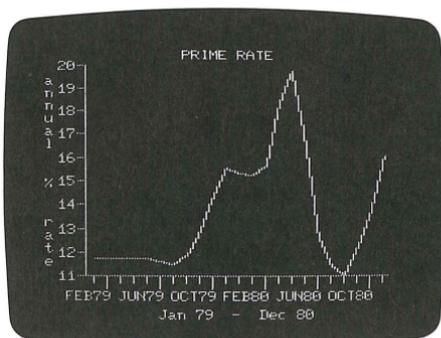


Figure 8-14. Prime Rate Data for 1979 - 1980

Use the following commands to get a graph of the distribution of this prime rate data:



Then, using the GENERATE POINTS command, you can generate the values on the curve that correspond to NOV and DEC. When you use this command, the points that are currently in the work file are thrown away, and the generated points replace them. This command works differently if there are labels on the horizontal axis than if there are numbers on the horizontal axis.

## With Horizontal Labels

If the horizontal axis has labels on it, the GENERATE POINTS command takes the form

```
Generate points (<from> <to>)
```

If you don't use the <from> and <to> modifiers, the program generates one vertical value for each of the labels within the current range.

If you use <from> and <to>, the program generates one value for each point in the range <from> to <to>. The range <from> to <to> need not fall within the range that is currently set. For example, if the horizontal range is currently set to JAN through JUN, but there are labels for JAN through DEC in the work file, you can generate points for the interval JUL through OCT using the command

```
GEN P JUL OCT
```

## With Horizontal Values

If the points in the work file have numbers on the horizontal axis instead of labels, the GENERATE command takes the form

```
Generate points <from> <to> (<step size>)
```

With numbers on the horizontal axis you must specify the starting and ending points using the <from> and <to> modifiers. There are no limits on the values that <from> and <to> can have.

Unless you specify a <step size>, the interval between two generated points, the program generates 20 points. If you do specify a <step size>, the number of points generated is

$$(\langle to \rangle - \langle from \rangle) / \langle step \ size \rangle$$

rounded down to the nearest integer.

The first point the program generates is at <from>, the second point is at <from> + <step size>, and so on. For example, if your horizontal axis has values between 0 to 10, and you type the command

```
GEN P 1 9 2
```

the program generates points for all the odd values between 0 and 10.

## Generate Points onto Labels

This example leads you through a typical example of the GENERATE POINTS command. It shows you how to FIT a line to a set of data points, and then how to use the line as an indicator of future performance. We will generate two points that lie on this line.

First use the EDIT command to enter the following points into the work file:

```
JAN 3
FEB 4.5
MAR 6.3
APR 5.1
MAY 7
JUN 8.5
JUL 9.7
AUG 11.2
SEP 12.1
OCT 13
```

Notice that the vertical values fall between the values 3 and 15. Let's set the vertical range to 0 through 20 using the command

```
SET VE RA 0 20
```

This should leave enough room on the vertical axis for the generated points to be plotted. Before you can generate points for November and December, you must add these two labels using the command

```
ED LA
```

followed by the editing commands

```
APPEND NOV
APPEND DEC
```

Type END to leave the editor. Next set the horizontal range so that the graph has room for two more points using the command

```
SET HO RANGE JAN DEC
```

and then draw a line representing the existing points using the command

```
DRAW LINE
```

And you should see the following graph:

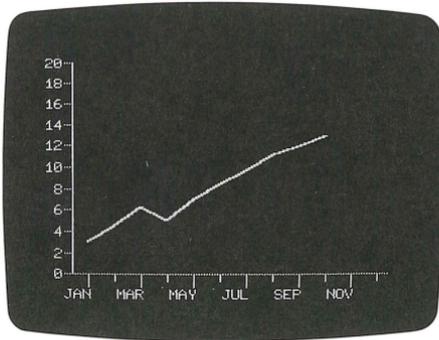


Figure 8-17. The Original Set of Data

Notice that the graph drawn has enough vertical and horizontal room for points above the labels NOV and DEC. To find the line that best approximates the data, use the command

FIT LINE

and the program finds that line for you. All that is left to do is to generate a couple of points, and display them on the screen. Do the former by typing

GENERATE POINTS NOV DEC

and two points are generated. You can see the values of these two points by typing

LIST

Notice that the old points are no longer there. Finally, place the generated points on the screen using the command

DRAW MARKS

## Generate Points onto Points

This time let's generate a set of points onto an axis that has numbers on the horizontal axis instead of labels. To place the equation for an exponential curve into the work file, use the command

SE CU LOG 1 3

The coefficients 1 and 3 have been chosen so that the curve doesn't rise too fast. Now generate a set of points that lie on the curve using the command

```
GEN P 1 5
```

This generates 20 points that lie in the interval 1 to 5 on the exponential curve. Remember that with values on the horizontal axis, you must specify the <from> and <to> values. Finally, place a graph of the generated points on the screen using the command

```
DRAW MARKS
```

The image on your screen should look like this.

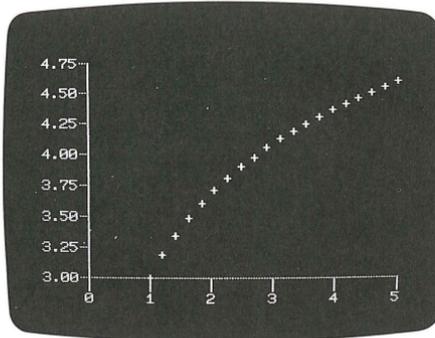


Figure 8-18. Generating a Logarithmic Curve

## A Note on Generate

The process you must go through to generate points can be a bit confusing. Before you can place the original set of data and the generated points on the same graph, you must allow enough room on both axes for the different sets of data. In Figure 8-17, we set the ranges using the SET RANGE commands.

Another method is to let the program set the ranges for you. For the program to be able to do this, both sets of data -- the original points, and the generated points -- must be in the work file at the same time. The example in the section, Drawing Bars, shows how this might be done. The general procedure is given below.

- Enter a set of points into the work file, using either EDIT or LOAD (data or points).
- If you entered the points using EDIT, SAVE the points. You will need them later.
- EDIT more labels onto the horizontal axis if necessary (to create room for generated points).
- Use SET CURVE or FIT CURVE.
- GENERATE a new set of points. (The original points are removed from the work file.)
- SAVE the generated points on a diskette.
- APPEND POINTS <original points> so that all the points that are to appear on your graph are in the work file.
- DRAW AXIS. This sets the ranges for both axes, allowing enough room for both sets of data.
- LOAD POINTS <original points>. This throws out all the points currently in the work file, but leaves the ranges set. It then enters the original points into the work file.
- DRAW the original points however you like.
- LOAD POINTS <generated points>. Replaces original points with generated points without changing the labels.
- DRAW the generated points however you like.

## The Smooth Command

The SMOOTH command is used to get an unweighted average of your data points. It is a common method of predicting future performance based on past data. For example, you could use the SMOOTH command to predict future inventory requirements from past sales performance. Another use might be a short-term stock market forecast for certain stocks.

## Smooth Moving Average

A moving average is used to obtain an unweighted average of the points in the work file. When you use the SMOOTH command, you specify the number of data points to be averaged to produce each smoothed point. The smoothed point can be assigned to any horizontal position between the first averaged point and the last averaged point. The program averages a set of points starting at the first point in the work file, or at a point you can specify, and generates a smoothed point, then it averages a set of points starting at the next point in the work file and produces a second smoothed point, and so on. The data points that are averaged together to get one smoothed point are named like this:

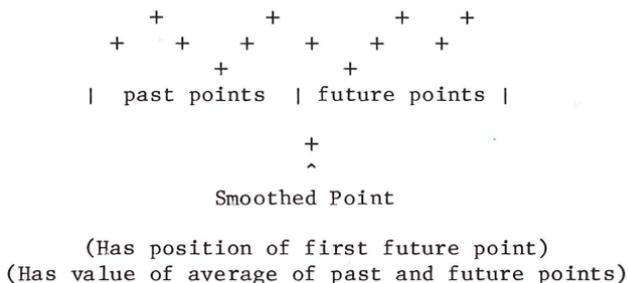


Figure 8-19. Smoothed Point

This diagram represents six past points and six future points averaged together to produce one smoothed point. The value of each smoothed point is assigned to the label (or coordinate) of the seventh point out of that set of 12.

The smooth command is given in the form

```
SMOOTH Moving Average <#past points> (<#future points> (<from>))
```

The number of points averaged to produce each smoothed point is

```
#past points + #future points
```

and the smoothed point generated is assigned to the label of the first future point. If you don't specify <#future points>, it is

assigned a value of  $\emptyset$ . In this case the smoothed point is the point after the last past point.

## An Example of Smooth Moving Average

This example uses the SMOOTH MOVING AVERAGE command to average out the high and low values of a stock's price, displaying a clearer image of the general trends of the stock's price. The example assumes that there is a file DATA:PRICE.

First clear the data from the work file and load in a set of data from the DATA: diskette using the commands

```
CLEAR (answer Y if needed)
LOAD DATA:PRICE
```

Now create a graph of the stock's prices using the command

```
DRAW LINE
```

For this example, we want each smoothed point to be the average of seven original points, and the smoothed point should have the position of the center point. Since the smoothed point is the first future point, we need 3 past points, and 4 future points to get this result. Give the command

```
SMOOTH MOVING AVERAGE 3 4
```

followed by the command

```
DRAW LINE
```

and you should see the following image of stock prices and the smoothed average of the stock prices.

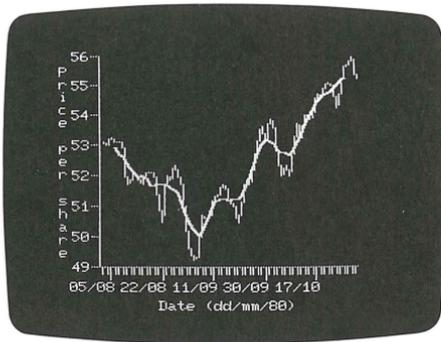


Figure 8-20. A Smoothed Graph



SMOOTH MOVING AVERAGE destroys the work file.



