VISITREND/PLOT™

BUSINESS GRAPHICS WITH FORECASTING & STATISTICS

VISICORP™

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User's Guide
for the APPLE II & II PLUS
48K DOS 3.3

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VISICORP™

VISITREND/PLOT™ USER'S GUIDE

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PREFACE

PURPOSE OF THIS MANUAL

This manual teaches you how to use VisiTrend/Plot™, and provides a complete reference to the details of the program.

Chapter 1: INTRODUCTION presents an overview of the three VisiTrend/Plot subprograms, and guides you in setting up your computer, and in getting started with the program.

Chapter 2: THE VISITREND/PLOT TUTORIAL contains five lessons that teach the main features of the program with examples and illustrations. You are introduced keystroke-by-keystroke to drawing graphs, managing files, editing, and analyzing data. In addition, Lesson 5 contains a set of plotting examples. Each lesson ends with a functional summary that can serve as a bare-bones course, or as a review of the lessons.

Chapter 3: REFERENCE alphabetically references each VisiTrend/Plot menu, and the program commands and features. You can use the Reference to provide more detail during the lessons, or to clarify and enhance your knowledge of particular points, after you have learned the program.

The Glossary and Index are effective tools for learning terminology, and locating the discussion of various topics.

The Appendixes cover topics of special interest: Appendix A is a list of error messages, Appendix B contains printer information, Appendix C discusses data formats for file storage, and Appendix D shows how VisiTrend/Plot data can be shared with other programs such as VisiCalc®.

The Pocket Reference Card provides a handy summary of the VisiTrend/Plot menu functions and special features.

HOW TO USE THIS MANUAL

The VisiTrend/Plot manual is primarily a set of lessons and a reference. It can be used in different ways to maximize its value. Here are a few suggestions:

- If you are using VisiTrend/Plot for the first time, and have not spent much time using other programs, read the Introduction and do the lessons. Each lesson is independent of the other lessons, but you should do them in the order given. As you progress, use the Reference to look up answers to your questions.

- If you have a good deal of computer experience and have used other programs, you can quickly learn the VisiTrend/Plot program by reading the Introduction and studying the functional summaries at the end of each lesson. The summaries are a brief keystroke guide, and can provide a quick course for learning the program. Refer to the text of the lessons or to Chapter 3: REFERENCE for further explanations and details.

INTRODUCTION

ABOUT THIS PROGRAM

The VisiTrend/Plot™ program turns your computer into a statistical-analysis and chart-plotting system. With this program you can enter and save business data, do complex forecasting and analysis, display charts of your current status and goals, print charts on your printer, and save charts on diskette for later use with VisiTrend/Plot or other programs. The VisiTrend/Plot program communicates with the VisiCalc® program and other programs that support DIF™ (data interchange format) files.

The VisiTrend/Plot program contains three subprograms:

*   The **Main Subprogram** for storage management and data editing.
*   The **Trend Subprogram** for statistical analysis and data editing.
*   The **Plot Subprogram** for plotting charts of the data generated by the other subprograms.

Figure 1-1 shows the relationship between these subprograms.
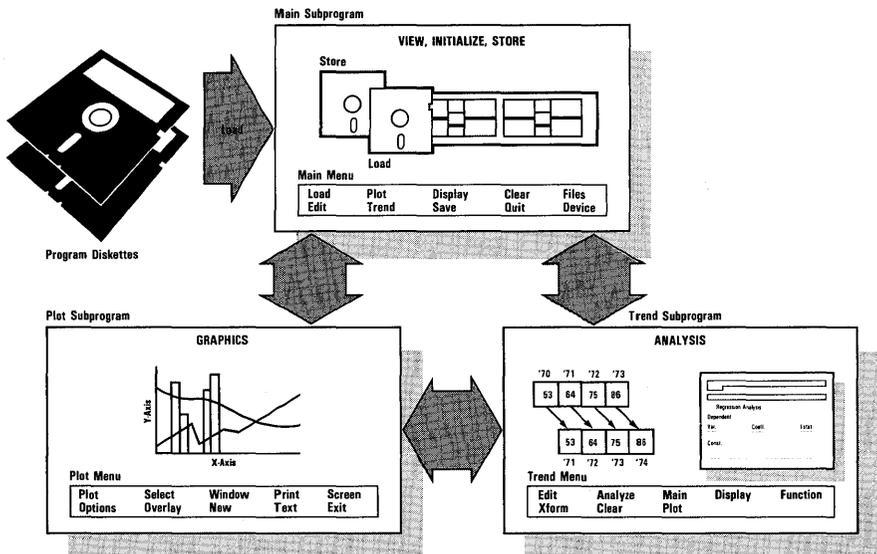
001-002

Figure 1-1. VisiTrend/Plot Program Overview

MAIN

When you load VisiTrend/Plot, the program begins in the Main subprogram. Main provides a path to the other two subprograms: Trend, and Plot. Existing data must be loaded from a data diskette using Main, or data must be created using either Main or Trend, before charts can be drawn using Plot. In the Main subprogram you can:

- Load data from a data diskette.
- Save data on a diskette.
- List the data currently in memory.
- Control the assignment of disk drives.
- Clear unwanted data from memory.
- Create new data and modify existing data.
- Load the Trend subprogram.
- Load the Plot subprogram.

TREND

In the Trend subprogram you can:

- Develop data series to do analysis and forecasting. The available methods include derivation of data-point-to-data-point moving averages, smoothing data, percent of change, leading, lagging, and cumulative total functions. Additionally, new series can be created by taking sums, ratios, logs, or other mathematical or logical transformations of the time series data.
- Perform linear multiple regressions, using the ordinary least squares method. The Trend subprogram calculates and displays the major statistical measures of a multiple regression including: standard errors of the coefficients and the regression, T-statistic, R-bar squared, F-statistic, and Durbin-Watson statistic.
- Perform trendline forecasting.
- Calculate and generate statistics such as minimum, maximum, mean, variance, standard deviation, and correlation coefficient.

PLOT

In the Plot subprogram, you can create text-only pages and annotations, and you can visually communicate statistical data by generating the types of charts shown in Figures 1-2 through 1-7.
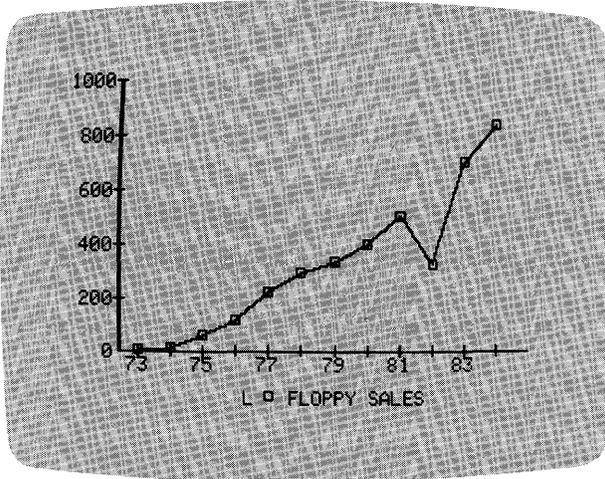
018-001/P

Figure 1-2. Typical Line Chart

    Line charts consist of points plotted against a value axis and a time axis. The points can be plotted with or without the connecting line.
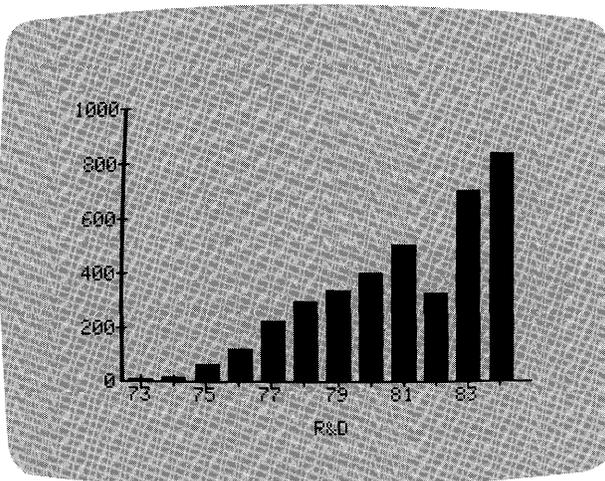
018-002/P

Figure 1-3. Typical Bar Chart

    Bar charts consist of vertical bars that indicate values by the height of each bar.
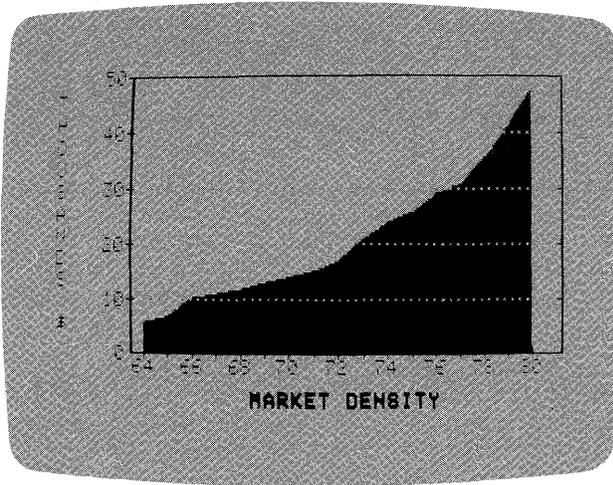
018-003/P

Figure 1-4. Typical Area Chart

Area charts consist of a line chart with the area between the plotting line and the base line filled in.
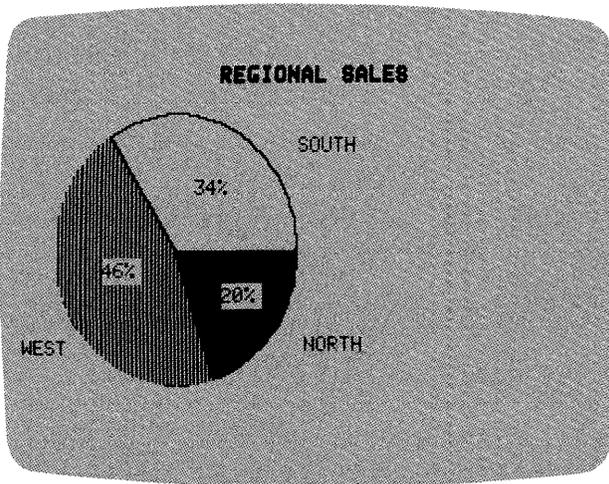
018-004/P

Figure 1-5. Typical Pie Chart

Pie charts consist of a circle segmented to show percentage of a whole or total.
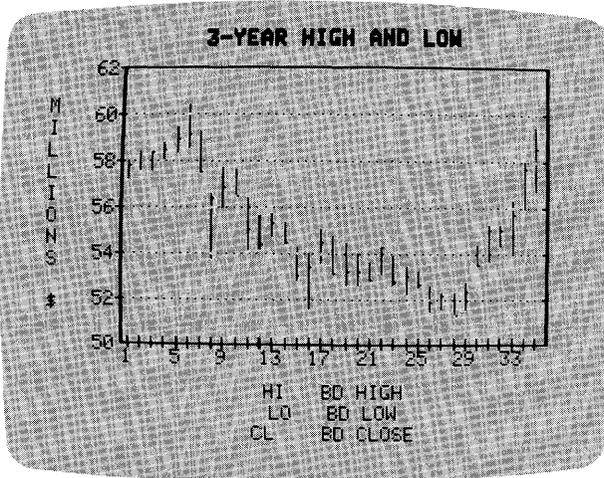
018-005/P

Figure 1-6. Typical High-Low-Close Chart

High-Low-Close charts consist of data points and vertical lines that show the high value, low value, and intermediate value for each data point.
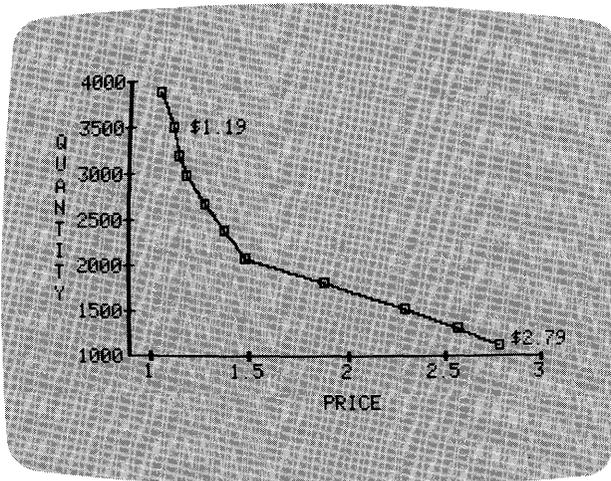
018-006/P

Figure 1-7. Typical XY Chart

XY charts consist of two sets of values plotted against each other. The single set of points on this type of chart graphically indicates the presence or absence of a correlation between the two sets of values.

Also, with the use of the VisiTrend/Plot overlay and window capabilities, combinations of all the chart formats (except the Pie chart) are possible. A Pie chart is a unique form that is always handled separately. Figures 1-8 through 1-10 show some examples of chart combinations.
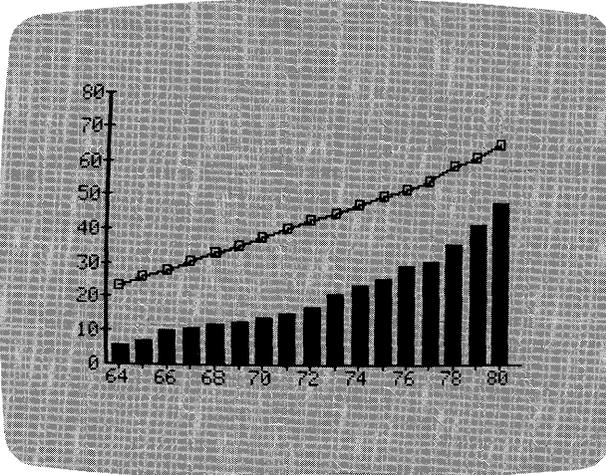
018-007/P

Figure 1-8. Combined Line and Bar Chart
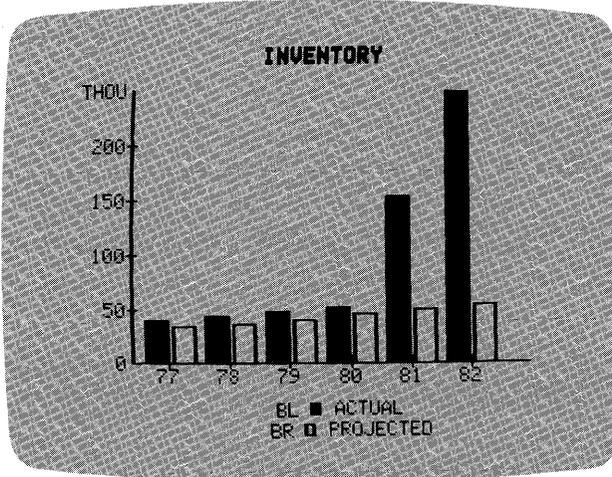
018-008/P

Figure 1-9. Comparative Bar Chart
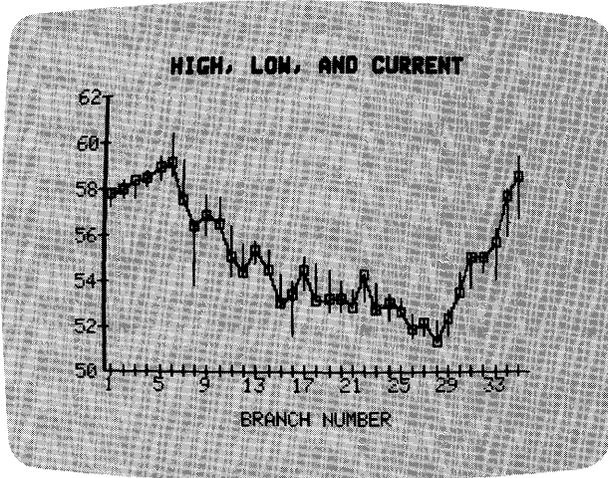
018-009/P

Figure 1-10. Combined High-Low-Close and Line Chart

COMPUTER SET-UP

To use the VisiTrend/Plot program with your computer, you must have:

- 48K or more of RAM memory.
- A video monitor or a TV set, either color or black-and-white. A video monitor with color is preferable so that you can make full use of the VisiTrend/Plot color capabilities.
- Two or more Apple Disk II disk drives. The disk controller must have the 16-sector PROMs installed. The 16-sector PROMs come with the Apple Language System and with Apple DOS 3.3.

  Make sure your disk drives are connected to the computer as shown under DEVICE in Chapter 3: REFERENCE.
- The two VisiTrend/Plot product diskettes that are stored in the plastic sleeve at the back of this binder.
- At least one blank diskette.
- The Apple Language System card or the Applesoft ROM if your system is an Apple II. The Apple II Plus already has Applesoft BASIC in ROM.

Be sure that your computer is set up and fully operational before you try to load the VisiTrend/Plot program. If you experience difficulty at any point in the set up, see your dealer.

1-7

TAKING CARE OF FLOPPY DISKETTES

You can't be too careful with your diskettes! Each diskette is magnetically coated and sealed in a protective square plastic cover. You can see the magnetic surface of the diskette through the oval cutout in the square cover.

Never touch the exposed magnetic surface with your fingers or any implement. Protect diskettes from dust by storing them in the paper sleeves. Do not store them within six inches from magnetic fields generated by a TV, speakers, or other magnetic devices.

Temperature extremes (such as in a car trunk on a warm day) destroy diskettes. Never fold, bend, or staple a diskette. And don't write on the square plastic cover with a hard pen or pencil (use only soft felt tip pens). Store diskettes in a special diskette binder or case.

GETTING STARTED

THE KEYBOARD

Figure 1-11 shows the computer keyboard. With the exception of a few keys, the keyboard is self-explanatory. Any special keys will be explained as you need to use them.
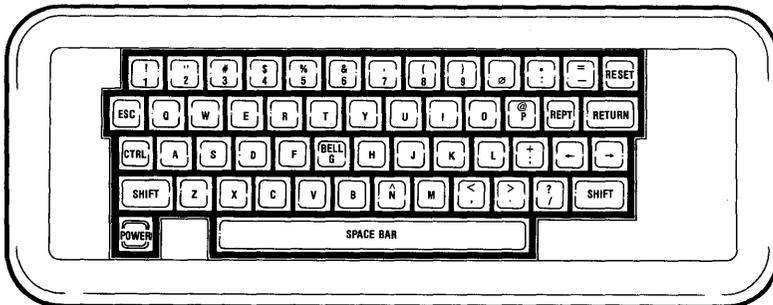
001-002

Figure 1-11. The Keyboard

WARNING: Never press the RESET key. When VisiTrend/Plot diskettes are in the drives, pressing RESET can damage the program and data. If you do accidentally press RESET, see the directions under KEYBOARD USAGE in Chapter 3: REFERENCE.

1-8

INSERTING AND REMOVING DISKETTES

The door of a floppy disk drive is opened by pulling outward and upward on the bottom edge of the door. The diskette is inserted into and removed from the drive with the diskette label facing upward. The edge of the diskette with the oval cutout enters the drive first; the edge with the label enters face up and last.

Never remove a diskette while the red IN USE light on the drive is lit. This can permanently damage the diskette, and is almost certain to destroy the information on it. You may be able to reuse such a diskette, but you will not be able to recover the lost data.