## Chapter 9

# Take Files

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# Chapter 9

## Take Files

Using the Apple II Business Graphics command `EDIT TAKE`, you can build a take file, a file that contains a series of Apple II Business Graphics commands. Then, using the `TAKE` command, you can execute all the commands in that file, as if you were typing them into the computer one at a time.

You would use a take file, for example, if you wanted to display a series of graphs or charts at a business meeting. The `WAIT` command lets you suspend the execution of the take file for a specified number of seconds, or until you press the `RETURN` key so that you can pace the display of graphs at the meeting.

Take files can also be used to place graphs on a plotter. If your plotter changes pens automatically, you can give the command to run the take file and then go away; when you return, your plot will be completed. If you must change the pens on your plotter, the `PRINT` command lets you place a message on the screen, notifying you that the program is waiting for you to change pens before it will go any further.



Because take files tend to be fairly long, we highly recommend that you set a virtual file before you edit a take file. Also, if a take file ends with a graphic image on the screen, that image stays on the screen until you press the `RETURN` key twice, which returns the system prompt to the screen.

## Getting Help

---

To see a summary of the commands in this chapter, type

```
Help TAKE
```

Figure 9-1 lists the uppercase and general command forms shown by `Help TAKE`.

```
EDIT TAKE (<file>)
Edit Take (<file>)

TAKE <file>
Take <file>

PRINT <message>
Print <message>

WAIT (<time>)
WAit (<time>)

COMMENT <comment>
COmment <comment>

LIST SETTINGS <file>
LIst Settings <file>
```

Figure 9-1. Help Take Commands

## Edit Take

---

To create a new take file or modify an existing one, use the EDIT TAKE command, which has the general form

```
Edit Take (<file>)
```

To create a new take file, do not mention a file in the command. When you type the command

```
E T
```

if you have any unsaved data in the work file, the program beeps and asks you

```
DO YOU WANT TO CLEAR THE WORKFILE?
```

Type Y if you want to throw away the contents of the work file. Type N if you want to save the contents of the work file.

The program displays the edit prompt

```
l:      ?
```

You can now use all of the normal edit commands to enter and modify the commands that you want to place in the take file.

If you name a file in the EDIT TAKE command, it must be a take file. The program loads that file into the work file, and positions the edit prompt at that take file's first command. You can then use all of the edit commands to modify the take file.

## Ending a Take File

---

When you have finished editing your take file, you must terminate the editing session using the END command. The END command for ending a take file is a little different from the END command for editing a points or labels file. The general form is

```
END (<file>)
```

or if you have the prefix set, the general form is

```
<prefix character>End (<file>)
```

If you are creating a new take file, you must specify a file name. If you are modifying an existing take file, you can omit the file name, and the take file is saved with its old name.

When you end a take file editing session, the program places a file of type TAKE onto a diskette. Use the command

```
LlSt CAtalog
```

to verify that your file was saved with the name and type that you wanted.

If you don't want to save the file, type

```
CLEAR  
END
```

## Entering Commands

---

Two system commands, CLEAR and APPEND, are also edit commands. To use CLEAR or APPEND as system commands in a take file, you must either abbreviate the commands or set a prefix and then enter CLEAR or APPEND without the prefix.

As you enter commands into a take file, the program checks each one to see if it is an edit command. If it is, the program executes it. The program does not check the syntax of anything that is not an edit command. Therefore, if you type an edit command incorrectly, it will be entered into the take file as a system command. Likewise, if you make a typing error in a command that you place in the take file, the program will not detect it.



Check all the commands in the take file for accuracy before you type the END command. If you don't notice an error while the take file is running, the take file could accidentally place incorrect data on a graph.

# Using a Take File

---

Once you have created a take file and stored it on a diskette, you can run it by typingd

```
Take <file>
```

The commands in the take file are executed sequentially, as if you were typing them from the keyboard.

You can stop the execution of a take file at any time by pressing the ESC key. The program sends the message

```
? ABORTING TAKE FILE
```

to the command screen and awaits your next command.

## Pausing During the Take File

---

You can make the take file stop temporarily at any time during execution by pressing the space bar. The program will resume execution of the take file when you press the space bar again.

Alternately, you can use the WAIT command to stop the execution of a take file. This is useful for the timing of presentations and for changing pens on a plotter. The WAIT command takes the form

```
Wait (<time>)
```

The <time> is the number of seconds that the program waits before continuing. If you don't specify a time in the command, the program places this message on the command screen

```
PRESS <RETURN> TO CONTINUE, <ESC> EXITS
```

and pauses until you press either the RETURN key or the ESC key.



While a take file is running, the program keeps the graphics screen on for the presentation. If a graphics screen is the last screen of the take file (i.e., if you don't put in a command that returns the command screen), the graphics screen stays frozen on the monitor. Press the RETURN key twice to unlock the graphics screen and return the system prompt to the screen.



If the graphics screen is being displayed at the time of the WAIT command, you will not be able to see the message sent to the command screen.

If you press the ESC key while the take file is running, the program beeps and displays the command screen and the message

```
? ABORTING TAKE FILE
```

## Printing Messages

---

If you want to place a message on the screen, for example, to remind someone to change the pen color on a plotter to blue, use the command

```
Print <message>
```

If the <message> is a single word long it need not be enclosed in quotes; otherwise, it may be in single or double quotes, as long as the same quote mark is used at the beginning and the end. For example, all the following PRINT messages are valid

```
P "PAUSING FOR 20 SECONDS"  
PR WAITING  
PRINT 'PUT BLUE PEN IN PLOTTER AND PRESS RETURN'
```

## Adding Comments to a Take File

---

You can place explanatory comments within the text of a take file using the command

```
COmment <comment>
```

The comment can be anything you want. Quotes aren't necessary.

## A Sample Take File

---

Here is an example of a brief EDIT TAKE session. In this example, you create a take file that draws a multicolor graph. This example assumes that you have some points with vertical values in the file DATA:POINTS. If you don't, you can create a file by this name, or you can use any points file that you have on a diskette. This example also assumes that you haven't previously set the prefix. (If you have, omit the PREFIX command from the session below.)

<u>Command</u>	<u>screen</u>	<u>Effect</u>
EDIT TAKE		
DO YOU WANT TO CLEAR THE WORKFILE?	Y	(answer Y)
1:	? PREFIX .	(set the prefix to ".")
1:	? CLEAR	(deferred until execution)
2:	? LOAD DATA:POINTS	(load points file)
3:	? DRAW LINE	
4:	? SET COLOR ORANGE	
5:	? MULTIPLY .6	(multiply points by .6)
6:	? DRAW LINE	
7:	? SET HORIZONTAL TITLE "HORIZONTAL TITLE"	
8	? COMMENT PLACE A FLOATING TITLE BY COORDINATES	
9:	? SET HORIZONTAL FLOATING TITLE "19.7 49.7" 19.7 49.7	
10	? COMMENT PAUSE FOR 20 SECONDS	
11:	? WAIT 20	
12:	? .END DATA:CHART1	(edit command needs prefix)

The take file you just created is stored in the file DATA:CHART1. To see how the take file works, type the command

TAKE DATA:CHART1

## Settings and a Take File

---

To put the current settings of the work file (the ranges; the horizontal, vertical, and general titles; and the label lengths) into a take file, type the command

LIST SETTINGS <file>

If you have been developing a graph on the screen, and you want to create a take file that draws the same graph, type these commands:

<u>Command</u>	<u>Effect</u>
LIST SETTINGS <file>	(creates a take file)
SAVE LABELS <file>	(if you need to)
SAVE POINTS <file>	(the file can have the same name)
EDIT TAKE <file>	(file = take file)

The LIST SETTINGS command creates a take file with the file name specified in the command. You then can edit the take file and add commands for drawing graphs, manipulating the data, etc.

For example, add a few commands such as a LOAD LABELS command, a LOAD POINTS command, and floating title commands if you need them, and you have quickly created a take file that can reconstruct the same graph that you had on the screen.

Notice that the files that contain the settings, points, and labels can all have the same name. This can be useful when you have a lot of information stored on a diskette.

# Appendix A

# Error Messages

# Appendix A

## Error Messages

Sometimes you will type a command that Apple II Business Graphics can't execute. Perhaps you mistyped the command, leaving out part of it or specifying a modifier that didn't match. Other times, you may type a command that looks valid, but can't be executed.

The program displays two types of error messages on the screen when it receives a command it can't execute. The first type begins with a question mark (?), the second type begins with a per cent sign (%).

Most error messages begin with a question mark. They indicate that the program attempted to do something impossible or that it couldn't make any sense out of the command. The program returns to the same state as before it tried to execute the command. An example of this type of error message is:

```
? VERTICAL COORDINATE MISSING
```

Very rarely, you will get an error message that begins with a per cent sign. This indicates that the program tried to do what the command said, but couldn't. As a result, you may have lost some data, or the program may have entered a state that will be hard to recover from, and you must reboot it. An example of this type of error message is:

```
% UNABLE TO READ DATA FILE
```

## Appendix B

# Control Codes

- 174 Screen Control
- 175 Special Characters

# Appendix B

## Control Codes

This appendix contains a brief summary of all the control characters used by Apple II Business Graphics. It includes two sections: Screen Control and Special Characters.

### Screen Control

---

The following control characters are described in the chapter on Communicating with the Program. They can be used any time you are using Apple II Business Graphics. To enter a control character, hold down the key labeled CTRL while pressing another key. For example, CTRL-A means to press A while holding down the key labeled CTRL.

#### Control

<u>Character</u>	<u>Effect</u>
CTRL-A	Displays other half of command or help screen.
CTRL-E	Turns on lowercase mode. When lowercase mode is on, CTRL-E works like SHIFT-LOCK on a typewriter.
CTRL-F	Turns off display of characters on the screen.
CTRL-H	Moves the cursor back one space.
CTRL-S	Stops program next time it tries to write to screen. Press CTRL-S again to start program.
CTRL-T	Turns off lowercase mode.
CTRL-W	When lowercase mode is on, causes next letter to be capitalized.
CTRL-X	Deletes the line you just typed.
CTRL-Z	Turn on sideways scrolling.

# Special Characters

---

The special characters are characters that are part of the program's normal character set, but that cannot generally be displayed on the screen. You can use them on a graph as part of a horizontal, vertical, or floating title.

There are 26 special characters. Most you enter as simple control characters, others you must enter as two-key sequences. To generate the special character for most letters, type the letter while holding down the key labeled CTRL. To generate the special character for letters that are used by the system in control codes, type CTRL-B and then the letter. For example, to generate the special character associated with A, you must type CTRL-B followed by the character A. In the table of special characters given below, this sequence is designated by CTRL-B A.

CTRL-B A = ◀	CTRL-D = □	CTRL-O = π
CTRL-B B = °	CTRL-G = Δ	CTRL-P = ♡
CTRL-B C = ⊖	CTRL-I = →	CTRL-Q = ◆
CTRL-B E = Σ	CTRL-J = ↓	CTRL-R = ♣
CTRL-B F = √	CTRL-K = [	CTRL-T = ⌘
CTRL-B H = ←	CTRL-L = ♯	CTRL-U = ×
CTRL-B S = ♠	SHIFT-M = ]	CTRL-V = †
CTRL-B W = ÷	CTRL-N = √	CTRL-Y = ◄
CTRL-B X = §		
CTRL-B Z = ‡		



## Appendix C

# Using External Devices

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179	The Hiplot Plotter
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# Appendix C

## Using External Devices

This appendix contains information about the way that Apple II Business Graphics communicates with external devices. Apple II Business Graphics lets you send listings and graphics to five different devices: the console; a HP 7225A/B plotter; a Houston Instruments (Hiplot) DMP-3, 4 plotter; a Qume Sprint 5/45 or Sprint 5/55 printer; or a Silentype printer. The first sections explain how to use the program with each of these devices, and how to set the operating characteristics of each of these devices. The final section tells what devices can be placed in which slots.

### Overview

---

When you start up Apple II Business Graphics, it is set up to communicate with the Apple's keyboard and screen. If you have an 80 column card in slot #3, the program is set up to communicate with this card (note: not all 80 column cards can display high resolution images).

If you want to send graphic information to a different device, you must tell the program what slot that device is in. You do this with the

```
SET SLOT <slot number>
```

command. To send information to a device using a LIST command, you do not have to SET SLOT first. If you are using a device name (i.e., PRINTER: or REMOUT:), the correct slot is assumed.

Once you have set the slot, there are several different ways that you can communicate with devices.

1. If the device is a printer in slot #1, you can send a listing to it using the LIST command and the slot <file> name PRINTER:.
2. If the device is a graphic output device supported by Apple II Business Graphics, you can send a listing to it using the LIST command and the slot <file> name for that slot. You can send graphics to it by using the

SEt DEvIce <device name> (<number>) (<number>)

command, followed by DRAW commands. Graphic devices may be in slots #1, #2, #4, #5, and #7.

3. If the device is a disk drive, you can send listings to it using a LIST command and a slot <file> name and a file name or the device's volume name and a file name. You can also send it labels, points, and screen files using a SAVE command and a slot <file> name or volume name with file names. Disk drives may be in slots #4, #5, and #6.

Volume names and slot <file> names are explained in the chapter on Communicating with the Program. The SET SLOT and SET DEVICE commands are explained in the chapter on Setting Up.

## The Console

The console is the main device for the Apple II. It consists of the keyboard and screen. When you turn the program on, it is set up to communicate with the console using two colors, green and violet, alternately.

If you use another device and then want to use the console again, or if you want the console to cycle through five colors, use the command

```
SEt DEvIce Console (<number>)
```

To use the console with two colors, omit <number> or set it to  $\emptyset$  with the command

```
SE DEV C  $\emptyset$ 
```

To use the console with five colors, use the command with <number> set to 1, as in

```
SE DEV C 1
```

The five colors that Apple II Business Graphics cycles through are: green, violet, orange, white, and blue, in that order. You can use a remote terminal or an 8 $\emptyset$ -column card in place of the console. If you do, the card must be in slot #3. You need not use SET SLOT for either of these devices.

## The Hplot Plotter

You can use the Houston Instruments DMP-3, 4 intelligent digital plotter with Apple II Business Graphics. To set up a DMP-3, 4 for use with Apple II Business Graphics, give the command

```
SEt DEvIce HIplot (<n>)
```

The modifier <n> sets the size of the graph to be drawn. The sizes

are

<n> = 0            10 X 7    inch graph  
<n> = 1            5 X 3.5 inch graph

If you omit <n> from the command, the HIPILOT draws a 10 X 7 inch graph.

To use the HIPILOT with an Apple II Serial Interface Card, place switch number 4 on the card in the OFF position. Remove ROM P8A, for high-quality printers, from the card if there is one. Finally, wire the HIPILOT cable for mode 2 operation.

The marks placed on graphs by the HIPILOT are:

<u>Number</u>	<u>Mark</u>	<u>Description</u>
0	+	plus
1	X	ex
2	□	open box
3	○	circle
4	△	triangle
5	X	ex with dashes

Figure C-1. Hiplot Marks

You can use a HIPILOT plotter in slot #1, #2, #4, #5, or #7.

## The HP 7225A/B Plotter

To use an HP 7225A/B 2400 baud digital plotter with serial interface #17603A with Apple II Business Graphics, use the command

```
SEt DEvIce HP7225A (<n>)
```

The device name for the HP plotter can be abbreviated to HP. The value of the modifier <n> determines the size of the graph. The possible sizes are:

<n> = 0            10 X 7    inch graph  
<n> = 1            5 X 3.5 inch graph

If you omit <n>, the HP draws 10 X 7 inch graphs.

The marks placed on graphs by the HP are:

<u>Number</u>	<u>Mark</u>	<u>Description</u>
∅	+	plus
1	X	ex
2	□	open box
3	○	circle
4	△	triangle
5	⌘	hourglass

Figure C-2. HP 7225A/B Marks

You can use an HP plotter in slot #1, #2, #4, #5, or #7.

## The Qume Sprint 5

You can use the Qume Sprint 5/45 or the Qume Sprint 5/55 with Apple II Business Graphics. To prepare a Qume for use, give the command

```
SEt DEvIce Qume (<n>)
```

The modifier <n> sets the size of the graphs drawn. The sizes are:

```
<n> = ∅      7 X 1∅ inch graphs
<n> = 1      4 X 4 inch graphs
<n> = 2     11 X 1∅ inch graphs
```

The Apple II Serial Interface Card used with the Qume must have the high-quality printer ROM P8A installed.

The marks that the Qume places on graphs are named and numbered as shown below.

<u>Number</u>	<u>Mark</u>	<u>Description</u>
∅	+	plus
1	X	ex
2	*	asterisk
3	0	oh
4	#	number sign

Figure C-3. Qume Sprint 5 Marks



A Qume that doesn't have bidirectional tractors probably won't produce satisfactory charts.

If your Qume is in slot #1, you can only use it with a LIST command. If it is slot #2, #4, #5, or #7, you can use it as a graphic output device.

## The Silentype Printer

To use a Silentype printer with Apple II Business Graphics, place it in slot #1, #2, #4, #5, or #7. You can use a LIST command to send listings to it with the slot <file> name of PRINTER: only when the Silentype is in #1. Alternately, you can send the image that is currently on the graphics screen to your Silentype using the commands

```
SEt SLOt (number)
WRite Screen Silentype
```

The Silentype produces graphs that measure 4.25 X 3 inches.

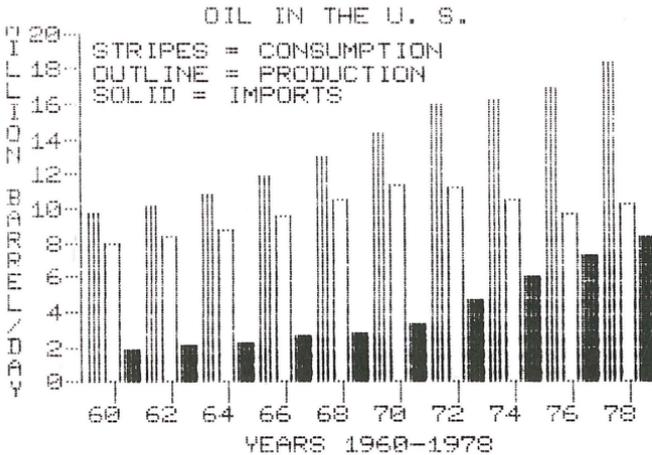


Figure C-4. Sample Graph Printed on a Silentype

# Peripheral Connector Slots

---

There are eight peripheral connector slots inside the APPLE II, on the main circuit board. These are the slots into which the interface cards for all the Apple II's external devices are placed. Certain slots are used for special purposes and are given special volume names, while other slots must be referred to by number. The names, numbers and uses of all the slots are given below.

<u>Slot Number</u>	<u>Volume Number</u>	<u>Volume Name</u>	<u>Uses</u>
SLOT #0			Must contain a Language Card.
SLOT #1	#6:	PRINTER:	Can only contain a printer/plotter.
SLOT #2	#8:	REMOUT: or <volume name>:	May contain a graphic output device. SET SLOT, SET DEVICE, and then use DRAW commands.
SLOT #3			May contain a terminal communications card or an 80 column card only.
SLOT #4			May contain a graphic device. SET SLOT, SET DEVICE, and then use DRAW commands.
	#9:	<volume name>:	May contain 4th Disk II Drive or hard disk. Refer to hard disk by volume name only.
	#10:	<volume name>:	May contain 5th Disk II Drive.
SLOT #5			May contain a graphic device. SET SLOT, SET DEVICE, and then use DRAW commands.
	#11:	<volume name>:	May contain 2nd Disk II Drive or hard disk. Refer to hard disk by volume name only.
	#12:	<volume name>:	May contain 3rd Disk II Drive.
SLOT #6	#4:	<volume name>:	This contains the boot drive. It may not contain any other device.
	#5:	<volume name>:	Can only contain 2nd Disk II Drive.
SLOT #7	#8:	<volume name>:	May contain a graphic output device. SET SLOT, SET DEVICE, and then use DRAW commands.



# Appendix D

## Using Files

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# Appendix D

## Using Files

This appendix explains the use of files, both inside and outside of the Apple II Business Graphics program. The first section explains how to use the INTERCHANGE command to transfer information from DOS, Pascal, FORTRAN, VisiCalc, DIF, and Apple Plot files into Apple II Business Graphics points files.