READING THE PROGRAM DISKETTE SERIAL NUMBER

The VisiTrend/Plot program diskette serial number is recorded on the program diskette. You need the serial number to complete your warranty card. Write down the number so that you can refer to it later. To read the number, follow the steps below:

1. With the computer power OFF, insert your Apple DOS 3.3 System Master diskette into drive 1. Turn the power ON.
2. Insert your VisiTrend/Plot program diskette into drive 2, and type the DOS 3.3 command:

   CATALOG,D2
3. Press the RETURN key to see the second page of the catalog listing. The program diskette serial number is contained in the name of the last file in the list. The name is SERIAL-NUMBER: xxxxxxxxxx, where xxxxxxxxxx is the 10-digit serial number.

LOADING THE VISITREND/PLOT PROGRAM

The procedure you use to load the VisiTrend/Plot program depends on the configuration of your computer. For all configurations, the 16-sector PROMs must be installed in the disk controller card.

Procedure 1 is used for Apple II Plus computers with or without the Language System, and for Apple II computers with the Applesoft ROM card installed. These systems come equipped with Applesoft BASIC.

Procedure 2 is used for Apple II computers with the Language System installed but without Applesoft in ROM. You must load Applesoft BASIC into these systems before you can load the VisiTrend/Plot program.

Procedure 3 is used if you have a Corvus Hard Disk™ connected to your computer.

Procedure 1 — Floppy Diskettes Only

Assuming that your video monitor and computer are OFF (the Apple's POWER light at the left corner of the keyboard is not lit), follow these instructions:

1. Turn ON your video monitor or TV set.
2. Insert the VisiTrend/Plot program diskette in drive 1, and the example diskette in drive 2. Close the drive doors. If you have multiple floppy-disk drives, drive 1 should be the drive connected to the controller card in the highest-numbered slot. This is usually slot 6.
3. Turn the computer power switch ON. The red IN USE light for drive 1 goes on, and the drive begins to whir. In a few seconds you see the VisiTrend/Plot startup display on the screen. If this display does not appear on the first try, turn the computer switch OFF then ON again.

Procedure 2 — Floppy Diskettes Only

Assuming that your video monitor and computer are OFF (the Apple's POWER light at the left corner of the keyboard is not lit), follow these instructions:

1. Turn ON your video monitor or TV set.
2. Insert the DOS 3.3 System Master diskette in drive 1, and close the door. Drive 2 should be empty. If you have multiple floppy-disk drives, drive 1 should be the drive connected to the controller card in the highest-numbered slot. This is usually slot 6.
3. Turn ON the computer power switch. The red IN USE light for drive 1 goes on, and the drive begins to whir. In a moment, Applesoft BASIC is loaded into the computer, and the Applesoft BASIC prompt (]) is displayed. If your computer contains a Microsoft RAM card, type **FP** and press the RETURN key.
4. Open the drive door, and remove the DOS 3.3 System Master diskette.
5. Insert the VisiTrend/Plot program diskette into drive 1, and close the door.
6. Insert the VisiTrend/Plot example diskette into drive 2, and close the door.
7. Type **RUN HELLO** and press the RETURN key. The red IN USE light for drive 1 goes on, and the drive begins to whir. In a moment, you see the VisiTrend/Plot startup display on the screen. If this display does not appear on the first try, turn the computer power switch OFF then ON again, and repeat from step 2.

Procedure 3 — Floppy Diskettes With Corvus Hard Disk

1. Your video monitor or TV set should be turned ON, and your computer should be turned OFF.

2. Insert the VisiTrend/Plot program diskette in floppy-disk drive 1, and the example diskette in floppy-disk drive 2 (if installed).

   NOTE: If you do not have a floppy-disk drive 2, use the Corvus COPY3 program to put the example diskette files on an empty volume.

3. Turn ON the Corvus Hard Disk drive.

4. When only the READY light on the Corvus Hard Disk drive remains lit, turn ON the computer power.

5. Within a couple of seconds, a DOS startup display appears on the screen.

6. When the] prompt appears, type **RUN HELLO,S4,D1**.

7. Press the RETURN key. In a few seconds, you see the VisiTrend/Plot startup display on the screen.

THE STARTUP DISPLAY

Figure 1-13 shows the initial screen after loading the VisiTrend/Plot program.

018-010/P
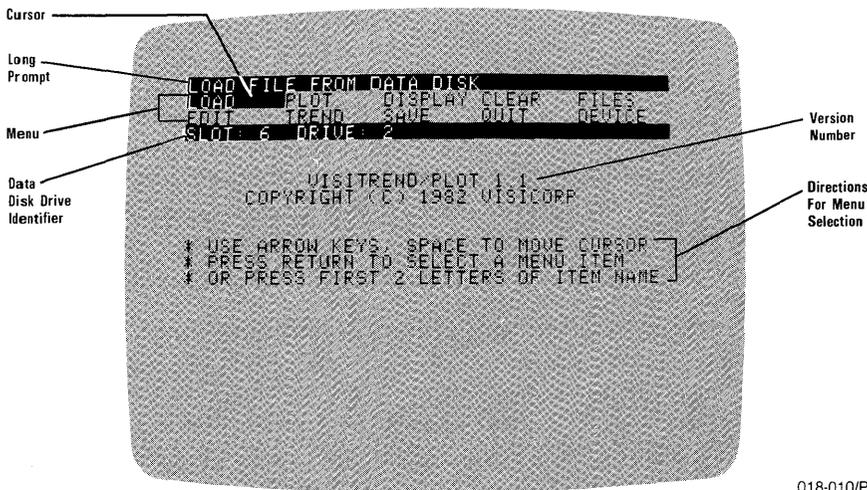
Figure 1-13. Startup Screen Display

The four dark and light bars that currently appear at the top of the screen are called the **status area**. At some points during the VisiTrend/Plot program, this status area appears at the bottom of the screen. The status area displays information about the computer and the program, and contains menus of commands you give to the VisiTrend/Plot program.

The light bars (inverse video) supply information and give directions. The dark bars (normal video) display a menu, messages from the program, or spaces for data entry.

Below the status area are two lines that contain the version number of your VisiTrend/Plot program, and the copyright notice. You should write down the version number, and refer to it in any future correspondence with VisiCorp. The copyright notice indicates that this program and its documentation are protected by the United States Copyright laws. Be sure to read the VisiCorp Customer License Agreement on the back of the User Support Plan.

Below the copyright notice are three lines of directions for selecting a menu item from those displayed in the status area.

THE CURSOR

The cursor is an inverse video rectangle that serves as your pointer to items on the screen. If you just loaded the program and have not pressed any keys, the cursor highlights the menu item LOAD.

Press the → key on the keyboard. The cursor moves to the menu item PLOT. Press the ← key, and the cursor moves back to LOAD.

As you move the cursor, the top line of the status area displays a long prompt of the meaning of each menu item. With the cursor on LOAD, the top line indicates that you can load a file from the data diskette. With the cursor on PLOT, the long prompt indicates that you can go to the Plot subprogram.

You can move the cursor left or right with the ← and → keys. When the cursor reaches the end of one line of items, it wraps around to the other line. You can also move the cursor up or down one line in the menu with the space bar. Experiment with the arrow keys and the space bar until you feel comfortable with moving the cursor to items in a menu.

SELECTING A MENU ITEM

Moving the cursor to a menu item does not execute a command to the program. To make the program respond, you must select that menu item.

You select a menu item in either of two ways:

* Move the cursor to the item, then press RETURN; or
* Type the first two letters of an item name, regardless of where the cursor rests. The cursor moves to the item whose abbreviation you typed, the long prompt flashes on the screen in the status area, and the display associated with that item appears.

Move the cursor to DISPLAY and press RETURN. The program beeps, and the message CAN'T! NO ACTIVE SERIES replaces the menu in the status area. The program cannot display a series of plotting data because none exists in memory yet.

Because the commands in the VisiTrend/Plot program are executed by selections from a menu, you must have a menu on the screen to continue. Whenever a menu is not present on the screen, you can redisplay a menu by pressing the ESC key. Press ESC, and the Main menu is again displayed.

SUMMARY

This completes your introduction to the VisiTrend/Plot lessons. You should now know how to:

* set up your computer.
* load the VisiTrend/Plot program.
* move the cursor within a menu.
* select an item from the menu.
* use the ESC key to redisplay the menu on the screen.

Now you are ready to go on to the VisiTrend/Plot lessons. Lesson One discusses drawing charts on the screen. Lesson Two covers the Main subprogram with the exception of the Edit operation. Editing operations are covered in Lesson Three. Lesson Four describes how to use the statistical analysis functions in the Trend subprogram. Lesson Five guides you in plotting a number of charts for experience with more complete data series.

LESSON ONE: THE PLOT SUBPROGRAM — DRAWING CHARTS

Lesson One covers loading plotting data into memory, and using the Plot subprogram. At the end of this lesson, you should know how to:

- Draw a chart.
- Add titles and other enhancements to a chart.
- Change the scale and range on a chart.
- Print a chart.
- Save the screen image of a chart for later display or printing.

Before you begin this lesson, be sure you have read the Introduction and know how to: load the VisiTrend/Plot program from the diskette, move the cursor in a menu, and select a menu item. Review the Introduction now, if you are unsure of any of these steps.

LOADING DATA INTO MEMORY

If you are not continuing directly from the Introduction, load the VisiTrend/Plot program diskette according to the directions under LOADING THE VISITREND/PLOT PROGRAM in Chapter 1. Your screen should look like the Startup Screen Display in Figure 1-13, earlier.

The status area displays the Main subprogram menu. The bottom line specifies the drive that contains the data diskette. From the Main menu you can access the other two VisiTrend/Plot subprograms: Plot and Trend.

First, you will load data from the data diskette, then go to the Plot subprogram and use that data to draw charts on the screen. Follow these instructions:

1. With the cursor on the word LOAD, press **RETURN**.
2. With the cursor on SAMPLE 1, press **RETURN**. The program displays a list of the data series in **SAMPLE 1**.
3. Press **RETURN** again. The list disappears and the Main menu returns. The **SAMPLE 1** data has been loaded into memory, and you can now use it to draw (plot) a chart.
4. Move the cursor to PLOT, and press **RETURN**. You are now in the Plot subprogram.

The Select menu appears in the status area at the bottom of the screen, preceded by the message PLEASE SELECT CHART TYPE. Your screen should look like Figure 2-1.
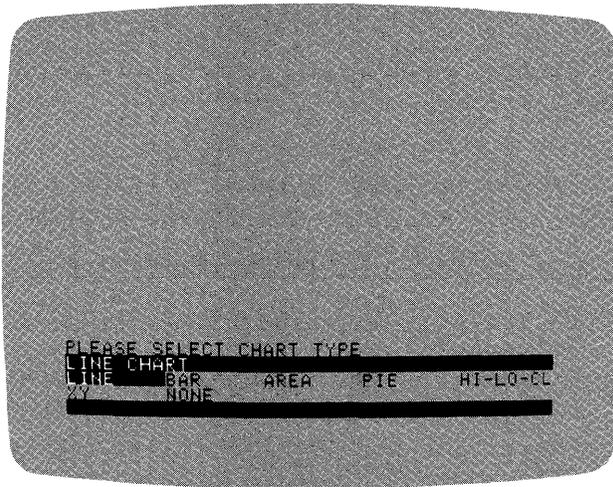
018-011/P

Figure 2-1. Select Menu

SELECTING A CHART TYPE

You use the Select menu to select the type of chart you want to draw. The menu indicates the six types of VisiTrend/Plot charts: **LINE, BAR, AREA, PIE, HIGH-LOW-CLOSE,** and **XY.** The last item on the menu, NONE, exits from the Select menu without choosing a chart type, and takes you to the Plot menu.

With the cursor on LINE, press **RETURN** to select a Line chart.

The menu disappears and is replaced by a line of information: CURSOR MOVEMENT, <SPACE>, OR <RETURN>. The same list of data series names you saw after loading **SAMPLE 1** appears at the top of the screen. You'll now indicate the data series to be plotted by moving the cursor, if necessary, and pressing **RETURN.** Using <SPACE> (the space bar) is discussed in Lesson Five when you select multiple series to be plotted on the same chart.

The header line of the data series list includes some information about each series:

NAME   The name of the data series: series names should describe the data they contain.

PER   The period of the series: the series in this list have a period of 1. This indicates one data point for each time period that the series covers. The period can be any value from 1 to 99. Typical values are 1 (annual), 4 (quarterly), 12 (monthly), and 30 (daily).

START The starting date for the series: the series in this list start in 1973. For periods other than 1, the starting date displays the year followed by the period of the first data point. For example, with a period of 12, a starting date 1980 9 indicates the 9th period of 1980 (September, 1980).

END   The ending date for the series: this date is displayed in the same manner as START. For example, with a period of 12, an ending date 1989 3 indicates the 3rd period of 1989 (March, 1989).

The number of data points in the series: a series can contain up to 150 data points.

You cannot go further in the Plot subprogram until you select a data series to plot. To move the cursor up and down in this list, use the keys marked ← or →. The cursor wraps around the list in much the same way as it wraps around a menu. Pressing → on the last item causes the cursor to jump to the top item. Likewise, pressing ← at the top of the list causes the cursor to jump to the bottom.

Move the cursor to the series named FLOPPY SALES, and press RETURN.

PLOTTING A CHART

The list of data series disappears, and the Plot menu is displayed at the bottom of the screen. Most of your work in the Plot subprogram is selected from this menu. Figure 2-2 shows the Plot menu.
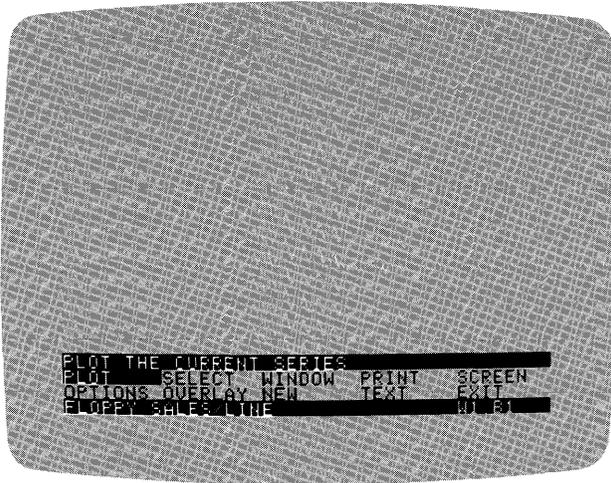
018-012/P

Figure 2-2. Plot Menu

The bottom line of the status area records the information FLOPPY SALES/LINE on the left, and W1.B1 on the right. You have selected a Line chart to be drawn for the **FLOPPY SALES** data series. W1 indicates that the chart's foreground, the data, will be drawn in white, and B1 that the background will be black.

The cursor is on PLOT, and the long prompt indicates that this menu item lets you PLOT THE CURRENT SERIES. Current means your most recent choice(s) from the data series list.

Plotting a Line Chart

Press **RETURN** to select PLOT from the menu. The program beeps, the menu in the status area disappears, and the plotting of the chart begins. Automatically, the Y and X axes, the axes tick marks and values, and the bottom legend are drawn. Your screen should resemble Figure 2-3.
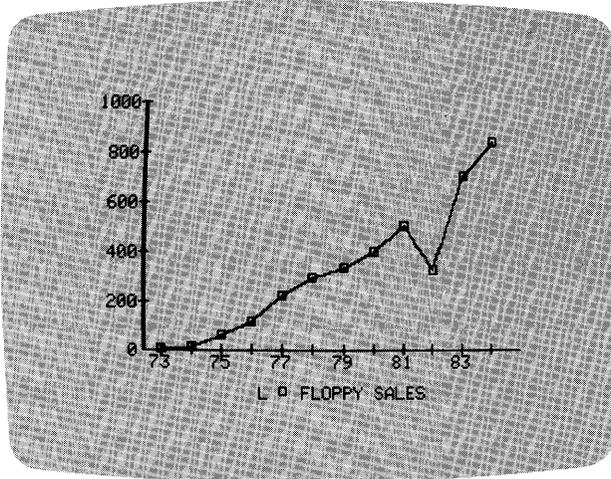
018-013/P

Figure 2-3. Line Chart With Floppy Sales Data

Examine the chart for a moment. The numbers along the Y-axis are the scale of the chart, and the numbers along the X-axis are the range in years. When there are many plotting points for a range of years, the Plot subprogram abbreviates the range numbers to fit on the axis.

The legend at the bottom has three parts: a chart-type code (in this case, L for Line), the plotting symbol used for the series, and the name of the series. A hollow square is always used when a single series is plotted. When you draw charts with multiple series in Lesson Five, you will see the other symbols: plus sign (+), hollow circle (o), x, hollow diamond (◇), and x over a dot (✕).

The chart has one plotting symbol for each of the 12 data points in the series, and the points are connected by a line.

To redisplay the Plot menu, press ESC. The status area covers the legend at the bottom, but the full chart is still visible above the status area.

Press ESC again to see the chart and legend without the status area. You can switch back and forth as often as you wish. ESC works this way whenever a chart is displayed on the screen.

Plotting a Bar Chart

Display the status area on the screen so that you can use the other items in the Plot menu. The menu lets you put titles on a chart, change the range and scale, add and remove grid lines, and many other options. Before examining these features, you'll practice what you just learned by drawing a different type of chart, a Bar chart.

Move the cursor to the word SELECT. The long prompt indicates that you can SELECT A CHART TYPE. Press **RETURN**.

The status area now displays the Select menu. Your Line chart is still on the screen, and you can still remove and redisplay the status area with the ESC key.

Move the cursor to BAR and press **RETURN**.