The following sections explain the format of the files that Apple II Business Graphics uses. This includes a detailed example of the format of an Apple II Business Graphics points file, the format a Pascal program must use to create an Apple II Business Graphics points file.

## The Interchange Command

---

The INTERCHANGE command lets you transfer several common types of data files from their original formats to the format of an Apple II Business Graphics points file. The types are

- DOS 3.2.1 text files (13 sector)
- DOS 3.3 text files (16 sector)
- Pascal/FORTRAN text files
- VisiCalc print files
- VisiCalc DIF files
- Apple Plot data files

The INTERCHANGE command is a destructive command; it should only be used when the workfile is clear.



The INTERCHANGE command temporarily uses the workfile to store the points it is transferring. If you are interchanging a file containing more than 90 points, you must use the command SET VIRTUAL FILE to place part of the workfile on diskette. The SET VIRTUAL FILE command is explained in the chapter on Setting Up.

Before you can use the INTERCHANGE command, the PLOT: diskette must be in drive #1 and the DATA: diskette must be in another drive. To use this command, type

### Interchange

After the disk spins for a while, the program responds

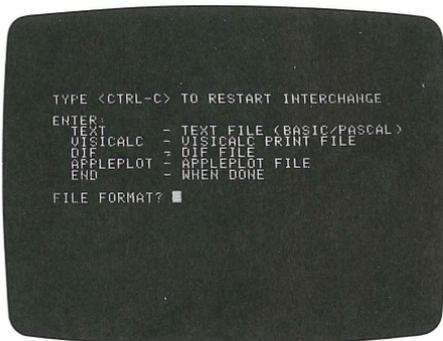


Figure D-1. Interchange Main Menu

After the INTERCHANGE main menu appears, you may remove the DATA: and DEMO: diskettes from their drives. You must replace DATA: before you type END, indicating that you have no more files to transfer.

When the INTERCHANGE menu is on the screen, type the file format that is appropriate for the data to be transferred (Text, VisiCalc, Dif, Apple Plot, or End). No matter which file format you choose, the program then asks you:

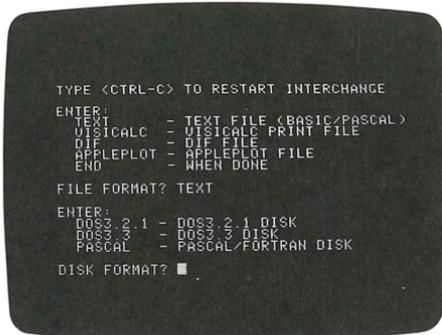


Figure D-2. Interchange Format Menu

Enter the appropriate format (DOS3.2.1, DOS3.3, or Pascal). If you choose either DOS format, the program responds

```

TEXT      - TEXT FILE (BASIC/PASCAL)
UTSICALC - UTSICALC PRINT FILE
DIF      - DIF FILE
APPLEPLOT - APPLEPLOT FILE
END      - WHEN DONE

FILE FORMAT? TEXT

ENTER:
D0S3 2 1 - D0S3 2 1 DISK
D0S3 3   - D0S3 3 DISK
PASCAL  - PASCAL/FORTRAN DISK

DISK FORMAT? D0S3 3

ENTER:
4 - DISK IN SLOT 6 DRIVE 1
5 - DISK IN SLOT 6 DRIVE 2
10 - DISK IN SLOT 4 DRIVE 1
11 - DISK IN SLOT 5 DRIVE 1
12 - DISK IN SLOT 5 DRIVE 2

DISK UNIT TO READ FROM? █

```

Figure D-3. Interchange Disk Number Menu

The program doesn't ask you the drive number for a Pascal file because a volume name is part of a standard Pascal file name.

Type the volume number of the disk drive containing the diskette from which you want to transfer data. After you type the drive number, the program asks

FILE TO READ FROM?

Type the name of the file. When you enter a Pascal file name, don't include the suffix ".TEXT".



You can abbreviate all responses to the program except the file name, as long as the response is unique.

After you enter a file name, the program verifies that the file exists. If the program can't find the file, it prints the message

? NO SUCH FILE NAME

and asks for the file name again.



At any time during INTERCHANGE, you can press CTRL-C to restart the process.

The procedure varies from this point, depending on the file format, and the nature of the data being transferred.

## Transferring Text Files

The data in any text file to be converted must be in the following format:

x-coordinate y-coordinate

Each line in the file to be transferred must contain one horizontal axis value and one vertical axis value separated by at least one

space. The same rules that apply to entering data with editing commands apply to data from text files. The data may be in any of these formats:

number	number
number	label
label	number
label	label

but the form must be consistent throughout the file. A label must not have blanks in it unless the entire label is enclosed in single or double quotes.

After you enter a file name, the program asks you what titles you want on the axes, and whether the axes have labels. You should see:

HORIZONTAL AXIS:

TITLE?

If you want the horizontal axis to be titled, enter the title and press RETURN. If you don't want a title, simply press RETURN. The program then asks

LABELS (YES OR NO)?

If the file contains horizontal labels, answer Yes, and press RETURN, otherwise answer No. If the horizontal coordinates are numbers that refer to months or years, you should answer Yes so that those numbers are entered as labels.

The same questions are then repeated for the vertical axis.



Titles that contain imbedded blanks or special characters should be enclosed in quotes. Non-Pascal file names containing spaces should also be enclosed in quotes.

After the program has converted the file, it asks if you want the points to be listed on the screen. If you list the points on the screen, and you notice that something is wrong, you can still press CTRL-C to restart the INTERCHANGE.

Finally, the program asks for the name of the file to write to. Enter a file name in standard Apple II Business Graphics format. If you have set a default volume name, it will be used. Type in the name of the file, and before you press RETURN, be sure that the data diskette specified by the file name is in one of the drives.

After INTERCHANGE saves the file, the INTERCHANGE main menu returns to the screen, and you can transfer additional files. When you have no more files to transfer, be sure that the DATA: diskette is in the boot drive, and type

End

The command screen reappears.

## Transferring VisiCalc Files

To transfer a VisiCalc print file to a points file, choose the VisiCalc file format, the disk format (DOS3.2.1 or DOS3.3), and the number of the drive the program should read the file from. The program then asks you

FILE TO READ FROM?

Enter the name of a VisiCalc print file. Once the program finds the file, it asks for the column width:

COLUMN WIDTH (Default=9)?

VisiCalc print files are normally stored with a column width of 9. If you changed the column width before you saved the print file, enter the new column width and press RETURN. Otherwise, just press RETURN.

Once again, the procedure resembles the text file transfer procedure. Enter the title for the horizontal axis, and whether or not the data on this axis should be treated as labels, and the program responds

FROM VISICALC COORDINATE?

Using the standard VisiCalc notation, enter the entry position of the first value you wish to convert to a horizontal value or label. If you saved the entire model, this position is the one that you originally used in VisiCalc.



If you only saved part of a VisiCalc model in the print file, the coordinates refer to the part that was saved as if it were in the upper left hand corner beginning at entry position A1.

The next query is

TO VISICALC COORDINATE?

Enter the VisiCalc entry position of the value that is to be used as the last horizontal value or label in the new points file.

The questions for the vertical title, labels, and coordinates are the same as above. The program then asks if you want to see the points listed on the screen, and for the name of the points file. This part of the procedure is identical to the procedure for text file transfers.

Here is a photo of a sample VisiCalc screen

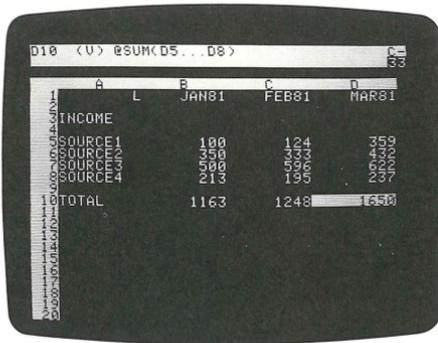


Figure D-4. Sample VisiCalc Screen

And here are two Apple II Business Graphics plots made by transferring data from the above screen's print file to Apple II Business Graphics points files.

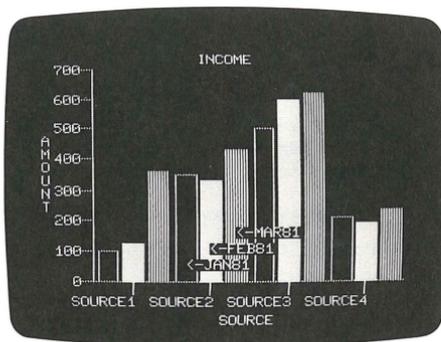


Figure D-5. Comparing Sources

Figure D-5 was created by transferring vertical information from the VisiCalc print file into three separate points files:

Horizontal labels from A5 to A8  
Vertical values from B5 to B8

Horizontal labels from A5 to A8  
Vertical values from C5 to C8

Horizontal labels from A5 to A8  
Vertical values from D5 to D8

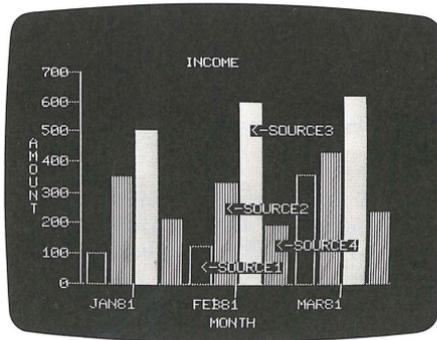


Figure D-6. Comparing Months

Figure D-6 was created by transferring horizontal information from the VisiCalc print file into four separate points files:

Horizontal labels from B1 to D1  
Vertical values from B5 to D5

Horizontal labels from B1 to D1  
Vertical values from B6 to D6

Horizontal labels from B1 to D1  
Vertical values from B7 to D7

Horizontal labels from B1 to D1  
Vertical values from B8 to D8

## VisiCalc DIF Files

DIF files are files in the Data Interchange Format that VisiCalc uses to organize information for use with other programs. The procedure for transferring information from a DIF file to an Apple II Business Graphics program is the same as the procedure for transferring VisiCalc information, but with one exception. Instead of asking for column width, the program asks this:

STORED BY ROW OR COLUMN (DEFAULT = ROW)?

Pressing RETURN indicates that the DIF file was stored in ROW sequence, which is the VisiCalc default.



Some programs expect DIF file names to have the suffix .DIF on them. If you use this convention for your file names, you must include the .DIF when you name the file for the program to read from.



Only VisiCalc 16-sector files can be used to generate DIF files; VisiCalc 13-sector files cannot generate DIF files.

## Apple Plot Files

To use the INTERCHANGE command to transfer Apple Plot files into Apple II Business Graphics points files, choose the Apple Plot file format, the correct DOS format, the proper drive number, and the file name. If the file name contains more than one word, enclose it in single or double quotes.

An Apple Plot data file can contain two sets of points. When the program asks

DATA SET (DEFAULT=1)?

press RETURN to transfer the first data set in the file, or press 2 followed by RETURN to transfer the second data set. Once you specify a set to transfer, the program transfers the set into the work file and asks you

LIST POINTS (YES OR NO)?

If you answer Yes, you can abort the interchange if the listed points look wrong. If you answer No, you are asked

FILE TO WRITE TO?

Enter the name of an Apple II Business Graphics file, press RETURN, and the program stores the points on a diskette.

# File Formats

---

This section describes the file structure and format of each of the types of files that Apple II Business Graphics can use. These file types are:

- points
- labels
- screen
- take
- help

## Points Files

Apple II Business Graphics stores points files as Apple II Pascal data files. When it places a points file on a diskette, it gives it the name

`<file>.P.DATA`

where `<file>` is the name you give when you SAVE the file. This is the name you would see if you were to use the Pascal system to view a listing of the contents of a diskette having a points file on it.

Apple II Business Graphics saves points and labels files as a series of Pascal records. The first record in the file indicates the number of labels in the file, the number of points in the file, and the horizontal and vertical titles, if there are any. The subsequent records in the file contain the actual values of the points and labels.

A points file takes up

$(n / 15) + 2$

blocks, rounded down to the nearest integer, where  $n$  is the number of points in the file or the number of labels in the file, whichever is largest. The number of points in the file can be different from the number of labels in the file if you used the command

SAve `<file>`

to create the file when the number of labels and points in the work file were different.

The use of Pascal records to create a points file is demonstrated in the Pascal program that follows. Here is a list of the storage areas that are within each Pascal record followed by a Pascal program that uses them.

XLNUM	number of horizontal labels
YLNUM	number of vertical labels
XYNUM	number of points
SXTITLE	horizontal title
SYTITLE	vertical title
X	horizontal coordinate (if XLNUM = 0) horizontal label record index (if XLNUM > 0)
Y	vertical coordinate (if YLNUM = 0) vertical label record index (if YLNUM > 0)
XLABEL	horizontal label (if XLNUM > 0)
YLABEL	vertical label (if YLNUM > 0)



The following program is provided as an example of the structure of points files. It is not a software product, and is not supported by Apple Computer, Inc.

```

PROGRAM YOURS;

CONST
  TLEN=60;
  LLEN=11;

VAR
  XLABEL:ARRAY[1..100] OF STRING[LLEN];
  Y:ARRAY[1..100] OF REAL;
  XNUM:INTEGER;
  SXTITLE,SYTITLE:STRING[TLEN];

PROCEDURE PSAVE(ARG:STRING);

CONST
  SAVELEN=15;

TYPE
  SAVETYP=RECORD
    CASE RECTYPE:INTEGER OF
      0:(R0:RECORD
          XLNUM:INTEGER;
          YLNUM:INTEGER;
          XNUM:INTEGER;
          SXTITLE:STRING[TLEN];
          SYTITLE:STRING[TLEN];
          END);
      1:(R1:ARRAY[1..SAVELEN] OF RECORD
          X:REAL;
          Y:REAL;
          XLABEL:STRING[LLEN];
          YLABEL:STRING[LLEN];
          FILLER:INTEGER;
          END);
    END;

VAR
  DATAFILE:FILE OF SAVETYP;
  SAVEREC:SAVETYP;
  FILESPEC:STRING;
  I,J:INTEGER;

```

```

BEGIN
  FILESPEC:=CONCAT(ARG,'.P.DATA');
  REWRITE(DATAFILE,FILESPEC);
  SAVEREC.RECTYPE:=0;
  SAVEREC.R0.XLNUM:=XYNUM;
  SAVEREC.R0.YLNUM:=0;
  SAVEREC.R0.XYNUM:=XYNUM;
  SAVEREC.R0.SXTITLE:=SXTITLE;
  SAVEREC.R0.SYTITLE:=SYTITLE;
  DATAFILE^:=SAVEREC;
  PUT(DATAFILE);
  SAVEREC.RECTYPE:=1;
  J:=0;
  FOR I:=1 TO XYNUM DO
    BEGIN
      J:=J+1;
      SAVEREC.R1[J].X:=I;
      SAVEREC.R1[J].Y:=Y[I];
      SAVEREC.R1[J].XLABEL:=XLABEL[I];
      IF J>=SAVELEN THEN
        BEGIN
          DATAFILE^:=SAVEREC;
          PUT(DATAFILE);
          J:=0;
          END;
        END;
      IF J>0 THEN
        BEGIN
          DATAFILE^:=SAVEREC;
          PUT(DATAFILE);
          END;
        CLOSE(DATAFILE,LOCK);
      END;
    BEGIN
      .
      .
      .
      PSAVE('THERE');
      .
      .
      .
    END.

```

## Labels Files

Labels files have the Pascal name

<file>.L.DATA

where <file> is the name you give when you save the labels file. Both horizontal and vertical labels files have the same format as points files, however, only one label is stored in each record of the file.

A labels file takes up

$(n / 15) + 2$

blocks on a diskette, rounded down to the nearest integer, where  $n$  is the number of labels in the file.

## Screen Files

Screen files have the Pascal name

<file>.S.DATA

where <file> is the name you give when you save it. A screen file contains an exact copy of the Apple's memory locations 2000-3FFF (hexadecimal), the area of memory used for the graphics page. Each one uses up 16 of a diskette's 280 blocks. A screen file contains no other information.

## Take Files

A take file is an Apple II Pascal Language System text file with the name

<file>.T.TEXT

where <file> is the name you gave when ended your take file editing session. A text file uses up 2 blocks plus the

$(\text{number of characters} + (3 \times \text{number of lines})) / 1024$

rounded up to the nearest integer and then multiplied by two blocks. Thus a take file always uses a multiple of two blocks of space.

## Help Files

A help file is an Apple II Pascal system text file. Its name is

<file>.H.TEXT

where <file> is the name of the individual HELP command you use to view that help file.

## Appendix E

# Using the Pascal System

200	The Program and Pascal
201	Using a Program
201	The Rest of the System
202	Boot

## Appendix E

# Using the Pascal System

This appendix explains the way that Apple II Business Graphics uses the Apple II Pascal system. It is intended for the experienced Pascal user who wants to develop Pascal programs that produce points files to be used by Apple II Business Graphics.

You can see the Apple II Business Graphics commands that are discussed in this appendix by entering the command

```
Help EXIT
```

This command shows you the format of the commands

```
Run  
Quit  
Boot (<slot number>)
```

## The Program and Pascal

---

The Apple II Business Graphics program is written in Pascal. It has a command that lets you QUIT the program so you can use other parts of the Pascal system, and a command that lets you RUN Pascal or FORTRAN code files. The use of both of these commands is limited by the version of SYSTEM.LIBRARY that Apple II Business Graphics uses.

SYSTEM.LIBRARY is the file that contains the different library units that a program can use. Due to the limited amount of space in a library, the program's version of SYSTEM.LIBRARY only contains the standard Pascal units CHAINSTUFF and TRANSCEND.



All of the unit slots in SYSTEM.LIBRARY are full. Apple II Business Graphics requires that all units in SYSTEM.LIBRARY be left in place. Do not move or alter any of the units in SYSTEM.LIBRARY.

If you want to write a Pascal program that uses other units, you must explicitly link the units into the program, as explained in the

Apple Pascal Operating System Reference Manual. There is no way to use the other intrinsic units with a program that runs under Apple II Business Graphics.

If your program only uses the intrinsic units CHAINSTUFF and TRANSCEND, you can use the following procedures without additional libraries.

## Using a Program

---

To run a program in a Pascal or FORTRAN code file use the command

```
Run <file>
```

from Apple II Business Graphics. If the program only uses the units CHAINSTUFF and TRANSCEND, it runs normally.

If your program generates an Apple II Business Graphics points file, as explained in the appendix on Using Files, the program can chain back to Apple II Business Graphics to make use of the new points file. To chain from a program to Apple II Business Graphics, use the following lines in your program.

```
USES CHAINSTUFF; (* Must be after program declaration *)

SETCVAL('command');          (* Use any AIIBG command  *)
SETCHAIN('PLOT:PLOT.CODE'); (* CHAIN to program      *)
EXIT(PROGRAM);              (* and leave          *)
```

The command that you set with the SETCVAL procedure can be any valid Apple II Business Graphics command. For example, you could set the command to be a TAKE <file> command that causes the points file you created to be displayed on the screen or plotted, and that then uses the RUN command to re-enter your program.

## The Rest of the System

---

If you want to develop your program in the Apple II Business Graphics environment, you can use the QUIT command to see the Pascal System command line. The command takes the form

```
Quit
```

After you use this command, you must leave the PLOT: diskette in the boot drive, and place a diskette containing other portions of the Pascal system into another drive. For example, if you want to edit a program, enter the QUIT command, place a diskette containing SYSTEM.EDITOR into one of the disk drives, and then press E for edit.

When you use the QUIT command, all the data that is in the work file is lost. Be sure that you save all important data.

## Boot

---

The BOOT command is used to reboot the Apple II from drive 1 of a specified slot. A disk controller card must be in that slot and a bootable diskette must be in drive 1. Apple II Business Graphics can only be booted from slot #6. To use the command, type

Boot (<slot number>)

If you do not specify a <slot number>, the drive 1 in slot #6 is booted.