Instead of listing the available data series, the program first displays the Bar menu in the status area. You can choose the style of bars you want to draw. Figures 2-4 through 2-6 illustrate the choices.
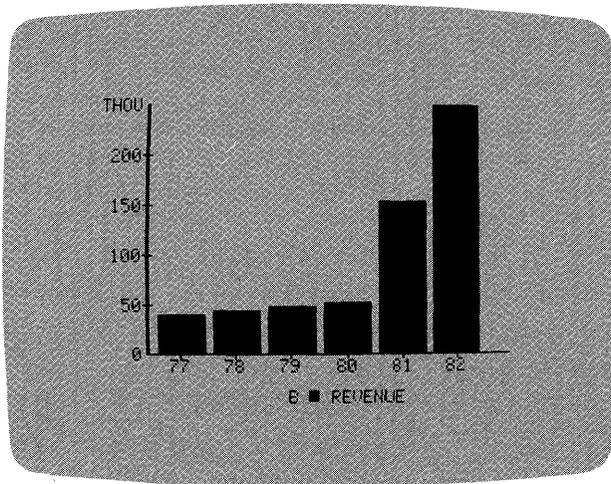
018-014/P

Figure 2-4. NORMAL Bars

Normal bars are full-width, centered on the X-axis tick marks.
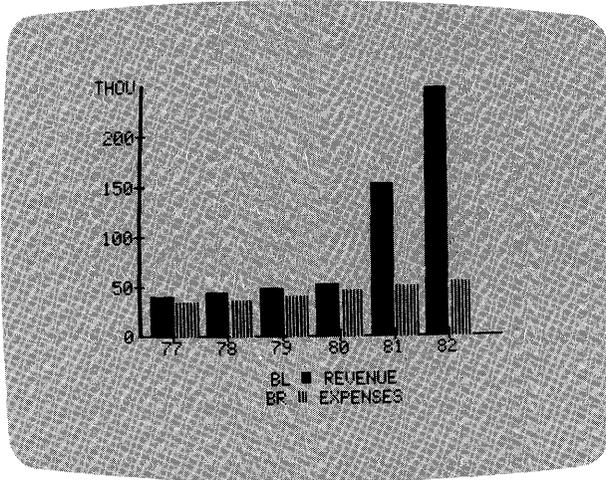
018-015/P

Figure 2-5. BOTH Bars

A half-width bar is drawn on each side of the tick mark. The plot is not complete until both half-width bars are drawn.
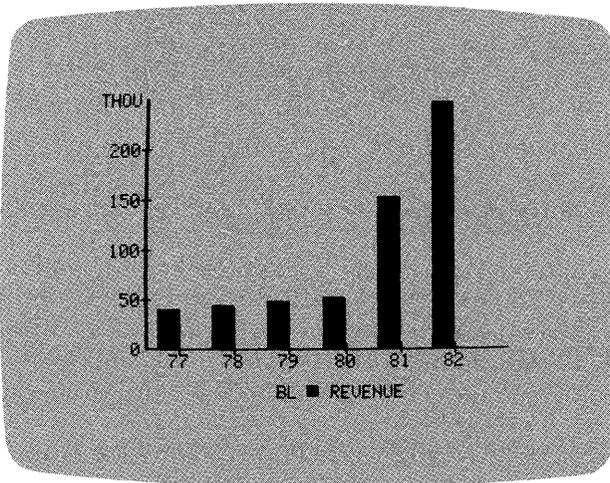
018-016/P

Figure 2-6. LEFT Bars (or RIGHT Bars)

Half-width bars appear to the left of the tick marks. Specifying RIGHT places half-width bars to the right of the tick marks. The plot is complete when either set of half-width bars is drawn, as appropriate.

   With the cursor on NORMAL, press **RETURN**. Now the program
displays the list of data series. Move the cursor to FLOPPY SALES, and
press **RETURN**.

   As before, the list disappears, and the status area presents the Plot
menu. Your previous line chart of FLOPPY SALES is still on the screen. A
previous chart remains as the current chart on the screen until you select
PLOT for a new chart. The bottom line of the status area reflects your
latest selections: FLOPPY SALES/BAR. Now plot the Bar chart.

   With the cursor on PLOT, press **RETURN**. The program beeps, the old
Line chart disappears, and the Bar chart is drawn. Another beep indi-
cates that the chart is complete. Your screen should now resemble
Figure 2-7.
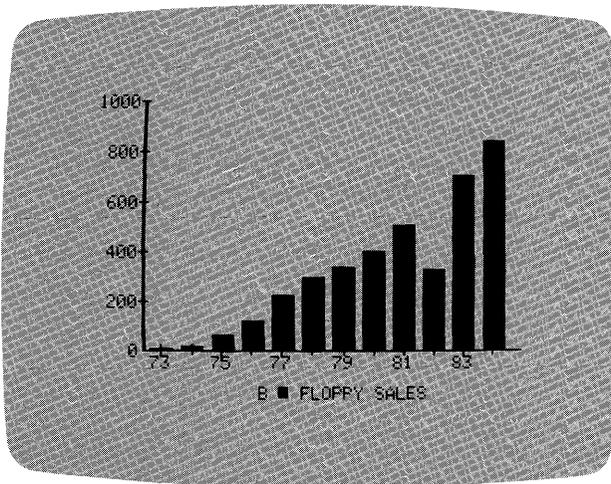
018-017/P

Figure 2-7. Bar Chart With Floppy Sales Data

ADDING DETAIL TO A CHART

   The chart on the screen is a typical Bar chart with basic information.
You can include more detail in the chart such as a descriptive legend,
highlighted titles, or explanations of unusual data.

   Press **ESC** to redisplay the status area with the Plot menu.

   The menu item that lets you add detail to a chart is OPTIONS. Move the
cursor to OPTIONS, and press **RETURN**; or abbreviate the item choice by
typing **OP**. The Options menu appears in the status area. Your screen
should resemble Figure 2-8.
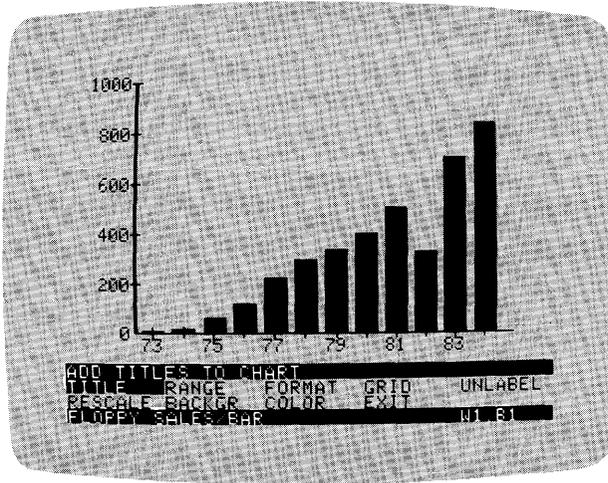
018-018/P

Figure 2-8. Options Menu

Putting Top and Bottom Titles on a Chart

With the cursor on TITLE, press RETURN. The status area now displays the Title menu, shown in Figure 2-9.
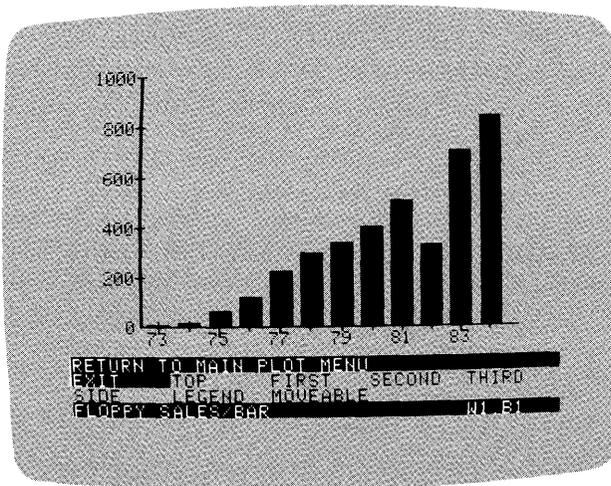
018-019/P

Figure 2-9. Title Menu

The first item in this menu is EXIT. As the long prompt indicates, choosing EXIT lets you RETURN TO MAIN PLOT MENU. All other items in the Title menu perform their function, then let you remain in the Title menu. Try EXIT. Now return to the Title menu from the Plot menu by selecting OPTIONS, and then TITLE.

Now create a top title for your chart. Move the cursor to TOP, and press RETURN; or abbreviate the item choice by typing **TO**.

In the status area, the title menu is replaced by spaces where you enter a title, as shown in Figure 2-10. The cursor is blinking on the title-entry line. This line displays any characters you now type at the keyboard.
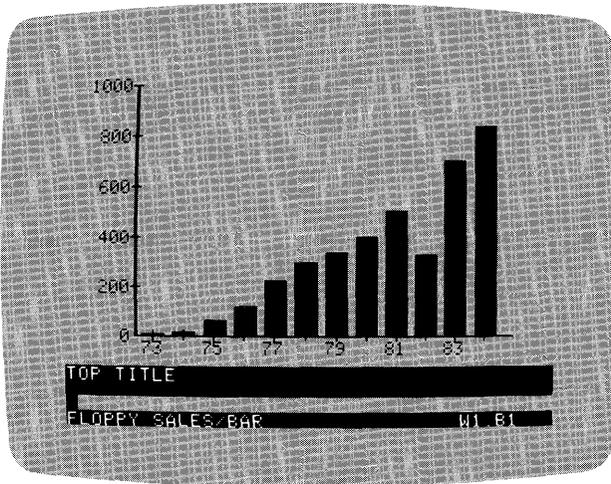
018-020/P

Figure 2-10. Title-Entry Status Area

Type **MY FIRST CHART**. The cursor moves forward as you type. If you make an error, use the ESC key to erase characters to the left of the cursor; then retype them. If you press ESC beyond the beginning of this line, a beep sounds, and you return to the Title menu. In such a case, simply select TOP again.

When you complete the title, press RETURN. Next, the Typeface menu appears, shown in Figure 2-11. You can choose to display your title in normal typeface, bold typeface, or inverse video. Move the cursor to BOLD, and press RETURN.
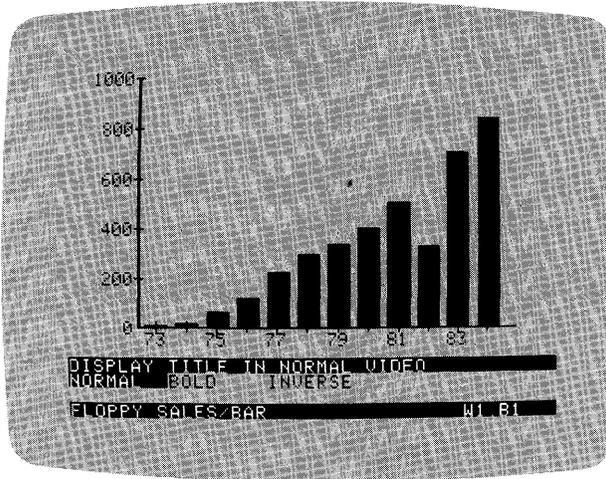
018-021/P

Figure 2-11. Title Typeface Menu

The title appears in boldface type, centered at the top of the chart. The Title menu returns to the status area. Your screen should resemble the one in Figure 2-12.
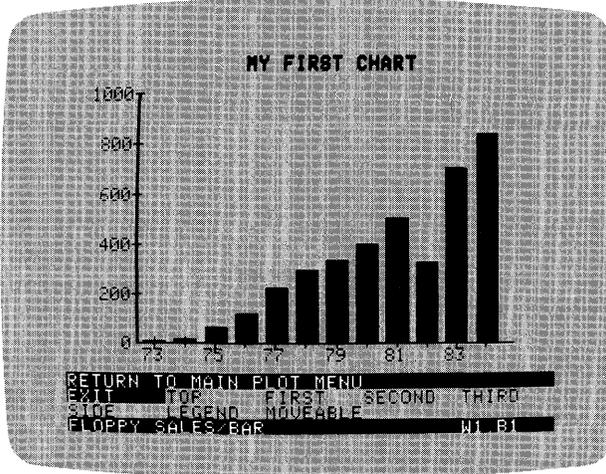
018-022/P

Figure 2-12. Top Title in Boldface

A top title can contain up to 37 characters. To change a top title, you would enter a new one by repeating the sequence above. Select TOP, enter the title, then choose a typeface. The new title would replace the old one. For more information, see the section "Changing and Erasing Titles" later in this lesson.

The menu also lets you enter one, two, or three bottom titles. Bottom titles occupy the first, second, and third lines in the legend area. A bottom title erases a legend that occupies the same line.

Move the cursor to FIRST, and press RETURN; or type **FI**. The title-entry area replaces the menu. Each of the three bottom titles can contain up to 37 characters. Type **DISK DRIVE SALES** for the First bottom title, and press RETURN. The Typeface menu appears. This time select NORMAL typeface; press RETURN. Rapidly, the legend is overwritten by the title, then the Title menu reappears. Press ESC to erase the status area, and take a better look at the bottom title. Press ESC when you are ready to continue.

SECOND and THIRD work the same way as FIRST. They create, respectively, a second and third title under the first title at the bottom of the chart.

LEFT-JUSTIFYING TOP AND BOTTOM TITLES

When a top title or a bottom title is placed on a chart it is automatically centered. If you want to left-justify a top title or any bottom title, type an "at" symbol (@) as the last character of the title. For example, if DISK DRIVE SALES were entered as DISK DRIVE SALES@, it would appear in the lower left-hand corner of the chart under the Y-axis.

If you want to try it now, select FIRST again from the Title menu, type **DISK DRIVE SALES@** as a new title, and select NORMAL from the Typeface menu. When you press ESC to remove the status area, you can see the title at the bottom-left of the chart. Press ESC to continue with the Title menu.

Putting Side Titles on a Chart

Move the cursor to SIDE, and press RETURN; or type **SI**. A side title can contain up to 14 characters. Type **UNITS/OUTLET** in the title-entry area, and press RETURN. This time, select INVERSE from the Typeface menu. The side title is displayed vertically along the left side of the chart, outside the Y-axis values.

Restoring the Legend

The LEGEND menu item is used to restore the original legend line(s) by erasing all bottom title lines. You covered the one-line legend with the FIRST title; now move the cursor to LEGEND, and press RETURN; or type **LE**.

The status area vanishes, the bottom title line is replaced by the original legend, and the status area returns — covering the legend. This happens fast, and you might miss it. Press ESC to erase the status area for a better look. Your bottom title is gone, and the original legend is back on the screen.

This menu item works slightly differently with Pie charts. Refer to the discussion of LEGEND in Chapter 3: REFERENCE for more details.

Putting Moveable Titles on a Chart

The last item in the Title menu is MOVEABLE. This option lets you enter a title, and move it to any location on the chart. You can put any number of titles anywhere on the chart you choose. A moveable title can contain up to 37 characters.

Press ESC to bring back the status area. Move the cursor to MOVEABLE, and press RETURN; or type **MO**. Type **PLANT FIRE** in the title-entry area, and press **RETURN**.

The title appears at the middle-left of the chart. This title can now be moved to any location on the screen.

The movement of a title is controlled with the I, ←, →, and M keys. Look at these keys on the keyboard. Notice that their relative locations suggest the four directions of movement:

<center>

up
I

left ←   → right

M
down

</center>

Press → a couple of times. The title jumps in a given direction each time a direction key is pressed. Now press the M key to move the title down over the chart bars. Notice that the title is white when over a black background and black when over a white background. Keep pressing the M key to move the title all the way to the bottom of the screen.

When the title reaches the limits of the screen, a beep sounds for each attempted move beyond the screen limits.

You can increase or decrease the distance of each title move by typing a number from 1 to 9. The higher the number the farther the title will move when a direction key is pressed. If you do not change the distance per move, the title moves at approximately the 5 rate.

<center>2-13</center>

Press 9, the greatest distance per move, then experiment with pressing I, ←, →, and M. The title can now be moved in fewer jumps from one screen border to another. Experiment with smaller numbers, too.

With a little practice, you can become adept at moving the title quickly to an area of the screen in big jumps, and fine-tuning its position in smaller jumps.

Move the **PLANT FIRE** title to the short bar for the year 1982. Center the title about a quarter of an inch below the top of the bar. When you have positioned the title where you want it, press RETURN.

A Typeface menu appears in the status area. This menu is identical to the Typeface menu for regular titles, with the addition of two items: FIX and CANCEL. The FIX menu item fixes the title in place; it can no longer be moved around the screen. Selecting FIX without specifying a typeface, automatically defaults to the NORMAL typeface. The CANCEL menu item erases the title, then returns you to the Title menu.

Before selecting FIX, or choosing to CANCEL, you can experiment with switching from one typeface to the other. The Typeface menu remains in the status area until either FIX or CANCEL is selected. When you select FIX, the title is fixed on the chart in the chosen typeface, and the Title menu reappears.

For now, move the cursor to FIX, and press RETURN. The title is fixed in place, in NORMAL typeface. The Plot subprogram automatically displays the title in a black rectangle, since it is fixed over the white bars. The title is now a permanent part of the chart. Your screen should resemble Figure 2-13.
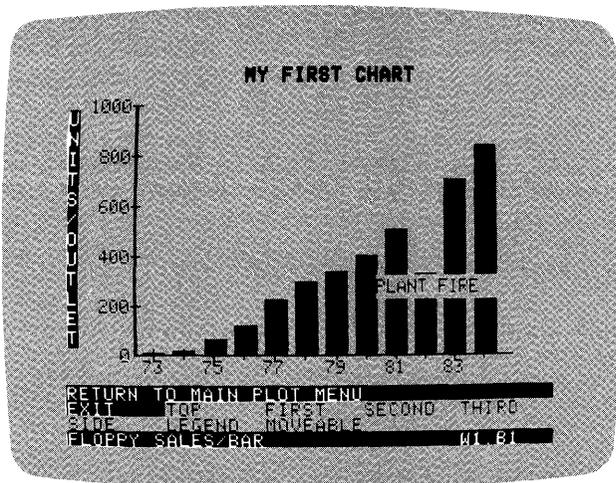
018-023/P

Figure 2-13. A Moveable Title in Place

You learned several important things in this exercise. Review some of them now:

- The keys I, →, ←, and M cause a moveable title to move in the direction indicated by their relative location on the keyboard.
- The numbers 1 to 9 can be used to select the distance a title moves each time the keys I, ←, →, or M are pressed.
- Pressing RETURN after locating a moveable title on a chart displays a Typeface menu.
- The Typeface menu item FIX is the only way to fix a moveable title in place.

Changing and Erasing Titles

Two types of titles can be added to charts in the Plot program: moveable titles and fixed titles. There are different methods for changing and removing these two types of titles.

CHANGING AND ERASING MOVEABLE TITLES

A MOVEABLE title can be easily changed or erased with the CANCEL menu item, before it's fixed in place. The method is the same in either case: to change a moveable title, you first erase it with CANCEL, then select MOVEABLE from the Title menu, and enter a new title.

WARNING: If a moveable title is covering any bars, lines or characters when you press CANCEL, a permanent black rectangle remains on the screen. To avoid this, move the title into an open black area of the screen before you display the Typeface menu.

Try cancelling a title. Select MOVEABLE from the menu, enter TEST1 as the title, and press RETURN. Move the title above the bars.

Now press RETURN to get the Typeface menu. Move the cursor to CANCEL, and press RETURN. The title is erased, and the Title menu reappears.

After you have selected the FIX menu item, a moveable title becomes a fixed title. It can still be changed or erased, but by the methods described below for **FIXED TITLES.**

CHANGING AND ERASING FIXED TITLES

Any FIXED title, except one that was previously moveable, can be changed or erased by simply selecting the same Title menu item again. Then enter a new title to change (write over) the previous title, or type at least one blank as the new title to erase the previous title.

There are two other methods of changing or erasing any fixed title (including a previously moveable title). Both of these methods work as well on other parts of a chart.

- One method is to select the TEXT item that appears in the Plot menu. This item will be covered in detail in Lesson Five.
- A second method is called **masking.** You create a mask to cover an area, thereby erasing it from the chart.

A mask is created with the MOVEABLE menu item, because a mask is simply a moveable title consisting of blanks bounded by periods. A mask can contain up to 37 characters (including the two periods). The mask functions as a horizontal bar, and therefore, cannot be used to effectively cover a side title.

Experiment with a mask now by entering a title on the second bottom title line. Move the cursor to SECOND, press RETURN, enter 1981, and press RETURN again. The Typeface menu appears. Select BOLD, and press ESC to view the new title line.