## Appendix F

# Sample Sets of Commands

- 204 A Bar Graph
- 206 A Multiple Bar Graph
- 207 A Pie Chart
- 208 A Graph without Axes
- 209 A Take File

## Appendix F

# Sample Sets of Commands

This appendix includes sample sets of Apple II Business Graphics commands for drawing a bar graph, a multiple bar graph, a pie chart, and a graph without axes, and also a set of commands for a sample take file. A figure showing the image created by the commands accompanies each set of commands. We assume that you know how to create a data file.

## A Bar Graph

---

Using a work file containing these points (which were saved in the tutorial chapter as DATA:CONS):

```
60, 9.7
62, 10.2
64, 10.8
66, 11.9
68, 13
70, 14.4
72, 16
74, 16.2
76, 17
78, 18.4
```

the following commands create the bar graph shown in figure F-1:

```
SE H T "YEARS 1960-1978"
SE V T "MILLION BARREL/DAY"
DR B
```

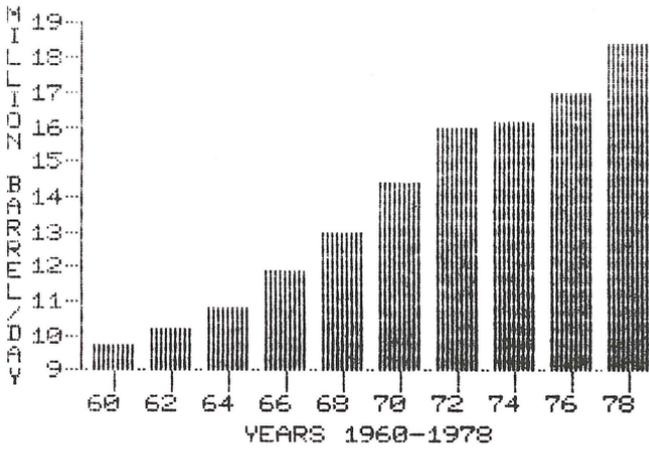


Figure F-1. Bar Graph

# A Multiple Bar Graph

This example assumes that you have three files named DATA:CONS, DATA:PROD, and DATA:IMPO. The following commands create the bar graph shown in Figure F-2:

```
Clear
SEt DEFault Volume DATA:
L0ad CONS
SEt Vertical Range 0,20
DRaw Bar 3
SEt COLOR Orange
SEt FILL Off
L0ad Points PROD
DRaw Bar
SEt Color White
SEt FILL ON
L0ad Points IMPO
DRaw Bar
SEt Title "OIL IN THE U. S."
SEt Floating Title "STRIPES = CONSUMPTION"
SEt Floating Title "OUTLINE = PRODUCTION"
SEt Floating Title "SOLID = IMPORTS"
SAve SCREEN OIL
SEt Slot 1
WRite Screen Silentype
```

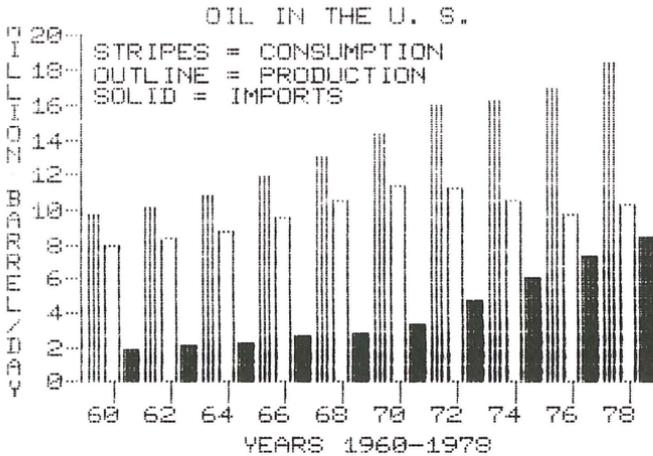


Figure F-2. Multiple Bar Graph

# A Pie Chart

---

This example assumes that you have one file named DATA:IMPO. The following commands create the pie chart shown in Figure F-3:

```
Clear
LOad Points DATA:IMPO
SEt Title "OIL IMPORTS 1960-1978"
SEt COLOR White
DRaw PIe 2
SEt COLOR Green
DRaw PIe
```

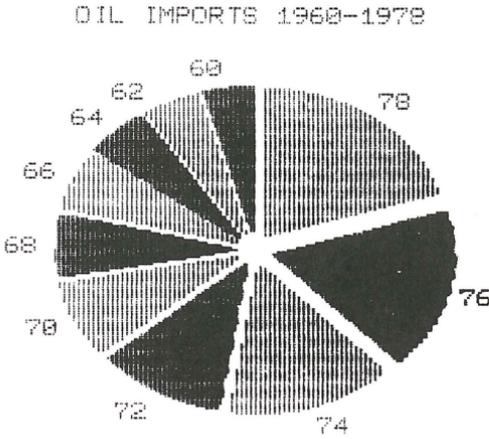


Figure F-3. Pie Chart

# A Graph without Axes

---

An axisless graph may be used as a title page for a graphic presentation. To draw an axisless graph, you set the color to None, then draw an axis. (The work file must contain data points before you can draw an axis.) The following commands create the graph shown in figure F-4:

```
SEt COLOR None  
DRaw AXis Ø  
SEt FLoating Title "A REPORT ON OIL IN THE U.S." 15, 7Ø  
SEt FLoating Title "A GRAPHIC OVERVIEW" 2Ø,6Ø  
SAve SScreen DATA:TITLPAGE
```

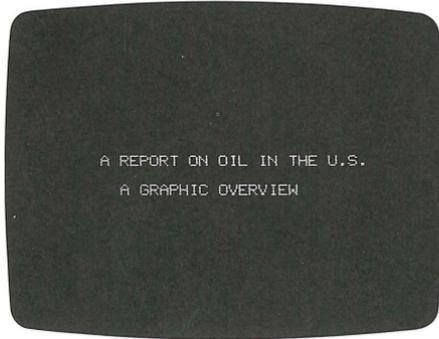


Figure F-4. A Graph without Axes

# A Take File

---

The following commands create a take file named PIX:DRAWPLAN that uses a points file named PIX:PLAN to draw a multicolor graph.

First, create a points file. Our example uses these data points, saved as PIX:PLAN:

```
ALICE,83
BILL,98
BOB,92,
BRENT,74
CHRIS,62
GEOFF,48
JERRY,99
LEONA,87
MICKEY,97
PATRIA,92
PHIL,86
QUEUE,99
SEAN,54
WILLIAM,73
```

Next, clear the work file and create the take file, setting the prefix to "." to distinguish the take editing commands from the commands that will be executed by the program when it runs the take file.

The example uses the Silentype to print a copy of the graph, but you could omit the SET SLOT 1 and WRITE SCREEN SILENTYPE commands and display the graph on the screen.

```
Set Default Volume PIX:
Set Virtual File TEMPTAKE
Edit Take
PREFIX .
Clear
Load PIX:PLAN
Set Vertical RAnge 40 100
Set Horizontal Label Length 2
Set Vertical Title "% TIME FOR PROJECT"
Set Horizontal Title "STAFF MEMBERS"
Set TITLE "STAFFING ESTIMATE - 1982"
Set Color White
Draw AXis 0
Set Color BLUe
Draw Bar
Set Slot 1
Write Screen Silentype
.END PIX:DRAWPLAN
```

To create the graph shown in figure F-5, run the take file by typing the command:

T PIX:DRAWPLAN

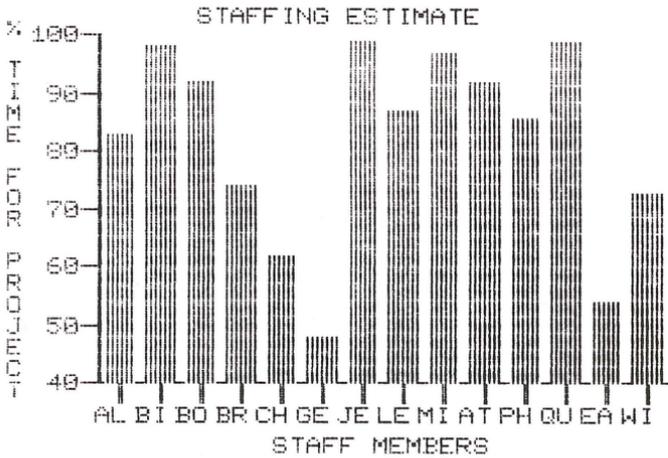


Figure F-5. Chart Drawn by Take File

## Appendix G

# Help Screens

213	Help Axis
213	Help Business
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225	Help Titles

# Appendix G

## Help Screens

This appendix shows all the help screens for each help command. Some commands have two screens, some have six. To see a list of the available screens, type

```
Help
```

Then, type the HELP command for the category you want, such as

```
Help AXIS
```

The rest of this appendix is an alphabetical list of the help screens.

# Help Axis

---

AXIS	AXIS
COMMANDS	EXPLANATIONS
1. DRaw AXis (<type>) a. type = 0      b. type = 1 c. type = 2      d. type = 3	1. Draw Axis only a. no grids      b. v/grid lines c. h/grid lines   d. both grid lines
2. SET Range <low value> <high value>	2. Sets range used on horizontal axis
3. SET V Range <low value> <high value>	3. Sets range used on vertical axis
4. LIst SETtings	4. Displays ranges,label lengths,titles
5. CLeAr horizontal Range	5. Resets horizontal range to default
6. CLeAr Vertical Range	6. Resets vertical range to default
7. SET horizontal Label Length <number>	7. Sets maximum length of h/labels
8. SET Vertical Label Length <number>	8. Sets maximum length of v/labels
CTRL-A for Explanations	CTRL-A for Commands

# Help Business

---

BUSINESS	BUSINESS
COMMANDS	EXPLANATIONS
1. DIStribute <interval size>	1. Determines the percentage of points within each interval determined by <interval size>
2. Generate points (<from> <to>) (<step size>)	2. Creates a data set from the currently fitted curve. If labels on h/axis, one point generated for each label. If points on h/axis, you must use <from> and <to>
3. SMOoth Moving Average <past periods> <future periods> <from>	3. Generates points, based on an even weighting of points in an interval, using a moving interval
CTRL-A for Explanations	CTRL-A for Commands

# Help Curves

---

CURVES COMMANDS	CURVES EXPLANATIONS
1. FIT <curve name>	1. Fits specified curve to the points in the work file
2. FIT Sine <low> <high>	2. Finds sine curve that best fits work file points between <low> and <high>
3. SET CURve <curve name> (C1) (<C2>) (<C3>)	3. Sets curve type and the coefficients for that curve. Coefficients used depend on the type of curve
4. LIST CURve (<file>)	4. Displays the coefficients of the last curve that was SET or FIT.
5. DRAW CURve (Dash)	5. Draws the last curve that was SET or FIT as a solid line, unless you specify Dash

CTRL-A for Explanations

CTRL-A for Commands

## CURVES (continued)

### COMMAND

#### EQUATIONS FOR CURVES

CURVE NAME	EQUATION
Constant	$Y = C1$
Line	$Y = C1 * X + C2$
Logarithm	$Y = C1 * LN (X) + C2$
Parabola	$Y = C1 * X^2 + (C2 * X) + C3$
Sine	$Y = C1 * SIN (C2 * X) + C3$

CTRL-A for Commands

# Help Data

---

## DATA

### COMMANDS

1. Edit
2. LIst (<file>)
3. LIst STatistics (<file>)
4. SAve <file>
5. CLear

NOTE: THESE COMMANDS APPLY TO THE NUMBERS AND LABELS IN THE WORK FILE

CTRL-A for Explanations  
DATA (continued)

### COMMANDS

6. LOad <file>
7. APpend <file>

CTRL-A for Explanations

## DATA

### EXPLANATIONS

1. To enter and modify data in work file
2. Lists points in the work file. Omit <file> to display list, <file> = PRINTER: to print list
3. Lists statistics of points in work file. Omit <file> to display list, <file> = PRINTER: to print list
4. Saves points to a diskette file
5. Clears everything from the work file

CTRL-A for Commands  
DATA (continued)

### EXPLANATIONS

6. Loads points and labels from <file> into the work file
7. Adds points and labels from <file> to the end of the work file

CTRL-A for Commands

# Help Draw

---

DRAW COMMANDS	DRAW EXPLANATIONS
1. DDraw AXIS (<type>)	1. Draws axis, grids, labels, and titles See HELP AXIS
2. DDraw Mark	2. Draws a mark for each work file point
3. SET Mark <mark number>	3. Defines style of mark (-3 through 4)
4. DDraw Line	4. Connects points with a solid line
5. DDraw Dash	5. Connects points with a dashed line
6. SET Dash <dash number>	6. Defines style of dash (0 through 4)
7. DDraw Vertical Bar (<number>)	7. Draws data as vertical bars. <number> can be 1-4 bars per label

CTRL-A for Explanations  
DRAW (continued)

CTRL-A for Commands  
DRAW (continued)

COMMANDS	EXPLANATIONS
8. DDraw horizontal Bar (<number>)	8. Draws data as horizontal bars. <number> can be 1-4 bars per label
9. DDraw Pie (<number of colors> <total area> <aspect ratio>)	9. Draws pie chart with given number of colors. If number not given, program cycles through colors. Refer to manual for <total area>

CTRL-A for Explanations

CTRL-A for Commands

# Help Edit

---

EDIT		EDIT
COMMANDS	ABBREV.	EXPLANATIONS
1. PREFIX <prefix character>	P	1. Allows abbrev. of editing commands
2. TOP	T	2. Displays first point in work file
3. BOTTOM	B	3. Displays last point in work file
4. UP (<number>)	U	4. Displays point up <number> from current point (default: 1 point)
5. DOWN (<number>)	DO	5. Displays point down <number> from current point (default: 1 point)

NOTE: WHEN A PREFIX CHARACTER IS SET, YOU MUST TYPE THE PREFIX CHARACTER BEFORE (ABBREVIATED) EDITING COMMANDS

NOTE: EDITING COMMANDS CANNOT BE ABBREVIATED UNLESS PREFIX IS SET

CTRL-A for Explanations

CTRL-A for Commands

EDIT (continued)		EDIT (continued)
COMMANDS	ABBREV.	EXPLANATIONS
6. CHANGE <x coord> <y coord>	CH	6. Changes value of current point
7. INSERT <x coord> <y coord>	I	7. Inserts point before current point
8. APPEND <x coord> <y coord>	A	8. Places point at end of work file
9. DELETE	DE	9. Deletes the current point
10. CLEAR	CL	10. Clears all points from work file
11. END	E	11. Terminates editing session

NOTE: WHEN A PREFIX CHARACTER IS SET, YOU MUST TYPE THE PREFIX CHARACTER BEFORE (ABBREVIATED) EDITING COMMANDS

NOTE: EDITING COMMANDS CANNOT BE ABBREVIATED UNLESS PREFIX IS SET

CTRL-A for Explanations

CTRL-A for Commands

# Help Exit

---

## EXIT

### COMMANDS

1. Boot (<slot number>)
2. Quit
3. Run <file>

## EXIT

### EXPLANATIONS

1. Reboots the Apple from <slot number>  
Default <slot number> is 6
2. Quits the program and runs Pascal
3. Starts a Pascal or Fortran program

CTRL-A for Explanations

CTRL-A for Commands

# Help Labels

---

## LABELS

### COMMANDS

1. Edit horizontal Labels
2. Edit Vertical Labels
3. LIst horizontal Labels (<file>)
4. LIst Vertical Labels (<file>)
5. SAve horizontal Labels <file>

NOTE: THESE COMMANDS CAN ONLY ALTER LABELS, NOT NUMBERS

CTRL-A for Explanations

## LABELS (continued)

### COMMANDS

6. SAve Vertical Labels <file>
7. CLear horizontal Labels
8. CLear Vertical Labels
9. LOad horizontal Labels <file>
10. LOad Vertical Labels <file>
11. APpend horizontal Labels <file>
12. APpend Vertical Labels <file>

NOTE: THESE COMMANDS CAN ONLY ALTER LABELS, NOT NUMBERS

CTRL-A for Explanations

## LABELS

### EXPLANATIONS

1. To enter or edit h/labels
2. To enter or edit v/labels
3. Lists h/labels on screen if <file> omitted, and on printer if <file> = PRINTER:
4. Lists v/labels on screen if <file> omitted, and on printer if <file> = PRINTER:
5. Saves h/label file to diskette

CTRL-A for Commands

## LABELS (continued)

### EXPLANATIONS

6. Saves v/label file to diskette
7. Clears work file of h/labels
8. Clears work file of v/labels
9. Loads h/labels from diskette file
10. Loads v/labels from diskette file
11. Adds h/labels from <file> to the end of the h/labels in the work file
12. Adds v/labels from <file> to the end of the v/labels in the work file

CTRL-A for Commands

# Help Math

---

## MATH

### COMMANDS

1. SWap
2. SHift <direction> <number>
3. Add <number>
4. ADd <file>
5. DIfference
6. DIvIdE by <number>

CTRL-A for Explanation

## MATH (continued)

### COMMANDS

7. DIvIdE by <file>
8. DIvIdE Into <number>
9. DIvIdE Into <file>
10. MultiplY by <number>
11. MultiplY by <file>
12. SUBtract <number>

CTRL-A for Explanations

## MATH

### EXPLANATIONS

1. Interchanges x values with y values
2. Moves all points <number> labels in <direction> (Left or Right)
3. Adds <number> to all y values
4. Adds y values from <file> to the corresponding y values in work file
5. Replaces each point with the difference between it and the previous point
6. Divides each y value by <number>

CTRL-A for Command

## MATH (continued)

### EXPLANATIONS

7. Divides each y value by y value of the corresponding point in <file>
8. Divides each y value into <number>
9. Divides each y into y value of corresponding point from <file>
10. Multiplies each y value by <number>
11. Multiplies each y value by the corresponding y value from <file>
12. Subtracts <number> from each y value

CTRL-A for Commands

MATH (continued)

COMMANDS

- 13. SUBtract <file>
- 14. SUBtract From <number>
- 15. SUBtract From <file>
- 16. SUM

MATH (continued)

EXPLANATIONS

- 13. Subtracts the corresponding y value in <file> from each y value
- 14. Subtracts each y value from <number>
- 15. Subtracts each y value from the corresponding y value in <file>
- 16. Replaces each y value by the sum of all previous y values, inclusive

CTRL-A for Explanations

CTRL-A for Commands

## Help Points

---

POINTS

COMMANDS

- 1. Edit Points
- 2. LIst Points (<file>)
- 4. SAve Points <file>
- 5. LOad Points <file>
- 6. APpend Points <file>

NOTE: THESE COMMANDS CANNOT ALTER THE LABELS IN THE WORK FILE

CTRL-A for Explanations

POINTS

EXPLANATIONS

- 1. To edit points in the work file
- 2. Lists points in the work file: omit <file> to display on screen, <file> = PRINTER: to print points
- 4. Saves points file to diskette
- 5. Loads points from <file> into the work file
- 6. Adds points in <file> to the end of the work file

CTRL-A for Commands

# Help Screen

---

SCREEN  
COMMANDS

1. CLear Screen
2. SEt SScreen
3. LOad SScreen <file>
4. SAve SScreen <file>
5. WRite Screen Silentye  
<aspect ratio>
6. SEt Fill ON
7. SEt Fill OFF

CTRL-A for Explanations

SCREEN (continued)

COMMANDS

8. SEt Color <color name>

Color Names:

Green  
Violet  
White  
Orange  
BLUe  
BLAck  
None

CTRL-A for Explanations

SCREEN  
EXPLANATIONS

1. Clears graphic image from work file and screen, displays command screen
2. Displays graphic image on screen
3. Loads graphic image from diskette
4. Saves graphic image on diskette
5. Prints graphic image on Silentye with specified aspect ratio
6. Subsequent images drawn filled-in
7. Subsequent images drawn as outlines

CTRL-A for Commands

SCREEN (continued)

EXPLANATIONS

8. The next draw command uses the color specified by <color name>

The program normally draws in the colors green and violet, alternately.

If you type the command

SET DEVICE CONSOLE 1

the program cycles through the colors green, violet, white, orange, & blue.