Now follow these steps to erase the line using a mask:

1. Press ESC to display the Title menu. Select MOVEABLE.
2. Create the mask on the title-entry line in the status area. The mask must contain the same number of blanks as the area to be erased, and it must begin and end with a period. Type a period, four blanks (use the space bar), and another period.
3. Press RETURN. The mask and two periods appear at the center-left of the chart.
4. Use the direction keys I, →, ←, and M to move the mask so that the two periods are on either side of 1981, and resting on the baseline. When the mask is in position, press RETURN.
5. When the Typeface menu appears, select FIX. Press ESC to view the line — the year 1981 and the two periods are gone. Press ESC again to display the Title menu.

As mentioned earlier, you can use masks to erase more than titles. A mask erases any portion of a chart between the two periods.

MANIPULATING THE RANGE AND THE SCALE

The **range** of any chart is the time between the starting date or reference point, and the ending date or reference point. The range is stored as part of the data series, and is plotted on the X-axis (except on an XY chart).

The **scale** of any chart is the spread of values plotted along the Y-axis. The scale is determined each time a series is plotted. The program draws a scale that takes into account the range of values in the series, and adds an appropriate number of scale divisions (tick marks).

In determining a scale, the program attempts to avoid divisions that result in fractional or non-round numbers. Whenever possible, the program chooses round numbers. For example, with a series of 0 through 700, the program tick-marks the Y-axis seven times. The tick marks are labeled 0, 100, 200, ...,700.

When Y-axis values are too large to be displayed, the program indicates a scaling factor (THOU or MILL) at the top of the Y-axis, and truncates the tick mark labels. For example, with a scale of 0 through 30,000, the program prints 0, 10, 20, 30 and displays THOU as the factor. This indicates that the numbers represent 0, 10,000, 20,000, and 30,000, respectively. Figure 2-14 is a chart with a scale factor of thousands.
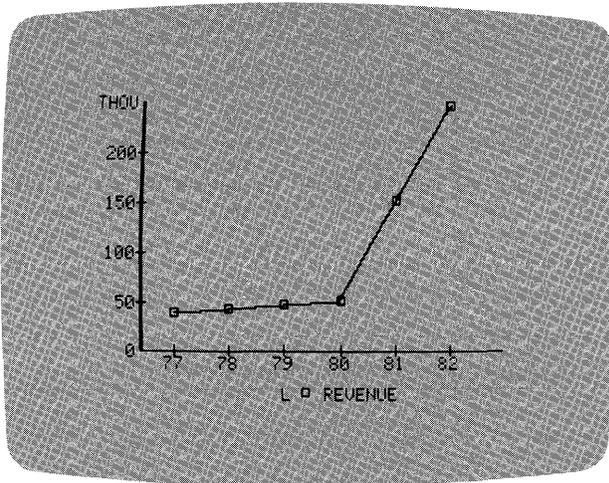
018-024/P

Figure 2-14. Example of Chart With Scale Factor

The VisiTrend/Plot program does its best to generate a good scale for your chart. There are times, however, when the values it chooses are not well-scaled. When this happens, you should consider rescaling the chart.

You can change both the range and the scale when you draw a chart. For example, you might choose to display only a subset of the range, or to emphasize or minimize small variations. The scale and range can strongly influence how the data in a chart is perceived.

Changing the Scale

You'll select a different chart for this portion of the lesson — a FLOPPY DENSITY line chart. Follow this sequence of steps:

1. Move the cursor to SELECT, and press **RETURN**.
2. With the cursor on LINE, press **RETURN**.
3. With the cursor on FLOPPY DENSITY, press **RETURN**.
4. With the cursor on PLOT, press **RETURN**. Your screen should resemble Figure 2-15.
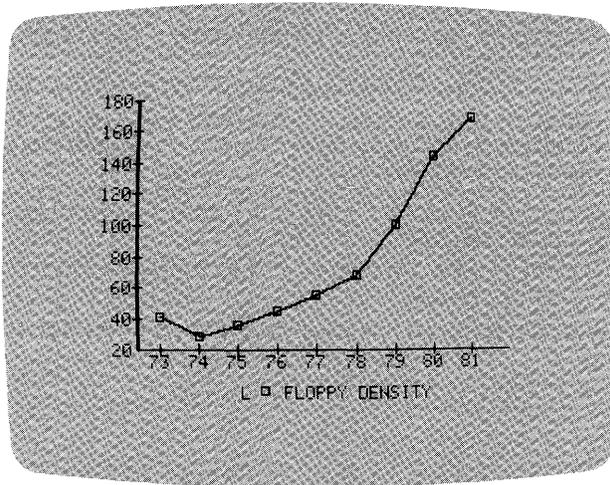
018-025/P

Figure 2-15. Line Chart Before Changing the Scale

Press ESC to display the Plot menu in the status area. Select OPTIONS. The Options menu is now displayed.

One of the items on the Options menu is RESCALE, which changes the scale of the Y-axis. Move the cursor to RESCALE and press **RETURN**.

The status area displays three prompts for the limits of the axis. The first prompt is Y AXIS MINIMUM. The current minimum on the chart is 20. Change it by typing −**200**; press **RETURN**. The next prompt is Y AXIS MAXIMUM. The current maximum is 180. Change it by typing **100**; press **RETURN**. The final prompt is # INTERVALS (2..12) OR <RETURN>. You can specify any number of intervals (tick marks) from 2 to 12, or press **RETURN** to accept intervals as determined by the program. The scale, −200 to 100, divides well into 6 intervals. Type **6** and press **RETURN**.

Note that when you rescale a chart that has a scaling factor (such as THOU), you must enter the complete numbers; for example, you would type 30000, not 30.

The Plot menu returns but the chart has not changed. You must replot the chart with the new scale. With the cursor on PLOT, press **RETURN**. A beep sounds, and a message appears in the status area DATA OFF SCALE, CHOOSE ACTION. This is a warning that some data points in the series are outside of the scale you specified, and that the chart will not contain those data points. You now have two choices of action: PROCEED or CANCEL. PROCEED continues with the chart, drawing it off-scale. CANCEL aborts the plot request (including the rescale numbers), leaves the current chart on the screen, and displays the Plot menu.

Select PROCEED. The program beeps twice to indicate that two data points cannot be drawn on the chart. The last two points in the series did not fit within the scale.

When you proceed with drawing an off-scale Line, Area, XY, Bar, or High-Low-Close chart, the program continues to display the message DATA OFF SCALE, CHOOSE ACTION, and prompts you to PRESS ANY KEY to continue. When you press a key (ESC, for example), the Plot menu returns to the status area.

The incomplete information on an off-scale chart can be misleading. A person reading the chart cannot know that certain data points continue beyond the top of the scale. It is usually preferable to rescale, and replot the chart, than to show incomplete information.

SPECIFYING WELL-SCALED CHARTS

When you select a scale, the program takes your request literally, and does not try to change it. You might occasionally produce some odd-looking scales. This is especially true if you select Y-axis intervals that are not even divisions of the difference between the minimum and maximum scale values. For example, if you set a scale from − 200 to 800 with 10 intervals, the labels read − 200, − 100, 0, 100 and so on. But if you set a scale from − 212.39 to 643.22 with 9 intervals, the chart, while correct, is hard to read (see Figure 2-16).
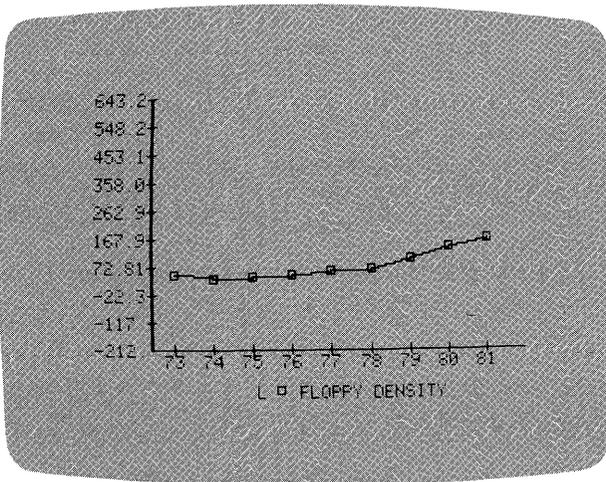
018-026/P

Figure 2-16. Example of Hard-to-Read Scaling

2-20

To determine a reasonable number of scale intervals, subtract the minimum value of the scale from the maximum value. Choose any number, in the range 2 through 12, that evenly divides into the difference. In the chart on your screen, 100 minus −200 equals 300. Specifying 2, 3, 6, or 12 results in divisions of 150, 100, 50, and 25 respectively. Others numbers, such as 4 and 5, divide evenly but result in divisions of 75 and 60. These latter numbers are not as common as chart units of 25, 50, and 100.

Press ESC to display the Plot menu. Move the cursor to OPTIONS, and press RETURN; or type **OP**. When the OPTIONS menu appears, select RESCALE. For Y AXIS MINIMUM, type **0**, and press RETURN. For Y AXIS MAXIMUM, type **750**, and press RETURN. For the number of intervals, type **10**, and press RETURN.

When the Plot menu returns, select PLOT. This time your scale values are accepted, and the chart is redrawn with a new Y-axis.

UNDERSTANDING SCALE ASSUMPTIONS BY THE PLOT SUBPROGRAM

If you mistakenly enter a minimum scale value that is greater than the maximum value, the program makes an assumption and continues. The program assumes that you reversed the values, and switches them back. If you enter the same value for the minimum and the maximum, the program uses this value as the minimum and sets the maximum approximately 20 percent higher.

If you enter a value less than 2 or greater than 12 for the number of intervals, the value appears to be accepted. However, the chart that results will be off-scale.

Changing the Range

Now you'll practice changing the range on a chart. Start with a new copy of the FLOPPY DENSITY Line chart. Go back to the Select menu, and plot a fresh chart of the series, or change the scale back to 20 to 180 with 8 intervals. PLOT the chart. If you need help with your choice, refer to the earlier sections of this lesson under SELECTING A CHART TYPE, and PLOTTING A CHART; or reread "Changing the Scale" above.

Now you should have a FLOPPY DENSITY Line chart on the screen that looks like Figure 2-15, earlier.

Press ESC to redisplay the Plot menu, then select OPTIONS. From the Options menu, select RANGE.

The top line of the status area displays the current range RANGE: 1973 to 1981. The Range menu offers three choices: SET, CLEAR, and EXIT.

EXIT returns you to the Plot menu, SET lets you change the range, and CLEAR removes a new range and displays the range stored in the series. CLEAR does nothing if you have not changed the range.

With the cursor on SET, press **RETURN**. The prompt YEAR? requests a starting year. Type **1974,** and press **RETURN**. The next prompt END YEAR? requests an ending year. Type **1990,** and press **RETURN**.

The Plot menu returns, but the chart is unchanged. RANGE works like RESCALE: you must now select PLOT to see the chart with your changes. With the cursor on PLOT, press **RETURN**. Your chart is redrawn with the new range.

You removed one year from the front of the series, and added nine years to the end. You can lengthen or shorten a range. If you change the range, and thus remove data points, you might wish to rescale. Specifying a range that does not include at least two of the data points in the series, causes the program to print the message CAN'T! BAD RANGE. In such a case, you would press **ESC** to return to the Plot menu, and try again.

Because the period of this series is 1 (annual), the program did not prompt for a period with the starting and ending years. When your data series has a period other than 1, the program additionally prompts for the period of the first data point — for both the starting and the ending years.

Press **ESC** to redisplay the Plot menu, then select OPTIONS. Select RANGE again from the Options menu. This time, move the cursor to CLEAR, and press **RETURN**. When the Plot menu returns, PLOT the chart again. The chart is redrawn with the original range. Press **ESC** to display the Plot menu.

FORMATTING A CHART

You can modify Line, Bar, and XY charts with the FORMAT item in the Options menu. Before practicing with FORMAT, select NEW from the Plot menu. NEW erases the existing chart, and clears all options you have set. If you do not select NEW, some options such as BACKGR, are held over from chart to chart.

Now you'll plot a new chart to practice formatting. With a clear screen, move the cursor to SELECT, and press **RETURN**. Now choose LINE and the FLOPPY SALES series to plot. When the Plot menu reappears, PLOT the chart.

Redisplay the Plot menu, then select OPTIONS. Move the cursor to FORMAT, and press **RETURN**. The Format menu is displayed. The choices are SYMBOLS, LINES, POINTS, and BOTH. The line charts you have drawn in this lesson used both symbols and lines.

Select POINTS from this menu. The Plot menu returns. Now PLOT the chart again. It is redrawn without the plotting symbols — it contains only points to indicate plotted values.

Experiment with the other FORMAT choices by redisplaying the Plot menu, and repeating the preceding steps. Begin with OPTIONS, then FORMAT.

The FORMAT menu item is valid for Line, XY, and Bar charts. For Line and XY charts, the format choices are: symbols only, lines only, points only, or both symbols and lines. When FORMAT is selected for a Bar chart, the Format menu is different. You can select outlined bars, shaded bars, or solid bars. Figures 2-17 through 2-21 show the Bar and XY chart formats.
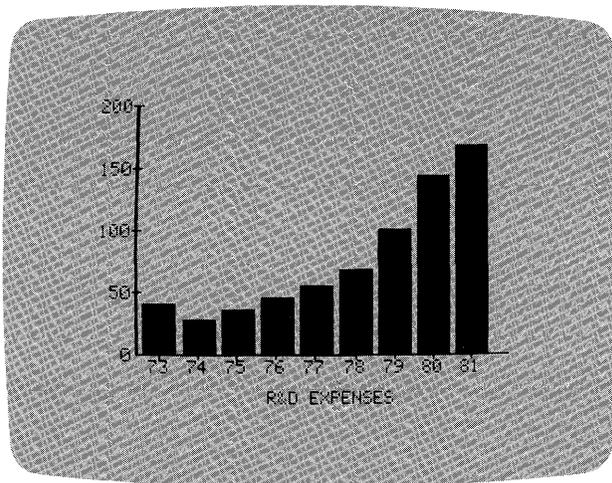
018-027/P

Figure 2-17. Solid-Bar Chart
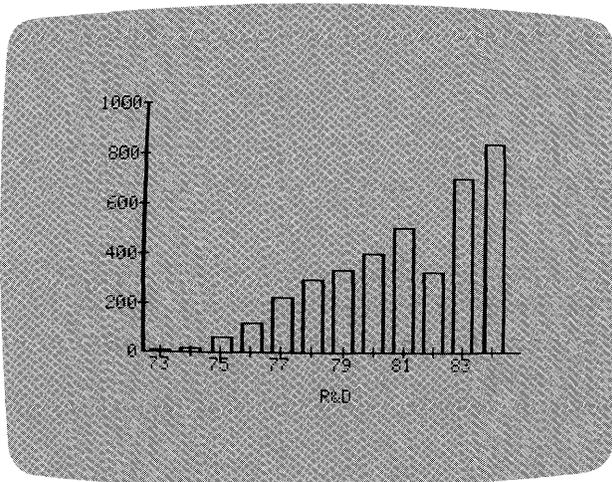
018-028/P

Figure 2-18. Outlined-Bar Chart
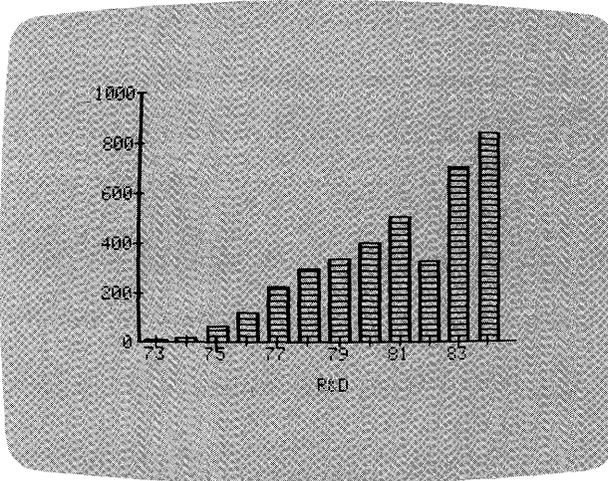
018-029/P

Figure 2-19. Shaded-Bar Chart
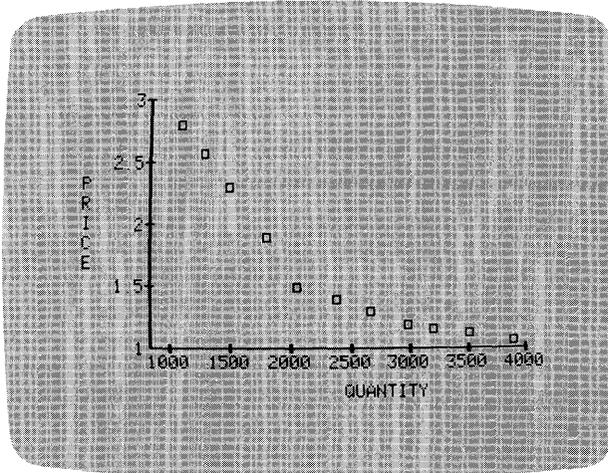
018-030/P

Figure 2-20. XY Chart With Symbols Only
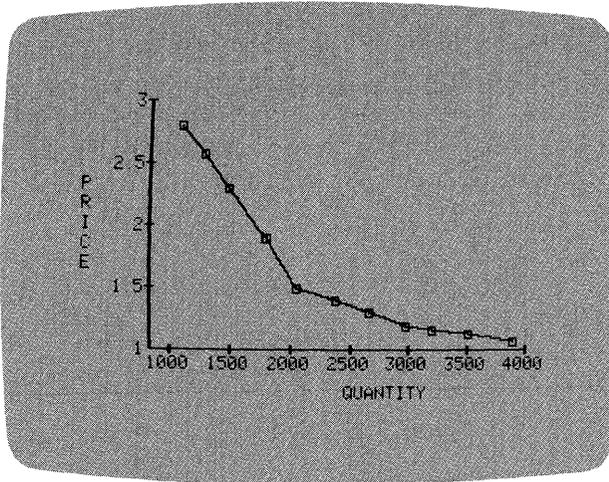
018-031/P

Figure 2-21. XY Chart With Both Symbols and Lines

If you select the FORMAT menu item with any kind of chart other than Line, Bar, or XY, a beep sounds and the program prints the message CAN'T! NO OPTION HERE. In such a case, you would press ESC to return to the Plot menu.

DRAWING GRID LINES

Press ESC to redisplay the Plot menu, then select NEW to clear the screen, and cancel all previously set options. Go to the Select menu. Now select LINE, the FLOPPY DENSITY series, and PLOT the chart. When the chart is drawn, press ESC to display the Plot menu.

Select OPTIONS, move the cursor to GRID, and press RETURN. The Grid menu appears. You can draw horizontal, vertical, or both horizontal and vertical grid lines. The NONE item takes you back to the Plot menu without drawing grid lines. With the cursor on BOTH, press RETURN. The program draws the grid lines for every tick mark that has a label, and completes the chart with top and right-side borders. The Plot menu is displayed. Your screen should resemble Figure 2-22.
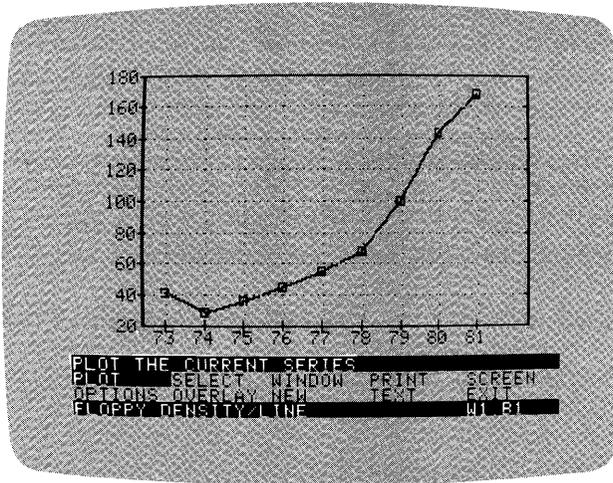
018-032/P

Figure 2-22. Example of Chart With Grid Lines

PLOT the series again. The program redraws the chart without the grid lines. Return to the Grid menu using OPTIONS and GRID, and select only HORIZ to draw the horizontal grid lines.

Go back to the Grid menu once more, and select HORIZ again. The program erases the existing grid lines. Note in Figure 2-23 that only the grid lines are erased; the added border on the top and right side remain. The Plot menu is displayed.
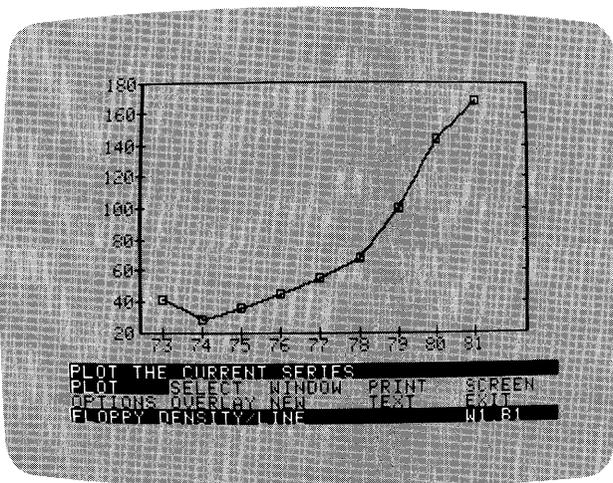
018-033/P

Figure 2-23. Chart With Grid Lines Erased

This grid line erasing feature works for horizontal and vertical grid lines. In general, if a set of grid lines does not exist on a chart, choosing HORIZ, VERT, or BOTH draws the set(s). Once a set of grid lines exists on a chart, choosing the same set a second time erases that set.

Charts that can have grid lines must be displayed before you choose the GRID menu item. If you select the item before you have plotted a chart, a beep sounds, and the program prints the message CAN'T! NO OPTION HERE. If this happens, press ESC to return to the Plot menu.

EXAMINING OTHER ITEMS IN THE OPTIONS MENU

You now have enough experience to examine the remainder of the Options menu. Move the cursor to OPTIONS, and press RETURN. There are three items here that you haven't used: UNLABEL, BACKGR, and COLOR.

UNLABEL erases the X and Y axes labels from a chart. The chart must first be displayed before UNLABEL is selected. Once you erase axis labels with this menu item, you must replot the chart to get them back.

BACKGR and COLOR offer you a variety of visual enhancements. For a complete description of how you can enhance your charts with black, white, and the various colors offered by the COLOR option, see the BACKGR and COLOR sections in Chapter 3: REFERENCE. For now, select EXIT to return to the Plot menu.

PRINTING A CHART

- If an Apple Silentype printer is connected to your computer, continue with the following exercise.
- If a non-graphics printer is connected to your computer, skip this exercise, because you can print listings and tables only.
- If another type of printer is connected to your computer, check Appendix B before going any further. Change printer drivers as explained in the Appendix, then continue with the following exercise.

To print a copy of the chart on your screen, select PRINT from the Plot menu. The Print menu appears in the status area. With the cursor on PRINT, press RETURN. The program immediately begins printing the chart to the printer.

While the chart is being printed, take a look at the Print menu. The Print menu allows you to change the printer driver to any other type that is supported by your computer, and to respecify a slot number for your printer interface card.

DRIVER changes printer/slot only for the current session.

DEFAULT changes printer/slot for the current session and all future sessions. Any change stays in effect until either DRIVER is chosen, or DEFAULT is chosen again.

SLOT allows you to respecify the slot number to which the printer is connected. Usually, the printer is connected to slot 1.

EXIT returns you to the Plot menu, without printing.

Chapter 3: REFERENCE and Appendix B contain more information on printers and the Print operation. When printing is completed, the program returns to the Plot menu.

SAVING A CHART ON DISKETTE

Once you have plotted a chart on the screen, you can save (store) the screen image in a diskette file. This allows you to retrieve the chart later for viewing on the screen, or printing to the printer. The SCREEN option lets you save and retrieve your charts.

Select SCREEN from the menu. The Screen menu appears with the choice of loading, saving, device changing, or exiting.

Now you'll practice saving the chart on the example data diskette. If you want to save the chart on a data diskette in another drive connected to your computer, see DEVICE in Chapter 3: REFERENCE.

Move the cursor to SAVE, and press **RETURN**. The SCREEN menu is replaced with the prompt CURSOR MOVEMENT OR < RETURN > . Screen images that have been saved on the diskette are displayed in a list, with [NEW FILE] at the end of the list. Moving the cursor with → or ← steps through the list, and **RETURN** selects the highlighted file. You are going to save the chart in a new file, so move the cursor to [NEW FILE], and press **RETURN**.

The status area prompts for the file name. Type **SCREEN1**, and press RETURN. The VisiTrend/Plot program saves the displayed chart on the data diskette, in a file named SCREEN1.PIX. The suffix .PIX denotes that the file is a screen image. You do not need to type this suffix; it's automatically added by the program whenever you name a file to save a screen image.

When the file has been saved on the diskette, the Screen menu appears again in the status area underneath the chart.

RETRIEVING A CHART FROM DISKETTE

From the Screen menu, you can also retrieve (LOAD) a chart image from a data diskette.

With the cursor on LOAD, press RETURN. A list of chart image files stored on the diskette appears on the screen. The program added .PIX to each file name when you saved the file.

The last entry in this list is [NONE]. When there are more file names than can fit on one screen, the last entry in the list is [MORE]. Selecting [MORE] displays the next screen of file names.

When the last entry in the list is [NONE], all file names in the list have been displayed. You select [NONE] if you change your mind about loading a file in this list. This choice cancels the Load operation, erases the list of file names, and redisplays the Screen menu.

For now, select SCREEN1.PIX from the list. The list is erased, and the chart you just saved in SCREEN1.PIX is displayed.

Press ESC to display the Screen menu again, and select EXIT to return to the Plot menu.

Note that the display on your screen is the saved image, or picture, of a plotted chart. As such, the .PIX file is available for display or printing to a printer; but you cannot add or remove options on this image. However, text can be added to and removed from a .PIX file using the TEXT menu item. You will learn about the Text operation in Lesson Five.

EXAMINING OTHER ITEMS IN THE PLOT MENU

You can now examine the remainder of the Plot menu. You haven't used four items in this lesson: WINDOW, OVERLAY, TEXT, and EXIT.

WINDOW allows you to draw two charts on the same screen.

OVERLAY allows you to add series to a chart without redrawing the chart.

TEXT allows you to create text-only screens, and to annotate and edit charts.

The Window, Overlay, and Text options are described in Lesson Five.

The EXIT item displays a menu offering three choices: MAIN, TREND, and CANCEL. MAIN reloads the Main subprogram, TREND loads the Trend subprogram, and CANCEL returns you to the Plot menu. The data series that you have in memory are not lost when you move to other subprograms.

SUMMARY

In this lesson, you've used most of the features of the Plot subprogram. At this point, you should know how to load the Plot subprogram, how to plot a chart, and how to enhance a chart with fixed and moveable titles, and grid lines. You should also be comfortable with changing the scale and range of a chart, storing and retrieving a chart image on diskette for future use, and printing a screen image on a printer.

FUNCTIONAL SUMMARY

Operation	From	Select or Type
LOADING		
Load a data file	Main menu	1. LOAD 2. file name 3. RETURN/PRINT
Load the Plot sub-program	Main menu	1. PLOT
PLOTTING		
Draw a Line chart	Select menu	1. LINE 2. series name
	Plot menu	3. PLOT
Draw a Bar chart	Select menu Bar menu	1. BAR 2. NORMAL/BOTH/ LEFT/RIGHT 3. series name
	Plot menu	4. PLOT

(Continued)

Operation	From	Select or Type
MENU DISPLAY		
Redisplay or erase the Plot menu after plotting	chart display	1. ESC
TITLES, LEGENDS, AND LABELS		
Put top, bottom, or side titles on a chart	Plot menu Options menu Title menu	1. OPTIONS 2. TITLE 3. TOP/FIRST/SEC-OND /THIRD/SIDE 4. title (end with @ to left-justify; correct with ESC)
	Typeface menu	5. NORMAL/BOLD/INVERSE
Put a moveable title on a chart	Plot menu Options menu Title menu	1. OPTIONS 2. TITLE 3. MOVEABLE 4. desired title 5. 1 through 9 (to change movement increment) 6. I, ←, →, M (position the moveable title) then RETURN
	Typeface menu	7. NORMAL/BOLD/INVERSE 8. FIX
Erase a fixed title (masking)	Plot menu Options menu Title menu	1. OPTIONS 2. TITLE 3. MOVEABLE 4. .spaces. 5. I, ←, →, M (position the mask) then RETURN 6. FIX

(Continued)

Operation	From	Select or Type
TITLES, LEGENDS, AND LABELS (Continued)		

Erase a legend	Plot menu
	Options menu
	Title menu
	
	Typeface menu
		1. OPTIONS
		2. TITLE
		3. FIRST/SEC-
		   OND/THIRD
		4. space(s)
		5. NORMAL/BOLD/
		   INVERSE

Restore the original legend	Plot menu Options menu Title menu	1. OPTIONS 2. TITLE 3. LEGEND
View the legend	Chart with status area	1. ESC
Erase axis labels	Plot menu Options menu Unlabel menu	1. OPTIONS 2. UNLABEL 3. BOTH/HORIZ/VERT
SCALE AND RANGE		
Change the scale and redraw the chart	Plot menu Options menu Plot menu	1. OPTIONS 2. RESCALE 3. Y-axis minimum 4. Y-axis maximum 5. number of intervals 6. PLOT 7. if off-scale: PROCEED
Change the range and redraw the chart	Plot menu Options menu Range menu Plot menu	1. OPTIONS 2. RANGE 3. SET 4. start of range 5. end of range 6. PLOT 7. if off-scale: PROCEED
Return to the original range and redraw the chart	Plot menu Options menu Range menu Plot menu	1. OPTIONS 2. RANGE 3. CLEAR 4. PLOT

(Continued)

Operation	From	Select or Type
FORMATTING AND COLOR		
Erase existing chart, and all options	Plot menu	1. NEW
Draw symbols only, lines only, or points only—on Line and XY charts	Plot menu Options menu Format menu Plot menu	1. OPTIONS 2. FORMAT 3. SYMBOLS/LINES/ POINTS 4. PLOT
Draw symbols and lines on Line and XY charts	Plot menu Options menu Format menu Plot menu	1. OPTIONS 2. FORMAT 3. BOTH 4. PLOT
Draw different bar formats on Bar charts	Plot menu Options menu Format menu Plot menu	1. OPTIONS 2. FORMAT 3. OUTLINE/SHADED/ SOLID 4. PLOT
Draw horizontal, ver-tical, or both horizon-tal and vertical grid lines	Plot menu Options menu Grid menu	1. OPTIONS 2. GRID 3. HORIZ/VERT/BOTH
Erase horizontal, vertical, or both horizontal and vertical grid lines	Plot menu Options menu Grid menu	1. OPTIONS 2. GRID 3. HORIZ/VERT/BOTH
Change background color on Line, Bar, or Area chart	Plot menu Options menu Backgr. menu Plot menu	1. OPTIONS 2. BACKGR 3. (color) 4. PLOT
Restore original background color on Line, Bar, or Area chart	Plot menu Options menu Backgr. menu Plot menu	1. OPTIONS 2. BACKGR 3. DEFAULT 4. PLOT
Change plotting color	Plot menu Options menu Color menu Plot menu	1. OPTIONS 2. COLOR 3. (color) 4. PLOT

(Continued)

Operation	From	Select or Type
FORMATTING AND COLOR (Continued)		
Restore original plotting color	Plot menu Options menu Color menu Plot menu	1. OPTIONS 2. COLOR 3. DEFAULT 4. PLOT
PRINTING		
Change the printer driver	Plot menu Print menu Linefd. menu Print menu	1. PRINT 2. DRIVER/DEFAULT 3. printer 4. YES/NO (use/don't use auto linefeeds) 5. slot number 6. EXIT
Print displayed chart	Plot menu Print menu	1. PRINT 2. PRINT
SAVING		
Save displayed chart on same diskette	Plot menu Screen menu	1. SCREEN 2. SAVE 3. existing file name/ [NEW FILE] then new file name
Save displayed chart on another diskette	Plot menu Screen menu	1. SCREEN 2. DEVICE 3. device identifier 4. SAVE 5. existing file name/ [NEW FILE] then new file name

LESSON TWO: THE MAIN SUBPROGRAM — LOADING, SAVING, AND DELETING DATA

This lesson describes the operations of the Main subprogram, except for Edit. The Edit operations are described in Lesson Three.

Main is the first subprogram you encounter after loading the VisiTrend/Plot program diskette. In the Main subprogram, you create, load, and save VisiTrend/Plot data. You can also access DIF (data interchange format) data from other VisiCorp products, such as the VisiCalc program. See Appendix D for information on DIF files.

In Lesson One, you were introduced briefly to the Main subprogram when you used it to load the sample data diskette, and to access the Plot subprogram. In this lesson, you will fully explore the Main subprogram.

ACCESSING THE MAIN MENU

- If you are continuing directly from Lesson One, your screen displays the FLOPPY DENSITY line chart image that you loaded from the file SCREEN1.PIX. The status area displays the Plot menu. Select EXIT from this menu. Now, with the cursor on MAIN, press RETURN to access the Main subprogram.
- If you are not continuing directly from Lesson One, load the program diskette according to the directions in the section LOADING THE VISITREND/PLOT PROGRAM in Chapter 1. Then load the data series as described in the section LOADING DATA INTO MEMORY in Lesson One.

In either case, the Main menu now appears in the status area at the top of the screen. This menu is shown in Figure 2-24.
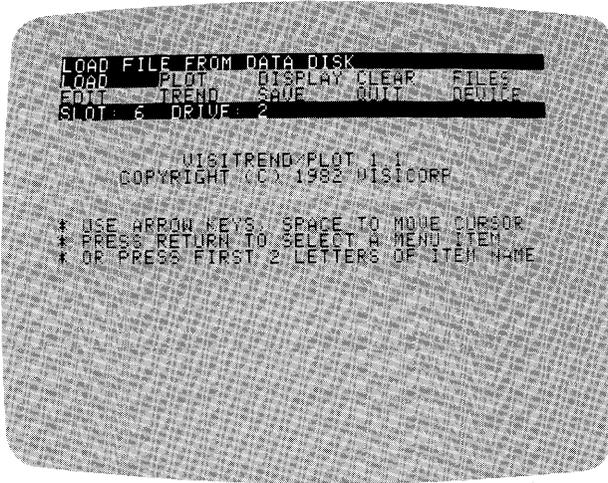
018-034/P

Figure 2-24. Main Menu

USING THE PROGRAM DISKETTE AND DATA DISKETTES

Data diskettes store data files, and the program diskette stores the VisiTrend/Plot program. The bottom line of the status area for the Main menu identifies the data drive. This is the drive used to load or save data on diskette, and that should contain your example data diskette throughout these lessons. When you're using your own data, that data diskette also belongs in this drive. If you have two floppy disk drives, the drive identifier is 2, as shown in Figure 2-25.

Slot: 6 ────────
Drive: 2
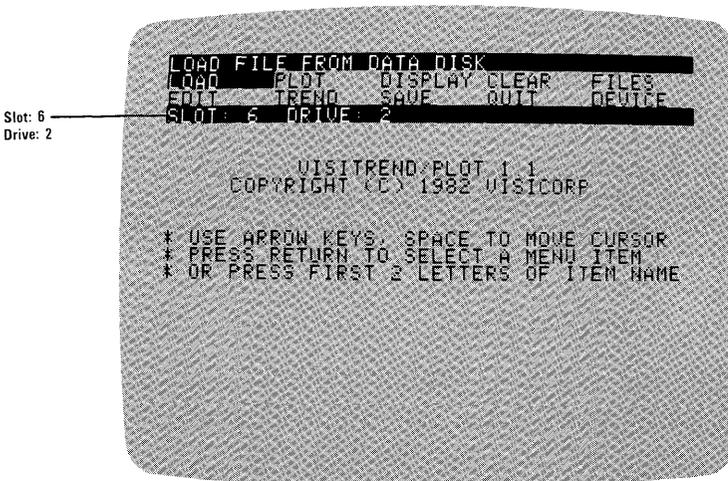
018-035/P

Figure 2-25. Data Diskette Identifier in Main Menu

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If you have more than two floppy disk drives (or a hard disk drive) con-
nected to your computer, check the slot and drive identifiers to make
sure that the drive listed contains the data diskette. If you try to load from
a nonexistent or empty drive, the program prints an error message.

Data should never be stored on the program diskette. The
VisiTrend/Plot example diskette contains all of the sample data series
used in these lessons. In Lesson One, you used two of these series from
the SAMPLE 1 file, FLOPPY DENSITY and FLOPPY SALES.

UNDERSTANDING FILES AND SERIES

Data is stored on a data diskette in units called files. This data can be a
screen image of a chart, or it can be a collection of data points (called a
series). A file is identified by a file name.

When the VisiTrend/Plot program processes data in the computer
memory, that data is called a series. Each series is a collection of data
points for a single chart, and is identified by a name, just like a file. Files
are used to store one or more series. Figure 2-26 shows the relationship
between files, series, and data points.
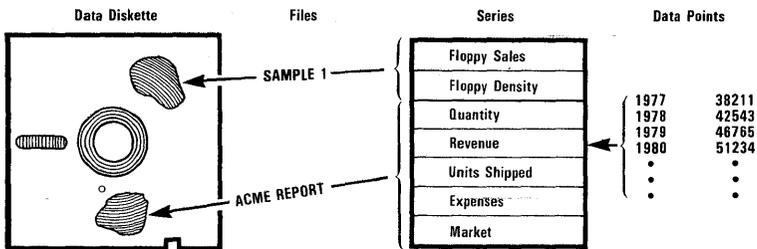
Figure 2-26. Relationship Between Files and Series

A data series can be used only after the file, on which the data series is
stored, has been loaded into memory from the data diskette. Loading a
file does not erase it from the diskette. When a file has been loaded into
memory, the program only processes the data in individual series.

Often, several series with related data need to be used for similar
tasks. The advantage in storing multiple series on one file is that you can
access lots of data by loading a single file instead of many files.

The points to remember are:

* Both files and series have names.
* Files are units of storage on diskettes. The program uses files for storing individual units of data.
* Series are individual units of data in files. The program uses series for processing.

> On a Corvus Hard Disk, a volume is the same as one data diskette.

USING DATA WITH THE VISITREND/PLOT PROGRAM

There are two ways to get chart-plotting data into the computer memory. You can create it with the Edit operation (described in Lesson Three), or you can load it from diskette.

In Lesson One, and possibly again at the beginning of this lesson, you loaded data from the sample diskette. You chose from a displayed list of file names, and then the program displayed a list of series names in the loaded file.

To recap briefly:

* After you loaded the VisiTrend/Plot program, the Main menu appeared, and you selected LOAD. The program then printed the list (directory) of files on the diskette. The list resembled Figure 2-27.
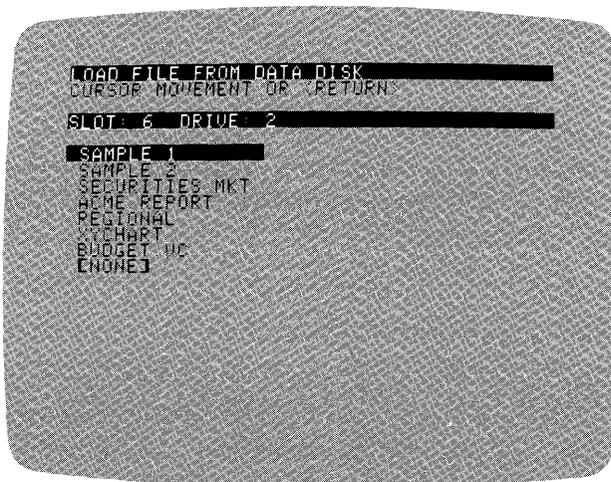
018-036/P

Figure 2-27. List of Files for Loading

- You chose the file SAMPLE 1, and the file was loaded into memory. Next, a list of the series in that file was displayed, as shown in Figure 2-28.
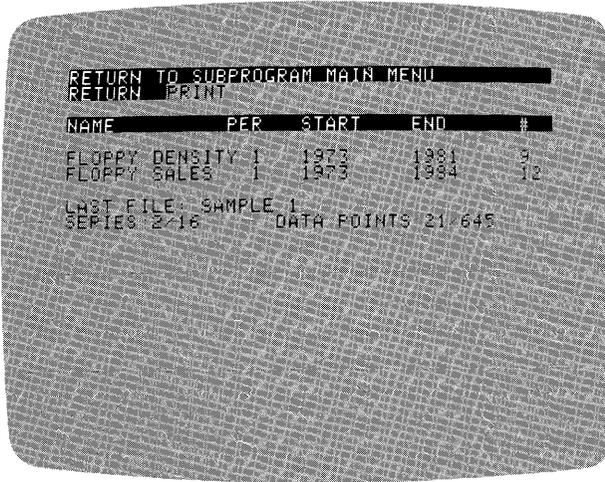
018-037/P

Figure 2-28. List of Series in Loaded File

- You selected RETURN, which returned the Main menu.

If you want to put more files into memory, repeat the above procedure. Be advised that you cannot put more than 16 data series or 645 data points into memory. One file can contain up to 16 series. Four files with four series each, or two files with 8 series each are also possible — as long as the total number of data points contained in all series is less than 645. Any one series cannot contain more than 150 data points.

When the memory limit is reached, a message is printed indicating that no more room is available. When memory is approaching its limit, the program does partial loads, if possible. In other words, some of the series in a file can be loaded even when there isn't room for all the series in that file.

DISPLAYING THE SERIES IN MEMORY

From the Main menu, move the cursor to DISPLAY, and press RETURN.

To review, the list on the screen shows the names of the series, the period of the data (the frequency of data points per year), the starting date, the ending date, and the number of points in the series.

This list has an additional line at the bottom that was not present in the Plot subprogram list. It reads:

SERIES: 2/16   DATA POINTS: 21/645

This line shows how much memory is occupied. Of the possible 16 series you may have in memory, there are now two. Of the possible 645 data points you may have in memory, there are now 21.

Select RETURN to return to the Main menu. Alternately, you may select PRINT to print a copy of the list before returning to the Main menu.

INITIALIZING A DATA DISKETTE

> Initializing a data diskette as described here, applies to floppy diskettes only. For a Corvus Hard Disk, see the appropriate Corvus manual.

Before a diskette can store data, it must be initialized with the FORMAT menu item. This item appears in the Files menu. You get to the Files menu by selecting FILES in the Main menu.

Move the cursor to FILES, and press **RETURN**. You're given three choices: FORMAT to initialize a data diskette, DELETE to delete files from a data diskette, and MAIN to return to the Main menu. The status area displays the identifier of the drive that you will use.

With the cursor on FORMAT, press **RETURN**. The status area displays directions for your next action:

INSERT DISKETTE S6,D2   <ESC> CANCELS.

You can either insert the data diskette in Slot 6/Drive 2, or you can press **ESC** to cancel the Format operation. Note that if your disk controller card is installed in a different slot, that slot number is displayed instead of slot 6.

Get another diskette to practice initializing. Make sure that the diskette is blank (or does not contain important information), and that the write-protect tab has been removed. The initialization process completely erases data on a diskette. Remove the VisiTrend/Plot example data diskette from the drive, and replace it with the diskette to be initialized. Press **RETURN**.

The red **IN USE** light stays on while the diskette is being initialized. When the Format operation is complete, you are returned to the Main menu.

A data diskette initialized with FORMAT is ready for storing data series and screen images. Before doing the next exercises, remove the data diskette you just initialized, and put the example diskette back in the drive.

SAVING DATA ON DISKETTE

The SAVE menu item takes data that is in computer memory and writes it onto a data diskette. Move the cursor to SAVE and press **RETURN**.

A menu with two items, NORMAL and DIF, is displayed. This menu lets you choose the format in which the data will be saved. If the data is to be used only with the VisiTrend/Plot program, save it in the NORMAL format.

The DIF (data interchange format) choice stores data in a format that can be used by other VisiCorp products, such as VisiCalc. See Appendix D, and the end of this lesson, for more detailed information.

With the cursor on NORMAL, press **RETURN**.

The status area displays the directions CURSOR MOVEMENT, < SPACE >, OR < RETURN >. You select the series to be saved in a file by moving the cursor to a series, and pressing **RETURN**. The space bar lets you indicate more than one series to be saved. An asterisk (*) marks a series when you press the space bar, but the marked series is not saved until you press **RETURN** to complete the Save operation.

You can change your mind up to the time you press **RETURN**. Pressing the space bar a second time causes the asterisk to disappear. The specified series is no longer selected for saving. Pressing the space bar selects the series again. You can select as many or as few series as you want.

Below the status area is the list of series currently in memory. At the bottom of the list are the items [NONE] and [ALL]. Figure 2-29 shows this display.
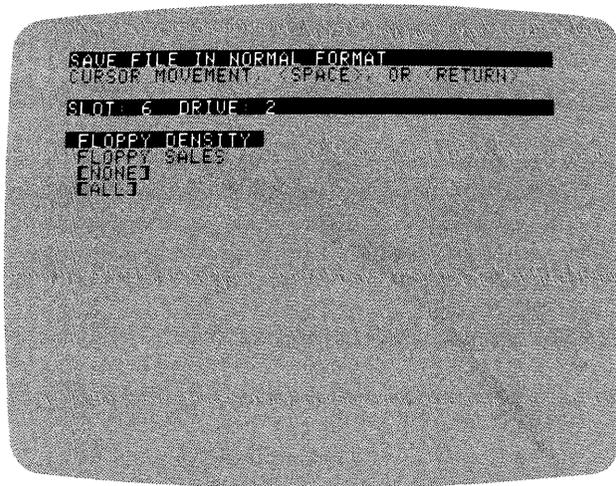
018-038/P

Figure 2-29. List of Series for Saving

You can cancel the Save operation by moving the cursor to [NONE], and pressing RETURN. Alternately, you can select [ALL], which puts all the series currently in memory onto the data diskette.

When you press RETURN, you save all series marked with an asterisk **and** the series which the cursor is highlighting (whether or not the latter has an asterisk). If the cursor is on [ALL] or [NONE], all series or no series are selected, respectively — regardless of the number of asterisks in the list.

For the purposes of this lesson, move the cursor to [ALL], and press RETURN. The directory of the files currently on the diskette is now listed under the status area. It is the same list you saw when you loaded SAMPLE 1. But there is a slight difference: there is now an entry called [NEW FILE] in this list.

You must now select the name of the file in which the selected series will be saved; but you must be careful. If you select an existing file name, you store the selected series in that file, but you destroy all the data previously stored in the file. For example, if you have a file in memory that contains series 1, 2, and 3, then save series 2 in that same file, the file will contain only series 2. Series 1 and 3 will be erased from the file on the diskette.

It is good practice to save all data in new files. If you decide later that you don't need old data, you can erase files with DELETE, described later in this lesson.

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Also remember that all selected series are saved in the same file, regardless of the file(s) from which they were originally loaded.

For now, select [NEW FILE].

When you choose to create a new file, the program prompts for a file name. Type **SAMPLE 1**, then press RETURN, and see what happens. An error message appears CAN'T! FILE EXISTS, and the Save operation is cancelled. When saving series in a new file, you must assign a file name that is different from all other file names on the data diskette.

Press ESC to return to the Main menu.

Remember to check the data disk drive identifier before starting a Save operation. The identifier cannot be changed during the Save operation. If you have begun a save but need to change the drive identifier, return to the Screen menu by selecting [NONE] from the series list, or by pressing ESC when you are prompted for a file name. Then select DEVICE to change the identifier.

If you select the identifier for a Corvus Hard Disk, the program will ask you to specify a volume.

You can cancel a save in one of two ways, depending on where you are in the operation:

1. You can cancel the save operation by selecting [NONE] from the displayed list of series in memory; or

2. You can cancel the save operation by selecting [NEW FILE] from the displayed list of files on the diskette, then pressing either ESC or RETURN when prompted for a file name. RETURN by itself is invalid as a file name, and cancels the operation.

CLEARING SERIES FROM MEMORY

When you save data on a diskette, the copy of the data in the computer memory is not erased. After you have saved new and modified series on diskette, you might want to clear them from memory to make room for new data you want to load or create.

The CLEAR menu item removes some or all of the series from memory. Move the cursor to CLEAR, and press RETURN. The status area prompts you to SELECT SERIES TO CLEAR. Remember, you must select the series you want to remove, not the ones you want to keep.

The list of series in memory is displayed under the status area. Two additional items: [KEEP ALL] and [KEEP NONE] are in this list. [KEEP ALL] removes nothing from memory; in effect, it cancels the Clear operation. [KEEP NONE] removes everything from memory.

You are going to clear the series FLOPPY SALES from memory. Remember, this doesn't affect the copy of the series that is on diskette in the file **SAMPLE 1**. Move the cursor to FLOPPY SALES, and press **RETURN**.

The program next gives you two choices: you can print the list of series still in memory (shown on the screen), and then return to the Main menu; or you can return directly to the Main menu. Select **RETURN**.

MOVING BETWEEN SUBPROGRAMS

When you have finished loading, editing, or creating data, you normally want to go to either the Plot or the Trend subprogram. The PLOT and TREND menu items load the Plot and Trend subprograms, respectively, from the program diskette.

In Lesson One, you loaded the Plot subprogram from this menu and used it to plot charts. In this lesson, you'll follow a similar procedure, but with the Trend subprogram. Unlike the Plot subprogram, the Trend subprogram contains the same edit capabilities as the Main subprogram; therefore, you can load the Trend subprogram without first loading data.

Move the cursor to TREND, and press **RETURN**. The Trend subprogram loads.

The Trend menu is displayed. This menu includes two items MAIN and PLOT that allow you to leave the Trend subprogram, and go to one of the other subprograms. Select MAIN; the Main subprogram is loaded, and the menu reappears.

Various items in the VisiTrend/Plot program offer you a "path" back to the Main or other subprograms. None of the data in memory is lost in transition.

To see for yourself that the data is kept, move the cursor to DISPLAY and press **RETURN**. The list displays the **FLOPPY DENSITY** series. Now press **RETURN**, and load the Plot subprogram. Select any chart type from the Select menu. Compare the list of series with the list from the Display operation. They are identical.

Now go back to the Main subprogram: press **RETURN**, select EXIT, then select MAIN. Do a DISPLAY again, and you will find that the list has not changed. Press **RETURN** to display the Main menu.

The Trend subprogram also contains a DISPLAY menu choice that you can try. The data remains no matter which subprogram you load.

DELETING FILES FROM THE DATA DISKETTE

You should periodically delete files from your data diskette to make space for new files, and to remove out-dated files.

The DELETE menu item erases files from your data diskettes. This item appears in the Files menu, along with the FORMAT item you used earlier. To display the Files menu, select FILES from the Main menu. When the Files menu appears, select DELETE.

The files on the diskette are listed below the status area. You select a file for deletion in the same manner that you select a file for loading or saving: you move the cursor to a file name, and press **RETURN**. Because this operation permanently erases files, the program warns you with a beep, and prompts you to confirm the deletion by typing **Y**. Do not press any keys yet. If you press **RETURN** and then **Y**, the file highlighted by the cursor will be deleted.

For the purposes of this lesson, select [NONE] at the bottom of the list. A second list of your chart image files appears containing the file you saved in Lesson One, SCREEN1.PIX. Select [NONE] again. The Delete operation is cancelled, and the Main menu returns.

REVIEWING THE EFFECTS OF COMMANDS ON FILES AND SERIES

The CLEAR, DELETE, LOAD and SAVE commands, as you have seen, affect files and series in various ways. Table 2-1 illustrates the **results** of executing these commands on files and series both in memory and on the data diskette.

Table 2-1. Effects of Commands on Files and Series

Command	Sub-program	Specified File Type	Specified Series	Results: Series Exists in Memory	Results: File Exists on Diskette
CLEAR	Main/ Trend		series name(s)	no	yes*
DELETE	Main	Normal/ .DIF/.PIX		yes	no
LOAD	Main	Normal/ .DIF		yes	yes
LOAD	Plot	.PIX		yes	yes
SAVE	Main	Normal/ DIF		yes	yes**
SAVE	Plot	.PIX (default)		current display only	yes

* If series was previously saved in a file on diskette.

** If the save is to an existing file, all previous series in that file are lost, and only newly specified series are saved in the file.

GETTING OUT OF THE VISITREND/PLOT PROGRAM

One remaining item in the Main menu has not been mentioned: QUIT. This item exits the VisiTrend/Plot program and puts you into DOS. All data in memory, and all work in progress, is cleared when you select QUIT.

You can leave the VisiTrend/Plot program now, so move the cursor to QUIT, and press RETURN. Type **Y** to confirm, and the] prompt is displayed. If you want to load the VisiTrend/Plot program again, follow the directions under LOADING THE VISITREND/PLOT PROGRAM in Chapter 1.

USING VISICALC DATA IN THE VISITREND/PLOT PROGRAM

This section describes how to move data from the VisiCalc program to the VisiTrend/Plot program, and vice versa. If you do not use both of these products, or have no need to transfer data, skip this section and go to the summary at the end of this lesson.

You can load and plot VisiCalc data using the VisiTrend/Plot capabilities. The VisiCalc data must be saved in a DIF file. However, you must also have a copy of the VisiCalc program that has a version number of 193 or higher.

Several important reminders about preparing VisiCalc data for use with the VisiTrend/Plot program are needed.

- When you arrange data in a VisiCalc worksheet, do not mix periodicities. A monthly worksheet, for example, can't be used for a VisiTrend/Plot chart that has a periodicity of one year.
- You must use the VisiCalc /S#S command to save the worksheet data that is to be plotted. The stored data should be a sequence of data values that are meaningful to plot as a series. A good example is a single row or column from a VisiCalc worksheet.
- Single or multiple rows and columns from a VisiCalc worksheet can be used. Each row or column is treated as an individual data series. The first coordinate in the row or column becomes the data series name. If the first coordinate is not a VisiCalc label, the VisiTrend/Plot program supplies a sequential name for each series: SERIES0, SERIES1, SERIES2, etc.
- Data from the VisiCalc program, while in a format acceptable to the VisiTrend/Plot program, does not contain all the information the Main subprogram expects. It does not contain a period or a start date. When you load VisiCalc data, you are prompted for the missing items.

The following exercise uses data from a VisiCalc worksheet that is contained on your VisiTrend/Plot example diskette in the file BUDGET.VC. You will load this worksheet file with the VisiCalc program, convert one row to a DIF file, then load the DIF file as a data series with the VisiTrend/Plot program. The steps in this exercise are summarized in Figure 2-30.
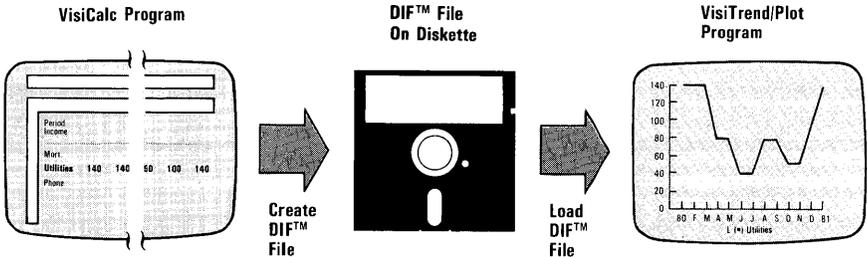
012-003

Figure 2-30. Using VisiCalc Data in the VisiTrend/Plot Program

1. Load the VisiCalc program diskette in drive 1. To load the VisiCalc file containing the worksheet from the example diskette in drive 2, type **/SL**. When the program prompts STORAGE: FILE TO LOAD, type **BUDGET.VC.D2** and press RETURN. The screen with the worksheet on it should look like Figure 2-31.
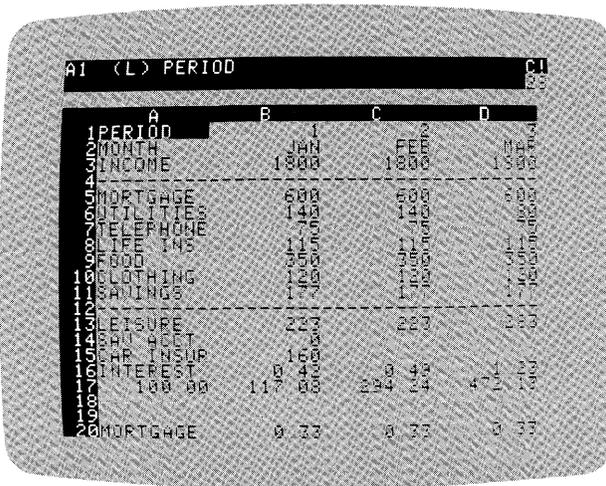
018-039/P

Figure 2-31. VisiCalc Worksheet

2. Move the cursor to the column or row you want for the data series. For this exercise, move the cursor to UTILITIES at location A6. The cursor location marks the upper-left corner of the rectangle of data to be saved. The lower-right corner is specified later.

3. Type **/S#S** to save the data in the DIF format. Type the file name **UTIL.DIF** to save the data, and press RETURN.

4. Specify M6 as the lower-right corner, and press RETURN.

5. Type **R** to save the data in a row.

Now remove the VisiCalc program diskette from drive 1, and load the VisiTrend/Plot program diskette. When the Main menu appears, select LOAD.

You load DIF files in the normal manner, just as VisiTrend/Plot data files are loaded. The file you'll now use appears on the list as UTIL.DIF. Move the cursor to this file name, and press RETURN.

The loading of the file begins. In a few moments, the disk drive stops, and the program prompts for a periodicity for the data series. Type **12** because the data in this file is on a monthly basis, and press RETURN. Next, you are prompted for a major start date (year). Type **1980**, and press RETURN. Finally, you are prompted for a minor start date (period). Type **1** for January, and press RETURN. The disk drive begins again, and the loading of the data is completed.

The program displays the list of series in memory. The UTIL.DIF file contains a single data series named UTILITIES. The series name is taken from the label in the VisiCalc row.

You can now go to the Plot subprogram, and create a chart of the UTILITIES data from the VisiCalc worksheet. If you've followed all the steps in this exercise, you can create a line chart using the UTILITIES data series that would look like Figure 2-32.
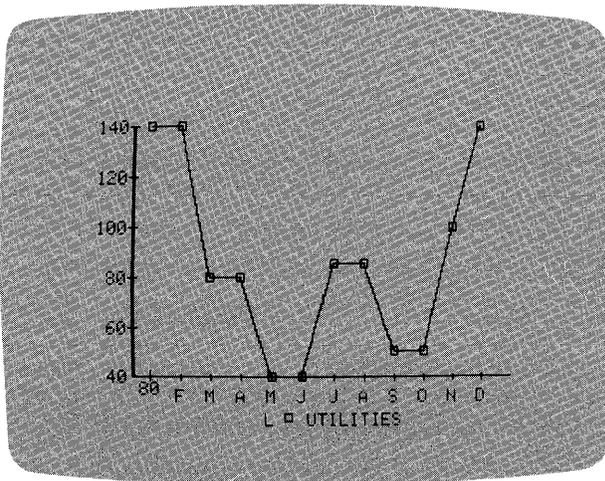
018-040/P

Figure 2-32. Chart Plotted from VisiCalc Data

You could also modify the data using the VisiTrend/Plot Edit operation (described in Lesson Three). After modifying the data with the Edit

operation, you could resave the series as a DIF file, then return to the
VisiCalc program and put the data back into the worksheet using the
steps described in the next exercise.

   Note that when any series is saved in DIF format using the
VisiTrend/Plot program, then moved into a VisiCalc worksheet, the
series name does not appear as a label on the worksheet. This is true even
if the series was originally saved as a DIF file in the VisiCalc program,
then modified and resaved in the VisiTrend/Plot program, and finally
returned to a VisiCalc worksheet.

   A VisiCalc worksheet constructed or modified using data that was
transmitted via a DIF file will not calculate like an original VisiCalc
worksheet that contained formulas. This is because no formulas are
copied into a DIF file — only data values.

USING VISITREND/PLOT DATA IN THE VISICALC PROGRAM

   The data series you used in the preceding exercise does not contain
the formulas, if any, that were used in the VisiCalc worksheet. The series
contains only values. The label of the VisiCalc worksheet row became the
series name. These values can now be loaded back into the VisiCalc
worksheet.

   NOTE: When any series is saved in DIF format using the
VisiTrend/Plot program, then moved into a VisiCalc worksheet, the
series name does not appear as a label on the worksheet. This is true even
if the series was originally saved as a DIF file in the VisiCalc program,
then modified and resaved in the VisiTrend/Plot program, and finally
returned to a VisiCalc worksheet.

   The following steps show you how to take any data series from the
VisiTrend/Plot program and use it to build values into a VisiCalc
worksheet. These steps are summarized in Figure 2-33.
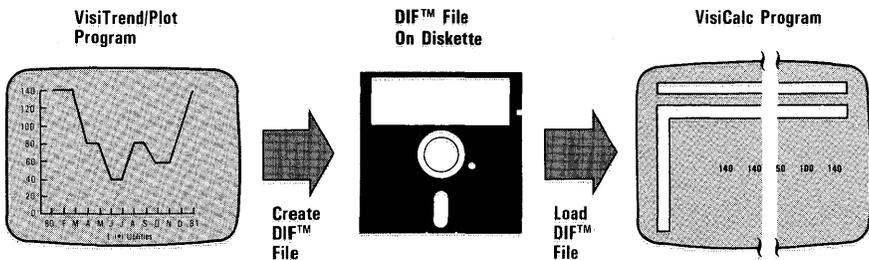
012-004

Figure 2-33. Using Data Series in the VisiCalc Program

1. For this exercise, continue to use the file UTIL.DIF containing the single series, UTILITIES. To demonstrate that a series saved as a DIF file in the VisiTrend/Plot program does not transfer its name onto a VisiCalc worksheet, select SAVE from the VisiTrend/Plot Main menu. Select DIF from the Save menu, then select UTILITIES from the list of series in memory. When the list of files on diskette is displayed, select UTIL.DIF to write over the same series on the existing file.

   Remember that whenever chosen VisTrend/Plot series are saved on a data diskette in a DIF-formatted file, the program automatically adds the extension .DIF to your specified file name.

2. Remove the VisiTrend/Plot program diskette, and load the VisiCalc program diskette in drive 1. Make sure the example data diskette containing the UTIL.DIF file is in drive 2.

3. Move the cursor to location B6. When DIF-formatted data is moved to a worksheet, the data appears in the row or column where the cursor rests.

4. Load the DIF file into the VisiCalc program from the example data diskette using the /S#L command. When the program prompts DATA LOAD: FILE TO LOAD, type **UTIL.DIF,D2** and press **RETURN**.

5. Type **R** to put the data in a row.

6. The data series that comprises the UTIL.DIF file appears on the screen as a row of values in the VisiCalc worksheet. Notice that the series name, UTILITIES, did not reappear as a label. Your screen should resemble Figure 2-34.
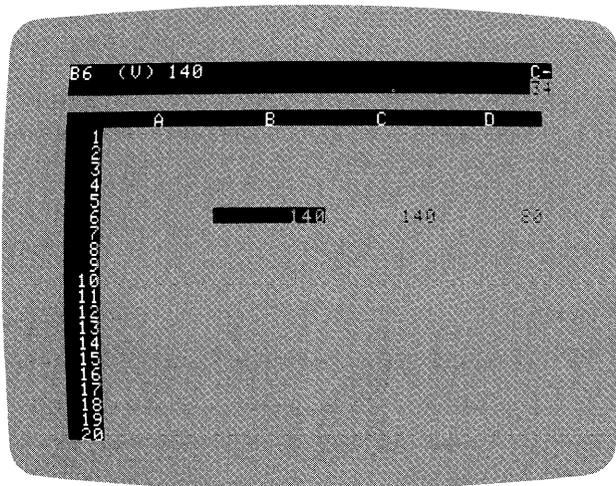
018-041/P

Figure 2-34. Data Series Loaded in VisiCalc Worksheet

You could fill out this entire VisiCalc worksheet using additional DIF files that contain data series values created in the VisiTrend/Plot program.

If you wish to create your own DIF files for use with the VisiTrend/Plot program, see Appendix D.

SUMMARY

This completes Lesson Two. Lesson Three discusses the VisiTrend/Plot program's Edit operations. You have been introduced to all the other Main subprogram menu items except EDIT.

If you have any trouble performing an operation, look up the menu item in Chapter 3: REFERENCE, or return to the lesson where the operation was described.

FUNCTIONAL SUMMARY

Operation	From	Select or Type
LOADING DATA		
Load data files without printing series information	Main menu	1. LOAD 2. file name 3. RETURN
Load data files and print series information	Main menu	1. LOAD 2. file name 3. PRINT
LISTING SERIES		
List series in memory without printing series information	Main menu	1. DISPLAY 2. RETURN
List series in memory and print series information	Main menu	1. DISPLAY 2. PRINT

(Continued)

Operation	From	Select or Type
CHANGING DATA DRIVE		
Change data diskette identifier	Main menu	1. DEVICE 2. identifier (3. volume no., if Corvus Hard Disk identifier specified in step 2.)
INITIALIZING		
Initialize a floppy diskette	Main menu Files menu	1. FILES 2. FORMAT 3. put diskette in prompted drive 4. RETURN
Re-initialize a floppy data diskette	Main menu	1. FILES 2. FORMAT 3. put diskette in prompted drive 4. RETURN 5. Y (to continue)
SAVING AND DELETING FILES AND SERIES		
Save one series in a file	Main menu Save menu	1. SAVE 2. NORMAL/DIF 3. series name 4. existing file name/[NEW FILE] then new file name
Save all series in a file	Main menu Save menu	1. SAVE 2. NORMAL/DIF 3. [ALL] 4. existing file name/[NEW FILE] then new file name

(Continued)

Operation	From	Select or Type
SAVING AND DELETING FILES AND SERIES (Continued)		
Save several series in a file	Main menu Save menu	1. SAVE 2. NORMAL/DIF 3. each series name except last: space bar and → 4. last series name: RETURN 5. existing file name/[NEW FILE] then new file name
Delete data file permanently from diskette	Main menu Files menu	1. FILES 2. DELETE 3. file name 4. Y (to confirm)
CLEARING MEMORY		
Clear all series from memory	Main menu	1. CLEAR 2. [KEEP NONE]
Clear one series from memory	Main menu	1. CLEAR 2. series name
Clear several series from memory	Main menu	1. CLEAR 2. each series name except last: space bar and → 3. last series: RETURN
TRANSFERRING BETWEEN SUBPROGRAMS		
Enter Main sub-program	power up	1. insert program diskette in drive 1 2. turn ON power switch
Enter Main sub-program	Trend menu	1. MAIN
Enter Main sub-program	Plot menu	1. EXIT 2. MAIN
Enter Trend sub-program	Main menu	1. TREND

(Continued)

Operation	From	Select or Type
TRANSFERRING BETWEEN SUBPROGRAMS (Continued)		
Enter Trend sub-program	Plot menu	1. EXIT 2. TREND
Enter Plot sub-program	Main menu	1. PLOT
Enter Plot sub-program	Trend menu	1. PLOT
Enter DOS	Main menu	1. QUIT

LESSON THREE: THE EDIT OPERATION

With the VisiTrend/Plot Edit operation, you can perform two important
tasks:

* Create new data series.
* Modify existing data series.

Identical Edit operations are available in the Main subprogram and in
the Trend subprogram. For this lesson, you will use EDIT from the Main
subprogram.

Load the VisiTrend/Plot program according to the instructions under
LOADING THE VISITREND/PLOT PROGRAM in Chapter 1. When the
Main menu is displayed, select EDIT. You do not need to load a file into
memory; this lesson teaches you how to create a new data series.

USING EDIT

After selecting the EDIT menu item, the status area prompts CURSOR
MOVEMENT OR <RETURN>. You are being directed to select from the
list displayed below the status area. You did not load a file, so the list
contains only [NONE] and [NEW SERIES].

Selecting [NONE] from this list cancels the Edit operation, and returns
you to the Main menu.

To enter data for a new series, move the cursor to [NEW SERIES], and
press RETURN. The status area next prompts for the series name.

Type **FIRST**, and press RETURN. Remember, you can correct typing
errors with the ESC key, whenever you are entering information during
the Edit operation. This includes a series name, starting year, or any data
value. Pressing ESC erases characters to the left of the cursor. You can
then retype the character(s).

The status area prompts for the period of the new series PERIODICITY?,
and displays a current period CURRENT: 1. Because you just loaded the
program, and have not done any editing or working with series in this
lesson, the program defaults to a period of 1. After you have worked with
a series, the period of the most recently edited series is displayed.

For this exercise, type **1** for the period of the new series, and press RETURN.

Next, you are prompted for the starting year. Type **1966**, and press RETURN.

The bottom line of the status area displays the name of the series and the starting year. Now, you are prompted for the first value in the new series FIRST VALUE?. Type **23**, and then press →.

Under the status area, the program creates two columns to contain the data values for the new series. The first column begins with 1966, and the corresponding value, 23, appears next to it in the second column. Because the program does not allow gaps in a data sequence, the next consecutive date for each new entry is automatically displayed. In this case, the period is 1, so 1967 appears next in the first column. An inverse video bar separates the two columns, and the cursor highlights where your next value will be placed in the second column.

If a series has a period other than 1, the period is incremented within the year; then the year is incremented when the period goes full cycle. Your screen should resemble the one in Figure 2-35.
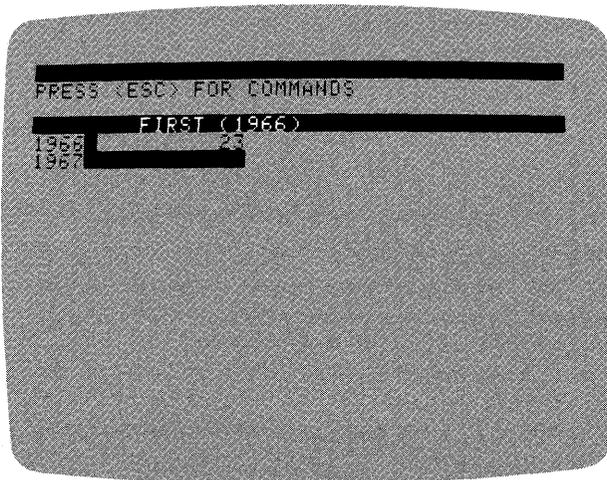
018-042/P

Figure 2-35. Display for Editing or Creating a Series

The status area displays a line of information PRESS <ESC> FOR COMMANDS. You can add more values to the series; or you can press ESC to display the Edit menu, and modify the current value(s).

For the moment, you'll add some more values to the series. When the complete series has been entered, you will use the Edit commands to modify the data.

Adding Values to the Series

To add a value for the year 1967, type **28**. Again the value appears in the status area. Press →, and the value moves down to the second column opposite 1967.

Add the remaining values to the series by repeating the preceding process: type the value, and press →. Enter the values **33, 37, 41, 44, 44, 53, 61, 75, 64, 73, 82,** and **79**.

After you enter the last value, the cursor is below the list in the second column, opposite the date 1980. Your series won't have a value for 1980, so press RETURN. The cursor moves up to the 1979 value, and 1980 disappears.

Replacing a Value

You can replace a value by moving the cursor to the old value and entering the new value. The new value is written over the old value when you press RETURN or →.

Move the cursor to the value for the year 1969. Instead of 37, this value should have been 39.9. Type **39.9**, and press →. The new value replaces the old value, and the cursor moves down to the next value in the column.

Using the Edit Menu

You have so far used the Edit operation to enter values for the series, and to replace a value by entering a new value that writes over an old value. You can further modify the data in a series with the Edit commands. Press ESC to display the menu of Edit commands in the status area. Your screen should resemble the one in Figure 2-36.
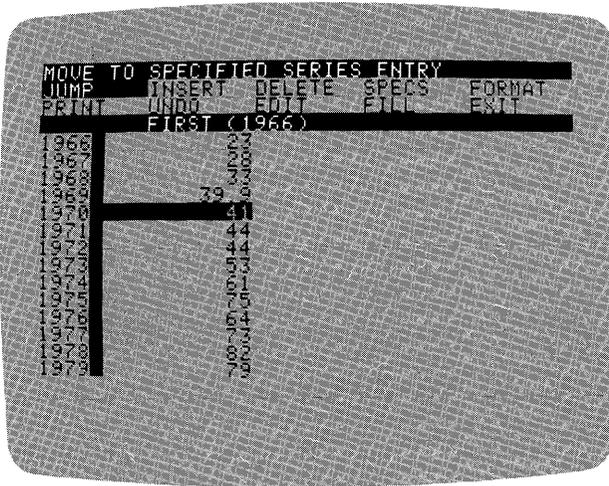
018-043/P

Figure 2-36. Edit Command Menu

The Edit menu provides the following commands:

JUMP	moves the cursor to a specific entry (value) within the series.
INSERT	inserts new data points between existing data points.
DELETE	deletes any number of existing data points.
SPECS	changes the specifications of a series.
FORMAT	changes the manner in which data is displayed.
PRINT	prints the contents of a series.
UNDO	cancels the current editing changes to a series.
EDIT	returns to the Edit entry level.
FILL	fills areas of a series with values generated by predefined formulas.
EXIT	retains the current series and any editing to that series in memory, and returns to the Main menu.

These Edit commands will be discussed more fully in the next several sections, and several of them will be practiced later in the lesson. For now, select EXIT. When you leave the Edit operation by this route, the work you created or modified is saved, and the Main menu reappears.

Select EDIT again from the Main menu. This time you don't have to enter a name, period, or starting date. The name of the series FIRST is listed along with [NONE] and [NEW SERIES]. With the cursor on FIRST, press RETURN. The years and corresponding data-point values reappear in two columns.

At this Edit entry level, you can position the cursor anywhere in the series list with the → and ← keys. The status area tells you how to display the Edit menu: PRESS <ESC> FOR COMMANDS.

For now, press ESC to display the Edit menu, and move the cursor to each menu item as it is discussed. Examine the long prompt for the item in the top line of the status area, but do not press RETURN to select any item.

JUMP — MOVING FROM POINT TO POINT

The JUMP command lets you move from entry to entry within the series without repeatedly pressing the arrow keys. With JUMP, you can move the cursor quickly to the top entry in the series using the ← key, and to the bottom entry in the series using the → key. You can also move the cursor directly to any entry by typing the year, and pressing RETURN. For series having a period other than 1, the JUMP command also prompts you for the period when you enter the year.

Long series can contain more entries than will fit on one screen display. When a year/period that you specify with JUMP is displayed on the current screen, the cursor simply jumps to it. If the specified date is on a screen other than one currently displayed, the current screen is erased, and the specified date appears at the bottom or top of a new screen. The location of the date (top or bottom) depends on the direction that the program moved within the screens of that series.

If a specified date does not exist in the series, a beep sounds, and the program returns to the Edit entry level. At this point, you could redisplay the Edit menu by pressing ESC, select JUMP again, and enter a valid date.

After a jump is completed, you are returned to the Edit entry level.

INSERT – ADDING AN ENTRY

The INSERT command lets you insert a new value for the date at the current cursor location. The value on which the cursor rests, and all values below the cursor are pushed ahead to the next date to make room for the value to be inserted. Up to 149 values can be inserted in a series.

Insertion with this command works like initially entering a value in the series: you can type the value, and press →. The cursor automatically moves to the following value in the column, and pushes it down to create room for your next insertion. You press RETURN to signal the last insertion. The remaining values move up again to fill the last gap created, and you are returned to the Edit entry level. You can then redisplay the Edit menu by pressing ESC.

The INSERT command operates anywhere in the series, except at the end (the last value in the series).

DELETE – ERASING A DATA POINT

The DELETE command erases one or more values beginning with the current cursor location. The range to be deleted is listed in the status area. You can cancel the DELETE command by pressing ESC.

When you select the DELETE command, the one data point where the cursor rests is displayed in the status area as the range for deletion. Moving the cursor in either direction broadens the range of values to be removed. If you try to move the cursor beyond the end of the series, the DELETE command is cancelled. The deletion is also cancelled if you try to remove all the values from the series.

You can delete values in either direction from the original cursor position. However, the original cursor position will always be the beginning or end of the range to be erased.

Pressing RETURN after you have defined the correct range removes the selected values from the series. The values below the removed area move up to fill the new empty dates. You are returned to the Edit entry level, where you can press ESC to redisplay the Edit menu.

SPECS – CHANGING THE SERIES SPECIFICATIONS

The SPECS command lets you change the name, period, or starting date of the series. This command cannot be used to change data points. When you select SPECS, a second menu appears from which you choose which specification is to be changed: NAME, PER, or START. The EXIT item lets you return to the Edit entry level.

You choose the specification from this menu, and respond to a prompt by typing the new value. When you press RETURN, the series specification changes immediately on the screen.

You can press the RETURN key without entering a new specification value for NAME and START. In such a case, the program assumes a value. For NAME, the program generates the name SERIESn, where n is a number from 1 through 16. For START, the program assumes the date 0, provided that the current period is 1. If the period is other than 1, RETURN alone doesn't work for START: the program instead prompts you to change the period.

FORMAT — CHANGING THE DATA DISPLAY

The FORMAT command lets you specify how to display data values in the series. Selecting FORMAT displays the current format at the top of the status area. Your format options appear on the second line: 0-6: PLACES, −1: FLOAT, <RET> NO CHANGE. The meaning of these options is:

0-6: PLACES	You can choose a fixed-decimal format display by specifying a number from 0 to 6, and pressing RETURN. This number is the precision (number of digits to the right of the decimal point). You are then prompted to specify a number from 6 to 15 for the column width (total number of digits displayed). Pressing only RETURN retains the current column width.
−1: FLOAT	You can choose a floating-decimal format display by specifying −1, and pressing RETURN. When floating-decimal format is chosen, the VisiTrend/Plot program controls the precision. You are then prompted to specify a number from 6 to 15 for the column width. Pressing only RETURN retains the current column width.
<RET> **NO CHANGE**	You can retain the current format and/or precision by pressing only RETURN. You are then prompted to specify a number from 6 to 15 for the column width. Pressing only RETURN retains the current column width.

If you make format changes and your resulting values are displayed as a number of greater than symbols (> > > >), one of the following situations is in effect:

- The value is too large for the column width. If this is the case, increase the column width.
- The value is an exponential number (such as 1E + 09), and you are in a fixed-decimal format. Exponential numbers can only be displayed in floating-decimal format. You cannot enter values in exponential format; however, the program automatically converts values to exponential format if they are less than or equal to 0.001, or greater than 9 digits to the left of the decimal point.

If you do not choose a display format, the program default is floating-decimal format.

The FORMAT command does not affect how values are stored, only how they are displayed during editing. Format changes remain in effect until you choose a new format, or exit the program.

PRINT — LISTING A SERIES

The PRINT command lets you print the displayed series on your printer. If you have other than an Apple Silentype Printer, find the information on your printer in Appendix B. You must change to the appropriate printer driver before using the PRINT command.

When PRINT is selected, the displayed series is printed with the name of the series at the top. The inverse video bar and any blank lines at the bottom of the screen are not printed. You can stop a Print operation by pressing CTRL-C. (Press and hold the CTRL key while pressing C).

After the current series is printed, you are returned to the Edit entry level. You can then press ESC to redisplay the Edit menu.

UNDO — CANCELLING CURRENT EDITING CHANGES

The UNDO command cancels all the changes made to the current series since you began the Edit operation. If you select UNDO on a newly-created series, the series is completely erased.

Keep in mind that the UNDO command cancels all editing changes made since selecting the series, not just the most recent change.

EDIT — RETURNING TO THE ENTRY LEVEL

The EDIT command takes you back to the Edit entry level, without executing any of the Edit menu commands. At this level, you can position

the cursor with the arrow keys, change data points by entering new ones, enter additional data points at the end of the series, or press ESC to redisplay the Edit menu.

FILL — ADDING TO A SERIES

The FILL command lets you insert values into the middle of a series, or direct the program to interpolate missing values between two known values. Values can be inserted in either an arithmetic or geometric progression, beginning with the value at the current cursor location. You can also select another entire series, and insert it into the series being edited.

The FILL command displays its own menu containing the following items:

- The ARITH menu item first prompts for the number of values to be inserted. You type the number, and press RETURN. The number can be any value that will not cause the total series to exceed the maximum of 150 points, or 645 points in memory. Next, you are prompted for the factor to be used in the calculation of the new values. Again you type the number, and press RETURN. Each succeeding data point is computed by adding the factor to the previous data point, up to the the specified number of values to be inserted.

- The GEOMET menu item works much like ARITH. First, you are prompted for the number of values to be inserted. You type the number, and press RETURN. The number can be any value that will not cause the total series to exceed the maximum of 150 points, or 645 points in memory. Next, you are prompted for the factor to be used in the calculation of the new values. Again you type the number, and press RETURN. Each succeeding data point is computed by multiplying the previous data point by the factor, up to the the specified number of values to be inserted.

- The SERIES menu item displays the current list of series in memory. You can select one. The entire chosen series is inserted into the current series, at the cursor location. If you insert a series into itself, the inserted values are those that existed before entering the Edit operation.

- The INTERP menu item performs a linear interpolation to fill in missing data values (zeros). The interpolation begins at the first zero value and continues to the first nonzero value. You position the cursor on the first zero value in the sequence before invoking the operation.

  If the value at the cursor is not zero, or if there is no nonzero value later in the series, a beep cancels the operation. The INTERP operation gets the starting point from the preceeding period, and the ending point from the next nonzero value. All points in between are then linearly interpolated.

- The EXIT menu item returns to the Edit entry level without performing any Fill operation.

PRACTICING WITH EDIT COMMANDS

The following exercises give you some practice with the more frequently used Edit commands. To do these exercises you must load the file SAMPLE 2 from the VisiTrend/Plot program diskette. If you need to review the steps, refer to the section LOADING DATA INTO MEMORY in Lesson One.

Exit to the Main menu, clear the FIRST series from memory, and load the file named SAMPLE 2. This file contains one series also named SAMPLE 2. When the series list appears, select RETURN to go back to the Main menu.

Select EDIT from the Main menu, then select the series SAMPLE 2. This series has 133 data points and a period of 12 (monthly). Its start date is 1977 1, the first period of 1977 (January 1977).

The screen fills with numbers when you select the series. For each date there are 12 periods, and for each period there is a value. The dates appear in the first column. The periods appear in the second column, and each value appears to the right of the corresponding period.

Moving the Cursor and Scrolling the Screen

Although the SAMPLE 2 series contains 133 data points, the screen can display only 20 of them at a time. To see the values beyond the first 20, move the cursor to the bottom of the screen with the → key. Continue pressing the → key. Additional dates and values appear at the bottom of the screen, and previously displayed values disappear off the top. This is called scrolling. You can use the arrow keys to scroll in either direction; scrolling is one way to move to any point in the series.

Moving With the JUMP Command

If you wanted to add more values to the end of this series, you could press the → key up to 133 times to reach the end of the series. The JUMP command can save you both time and effort. Press ESC to display the Edit menu. With the cursor on JUMP, press RETURN.

The status area displays your three choices: you can press ← to jump directly to the top of the series, you can press → to jump directly to the bottom, or you can type any date in the series and jump directly to it.

Type **1981**, and press RETURN. The status area next prompts for the period, because this series has a period other than 1. Type **1**, and press RETURN. The data on the screen is replaced by a new screenfull of data. The cursor highlights the first period of 1981 at the bottom of the screen. If you had specified the same date and period from a later point in the series, the target date would have appeared at the top of the screen. The location of the target date on the screen depends on the direction the cursor must move.

To practice using the arrow keys with the JUMP command, press ESC, and select JUMP again from the Edit menu. Press →. The screen display changes so that the cursor highlights the end of the series.

Formatting the Data

The values in this series are displayed to different degrees of precision. The floating-decimal format makes the values rather difficult to read. The FORMAT command lets you display the values in a more consistent and readable form.

Press ESC to display the Edit menu, and select FORMAT. The top line of the status area displays the current format: in this case, FLOATING. For a fixed-decimal series, the number of places of precision is displayed on this line.

The second line displays the format options you can enter, as described in the previous section **FORMAT — CHANGING THE DATA DISPLAY**. Pressing RETURN twice retains the existing format and column width, and cancels the FORMAT command.

Type **2** to specify a fixed-decimal format with two places of precision after the decimal. Press RETURN. The status area now displays the current column width, and prompts for a number for the column width.

The column width is the total number of digits to be displayed. This total includes the decimal point, the sign, and the exponent (if any). Positive values have an implied plus sign (+), and one position is always reserved for the sign. The width you specify can be any number from 6 through 15. Pressing RETURN, without entering a value, retains the current column width. For now, press RETURN.

The series on the screen displays the decimal points lined up with two digits to the right of the decimal point. Numbers to the right of the decimal are rounded to the specified number of places, not truncated. Press ESC to display the Edit menu.

Inserting Data into the Current Series

Select the JUMP command, and display the beginning of the series. Move the cursor to the first period of 1978. The data insertion occurs at the cursor location, and data later in the series is moved downward. The insertion point must be determined before you select INSERT. Press ESC, and select the INSERT command from the Edit menu.

Notice period 1 of 1978: the value that was in this location, and all subsequent values in the series, have moved down one place. The cursor now highlights an open space for your insertion. The dates in the series did not change; however, one new period has been added to the end of the series.

You can now insert a new value at this point in the series. Type **99**, and press **RETURN**. The value 99 is inserted into the location for period 1 of 1978.

Next, you'll practice inserting multiple values by pressing → after typing each value. Press **ESC**, select INSERT again, and enter two more values of 99. Press → after typing each value. In each case, the value is inserted in the current open space, and a new space is automatically opened in the following position. To terminate the insertion, press **RETURN**. Data values later in the series move up again to fill the last open space.

Deleting Data From a Series

To remove the three values of 99 from the series, you'll use the DELETE command.

From the Edit entry level, move the cursor to the first 99. This is the starting point for the deletion, and must be determined before you select the DELETE command. Press ESC to display the Edit menu, and select DELETE.

The status area displays the cursor position as the current range of the deletion: DELETE FROM 1978 1 TO 1978 1. If you press **RETURN** now, only this single value will be deleted. You can also press ESC to cancel the deletion.

Instead, press → twice, and watch the status area as you press the key. The period of the TO date increments from 1 to 3 as the cursor moves from value to value. With the cursor on 1978 3, press **RETURN**. The screen display is rewritten without the three values of 99. The cursor has returned to the top of the series, and the program is at the Edit entry level.

Press ESC to display the Edit menu, and select EXIT to return to the Main menu.

FUNCTIONAL SUMMARY

Operation	From	Select or Type
ENTERING EDIT		
Enter Edit Operation	Main menu	1. EDIT
CREATING SERIES		
Create and save a new data series in memory	Main menu	1. EDIT
		2. [NEW SERIES]
		3. series name
		4. period (1 through 99)
		5. starting year
		6. first value →
		7. additional values →
		8. RETURN
	Edit entry level	9. ESC
	Edit menu	10. EXIT
Save series in diskette file	Main menu	11. SAVE
		12. NORMAL/DIF
		13. series name/ [ALL]
		14. existing file name/ [NEW FILE] then new file name
ADDING, CHANGING, AND DELETING SERIES VALUES		
Add value(s) to short series	Main menu	1. EDIT
		2. series name
		3. → beyond last value
		4. value(s) →
		5. RETURN
Add value(s) to long series	Main menu	1. EDIT
		2. series name
		3. ESC
	Edit menu	4. JUMP
		5. →
		6. →
		7. value(s) →
		8. RETURN

(Continued)

Operation	From	Select or Type
ADDING, CHANGING, AND DELETING SERIES VALUES (Continued)		
Insert new value(s)	Series	1. → or ← to value to be preceded
		2. ESC
	Edit menu	3. INSERT
		4. new value
		5. RETURN or →
Insert value(s) by addition or multiplication	Series	1. ← or → to value to be followed
		2. ESC
	Edit menu	3. FILL
		4. ARITH/GEOMET
		5. number of values
		6. factor
Insert values from another series	Series	1. ← or → to value to be followed
		2. ESC
	Edit menu	3. FILL
		4. SERIES
		5. series name
Change an existing value	Series	1. → or ← to old value
		2. new value
		3. RETURN or →
Do linear inter-polation	Series	1. ← or → to first 0 value
		2. ESC
	Edit menu	3. FILL
		4. INTERP
Delete one existing value	Series	1. → or ← to value
		2. ESC
	Edit menu	3. DELETE
		4. RETURN
Delete several existing values	Series	1. → or ← to first deletion value
		2. ESC
	Edit menu	3. DELETE
		4. → or ← to last deletion value
		5. RETURN

(Continued)

Operation	From	Select or Type
JUMPING THE CURSOR		
Go to beginning or end of a series	Series Edit menu Series	1. ESC 2. JUMP 3. → to end; ← to beginning
Go to a specific point in a series	Series Edit menu	1. ESC 2. JUMP 3. year (and period if periodicity is not 1)
FORMATTING		
Change from floating to fixed point	Series Edit menu	1. ESC 2. FORMAT 3. number of places (0-6) 4. column width (6-15)/RETURN
Change from fixed to floating point	Series Edit menu	1. ESC 2. FORMAT 3. − 1 4. column width (6-15)/ RETURN
Change column width	Series Edit menu	1. ESC 2. FORMAT 3. RETURN 4. column width (6-15)

(Continued)

Operation	From	Select or Type
CHANGING SPECIFICATIONS		
Change series name	Series Edit menu	1. ESC 2. SPECS 3. NAME new name/RETURN
Change series period	Series	1. ESC 2. SPECS 3. PER 4. new period
Change start of range	Series Edit menu	1. ESC 2. SPECS 3. START 4. new year/RETURN 5. period (if period other than 1)
CANCELLING CURRENT EDIT		
Erase all editing changes during current Edit operation	Series Edit menu	1. ESC 2. UNDO
PRINTING		
Print series	Series Edit menu	1. ESC 2. PRINT

LESSON FOUR: THE TREND SUBPROGRAM — ANALYZING & FORECASTING

You need to have some familiarity with statistics to completely understand this lesson and the meanings of formulas and calculations. However, to perform the program operations as directed, you need no special background.

The Trend subprogram analyzes data series, and develops trend forecasts. It uses the following statistical techniques:

- Moving averages, smoothed data, percent of change, adjacent difference, leading, lagging, and cumulative totals.
- Mathematical and logical transformations of data into new series.
- Linear multiple regressions with up to five independent variables (using ordinary least squares), including standard errors of coefficients and regressions, T-statistic, R-bar squared statistic, F-statistic, and the Durbin-Watson statistic.
- Statistical minimums, maximums, means, variances, standard deviations, and correlation coefficients.

ACCESSING THE TREND SUBPROGRAM

- If you are not continuing directly from Lesson Three, make sure your computer is OFF; then load the program diskette according to the directions in the section **LOADING THE VISITREND/PLOT PROGRAM** in Chapter 1. Your screen displays the Main menu.
- If you are continuing directly from Lesson Three, your screen displays the Main menu. Lesson Four uses 13 series in a large file. If you have any new or modified series in memory, store them on diskette with SAVE. Then remove all series from memory with CLEAR. The Main menu is again displayed on the screen.

From the Main menu, select LOAD. When the list of files appears, select the file SECURITIES MKT to be loaded into memory. After examining the list of series in the file, select RETURN to display the Main menu.

Select TREND to load the Trend subprogram. The Main menu is replaced by the Trend menu, as shown in Figure 2-37.
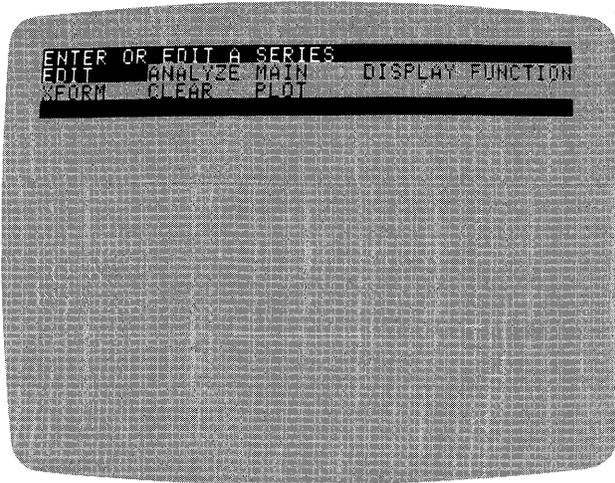
018-044/P

Figure 2-37. Trend Menu

Five of the eight menu items should look familiar. You used EDIT, MAIN, DISPLAY, CLEAR, and PLOT in the first three lessons. These menu items perform identically when selected from any menu in which they appear.

EDIT   allows you to enter new series data and to modify existing data. This operation is identical to the Edit operation in the Main subprogram.

MAIN   reloads the Main subprogram and passes control to it. This operation is identical to its counterpart in the Plot subprogram.

DISPLAY   shows a list of all series currently in memory. This operation is identical to the Display operation in the Main subprogram.

CLEAR   removes series from memory. This operation is identical to the Clear operation in the Main subprogram.

PLOT   loads the Plot subprogram and passes control to it. This operation is identical to the Plot operation in the Main subprogram: data must first be loaded in memory before the Plot subprogram can be used.

If you are unsure of the use of any of these operations, review the discussion and examples in Lessons One, Two, or Three. The remaining three operations are the heart of the Trend subprogram:

ANALYZE   performs linear multiple regression and trendline
          forecasting; calculates the common statistical measures of
          series such as variance, standard deviation, and coefficient
          of correlation; generates tabular output; and formats
          the data.

FUNCTION generates new series from existing series. It calculates the
          moving average, percent of change, adjacent difference,
          and cumulative total; does exponential smoothing; and
          generates leading and lagging series.

XFORM   allows you to develop your own transformation of a data
          series. You can manipulate series through mathematical
          and logical operations, and functions.

   The multiple regression operation in ANALYZE creates two new series.
Each operation in FUNCTION creates one new series. Before you use
these operations, you should select DISPLAY to list the number of series
(and data points) available for new series. If there is insufficient space to
complete the Trend operation, you must use CLEAR to remove some
series from memory.

USING THE ANALYZE OPERATION

   ANALYZE displays an Analyze menu containing five items. Move the
cursor to ANALYZE, and press **RETURN.** Your screen should resemble the
one in Figure 2-38.
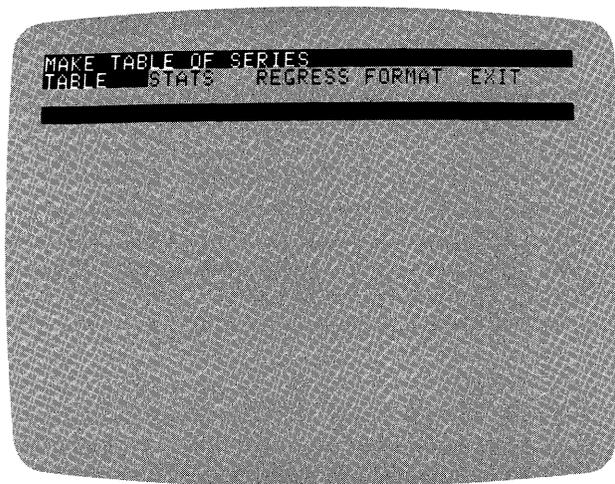
018-045/P

Figure 2-38. Analyze Menu

This menu contains two familiar items:

EXIT   returns immediately to the Trend menu.

FORMAT   specifies how the data is displayed. This menu item works exactly like FORMAT in the Edit menu. If you need to review the Format options, refer to the section **FORMAT — CHANGING THE DATA DISPLAY** in Lesson Three.

The remaining menu items, TABLE, STATS, and REGRESS, are discussed in the following sections.

Listing