CTRL-A for Commands

# Help Setup

---

SETUP COMMAND	SETUP EXPLANATION
1. FOrmat	1. Formats a diskette
2. INterchange	2. Converts other programs' data files
3. SEt DEfault Volume <volume name>	3. Automatically adds <volume name> to all file names
4. SEt Virtual File <file>	4. Uses <file> as temporary storage for a large work file
5. SEt SLoT <slot number>	5. Directs graphic output to a device in <slot number>
6. SEt DEvice <device name> (<number>)	6. Defines graphics device and mode

CTRL-A for Explanations

CTRL-A for Commands

SETUP (continued)

SETUP (continued)

COMMANDS

EXPLANATIONS

7. LIst Devices	7. Displays all devices that can be used
8. LIst CAting (<file>)	8. Lists files on all diskettes: omit <file> to display on screen, <file> = PRINTER: to print the list
10. DElete (<file type>) <file>	9. Deletes a file from a diskette

CTRL-A for Explanation

CTRL-A for Command

# Help Take

---

## TAKE

### COMMANDS

1. Edit Take (<file>)
2. Take <file>
3. Print (<message>)
4. WAIT (<time>)
5. Comment <comment>
6. LSt Settings <file>

CTRL-A for Explanations

## TAKE

### EXPLANATIONS

1. To enter and change commands in a TAKE file
2. Executes a file of commands
3. Places a message on the command screen
4. Pauses execution of TAKE file for <time> seconds, or until RETURN is pressed
5. Places comments in a TAKE file
6. Saves titles,label lengths,ranges in a TAKE file

CTRL-A for Commands

# Help Titles

---

## TITLES

### COMMANDS

1. SET Title <title>
2. CLEAR Title
3. SET Horizontal Title <title>
4. CLEAR Horizontal Title
5. SET Vertical Title <title>
6. CLEAR Vertical Title

NOTE: IF <TITLE> CONTAINS SPACES, YOU MUST ENCLOSE <TITLE> IN SINGLE OR DOUBLE QUOTES

CTRL-A for Explanations

## TITLE (continued)

### COMMANDS

7. SET Floating Title <title> (<x> <y>)
8. SET Vertical Title <title> (<x> <y>)

### Positioning Keys

If you omit <x> and <y>

To Move:	Type:
Up	U or I
Down	D or M
Left	L or J
Right	R or K

CTRL-A for Explanations

## TITLES

### EXPLANATIONS

1. Places title at top of the image
2. Removes title from top of the image
3. Places title on horizontal axis
4. Removes title from horizontal axis
5. Places title on vertical axis
6. Removes title from vertical axis

CTRL-A for Commands

## TITLE (continued)

### EXPLANATIONS

7. Places horizontal title with positioning keys or at coordinates
8. Places vertical title with positioning keys or at coordinates

### Coordinates

If you use <x> and <y>, the title is positioned with lower left corner of title at screen coordinate x,y

Ø,Ø is the lower left corner of the screen, and 1ØØ,1ØØ is the upper right corner of the screen.

CTRL-A for Commands



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## X

X-axis (see horizontal)

## Y

Y-axis (see vertical)

## Z



## Reference Card

### Commands

<> indicates a modifier with more than one form (e.g., <color>)  
() indicates an optional modifier

<file> is most often a data file

<prefix character> comes before the abbreviated version of an editing command

This card shows editing commands printed entirely in blue (e.g., DOWN).

#### A

ADD <file>  
ADD <number>

<prefix character>APPEND (<x coordinate>) (<y coordinate>)  
APPEND (<x coordinate>) (<y coordinate>)

APPEND <file>  
APPEND POINTS <file>

APPEND HORIZONTAL LABELS <file>  
APPEND VERTICAL LABELS <file>

#### B

<prefix character>BOTTOM

#### C

<prefix character>CHANGE (<x coordinate>) (<y coordinate>)  
CHANGE (<x coordinate>) (<y coordinate>)

<prefix character>CLEAR  
CLEAR

CLEAR  
CLEAR HORIZONTAL LABELS  
CLEAR VERTICAL LABELS  
CLEAR SCREEN  
CLEAR HORIZONTAL RANGE  
CLEAR VERTICAL RANGE  
CLEAR TITLE  
CLEAR HORIZONTAL TITLE  
CLEAR VERTICAL TITLE

COMMENT <comment>

## D

<prefix character>**DELETE**  
**DELETE**

**DELETE** (<file type>) <file>

**DIFFERENCE**

**DISTRIBUTE** <step size>

**DIVIDE BY**< number>

**DIVIDE BY**< file>

**DIVIDE INTO**<number>

**DIVIDE INTO**<file>

<prefix character>**DOWN** (<number>)

**DOWN** (<number>)

**DRAW AXIS** (<type>)

type = 0 through 3, default = 0

**DRAW VERTICAL BAR** (<number of bars per label>)

**DRAW HORIZONTAL BAR** (<number of bars per label>)

number of bars per label = 1 through 4, default = 1

**DRAW CURVE** (Dash)

**DRAW LINE**

**DRAW MARK**

**DRAW PIE** (<number of colors> <total area> <aspect ratio>)

number = 0 through 7, default = 0

total area = sum of the values on the Y-axis, default = no entry

aspect ratio = ratio of horizontal to vertical axis, default = 1

## E

**EDIT**

**EDIT HORIZONTAL LABELS**

**EDIT VERTICAL LABELS**

**EDIT POINTS**

**EDIT TAKE** (<file>)

<prefix character>**END**

**END** (<file>) file used when ending a TAKE file

## F

**FIT**<curve name>

FIT SINE <low> <high>

FORMAT

## G

GENERATE POINTS (<from> <to>) (<step size>)

## H

HELP

HELP AXIS

HELP BUSINESS

HELP CURVES

HELP DATA

HELP DRAW

HELP EDIT

HELP EXIT

HELP LABELS

HELP MATH

HELP POINTS

HELP SCREEN

HELP SETUP

HELP TITLE

HELP TAKE

## I

<prefix character>INSERT (<x coordinate>) (<y coordinate>)

INSERT (<x coordinate>) (<y coordinate>)

INTERCHANGE

## L

LIST CATALOG (<file>)

LIST CURVE <file>

LIST HORIZONTAL LABELS (<file>)

LIST VERTICAL LABELS (<file>)

LIST POINTS (<file>)

LIST SETTINGS

LIST STATISTICS (<file>)

LOAD <file>

LOAD HORIZONTAL LABELS <file>

LOAD VERTICAL LABELS <file>

LOAD POINTS <file>

LOAD SCREEN <file>

# M

MULTIPLY BY <number>

MULTIPLY BY <file>

# P

<old prefix character>PREFIX <new prefix character>

PREFIX <prefix character>

PRINT <message>

# S

SAVE <file>

SAVE HORIZONTAL LABELS <file>

SAVE VERTICAL LABELS <file>

SAVE POINTS <file>

SAVE SCREEN <file>

SET COLOR <color>

color = GREEN

VIOLET

WHITE

ORANGE

BLUE

BLACK

NONE

(Note: this is the order used when  
the program cycles through the colors.)

SET CURVE <curve name> <C1> (<C2>) (<C3>)

curve name = CONSTANT

LINE

LOGARITHM

PARABOLA

SINE

SET DASH <dash number>

dash number = 0 through 4

SET DEFAULT VOLUME <volume name>

SET DEVICE <device name> <number>

SET FILL ON

SET FILL OFF

SET HORIZONTAL LABEL LENGTH <number>

SET VERTICAL LABEL LENGTH <number>

number = 0 through 11, default = 11

SET MARK <mark number>  
mark number = -3 through +4

SET HORIZONTAL RANGE <low value><high value>  
SET VERTICAL RANGE <low value><high value>

SET SCREEN

SET SLOT <slot number>  
slot number = 0 through 7, default = 2

SET TITLE <title>

SET HORIZONTAL TITLE <title>  
SET VERTICAL TITLE <title>

SET HORIZONTAL FLOATING TITLE <title> (<x><y>)  
SET VERTICAL FLOATING TITLE <title> (<x><y>)

SET VIRTUAL FILE <file>

SHIFT <direction><number>  
direction = RIGHT  
LEFT

SMOOTH MOVING AVERAGE <past periods><future periods><from>

SUBTRACT <number>  
SUBTRACT <file>

SUBTRACT FROM <number>  
SUBTRACT FROM <file>

SUM

SWAP

T

TAKE <file>

<prefix character>TOP  
TOP

U

<prefix character> UP (<number>)  
UP (<number>)

W

WAIT (<time>)

WRITE SCREEN SILENTYPE

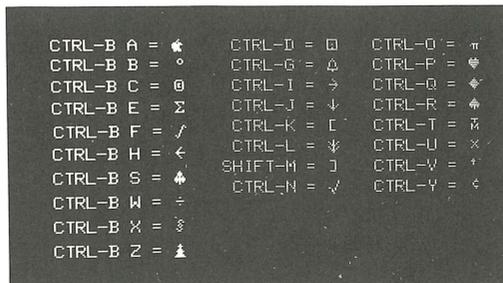
# Control Characters

To type a control character, hold down the key labeled CTRL while pressing one or more keys.

## CONTROL CHARACTER

## EFFECT

- CTRL-A** shows other half of the 80-character screen.
- CTRL-E** enables the lowercase feature and turns the shift lock on and off. (Use CTRL-T to turn off lowercase.)
- CTRL-F** turns the console display off and on.
- CTRL-S** stops and starts the program.
- CTRL-T** turns off the lowercase feature. (Use CTRL-E to turn on lowercase.)
- CTRL-W** capitalizes the next character you type (if it is a letter).
- CTRL-X** deletes the line you just typed.
- CTRL-Z** turns on the extended screen, so that you always see the last 36 characters you typed. (CTRL-A turns off CTRL-Z.)



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Work Phone \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

**What Printer or plotter do you currently use or plan to purchase?**

**What other programs would you like to be able to load files from?**

**What other commands or features would make this product more useful?**

**What output media do you prefer?**

Slides (35mm)      Overhead transparencies

Paper                      Other \_\_\_\_\_

**Do you have any other comments or ideas?**



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Tuck end flap  
inside back cover  
when using manual.

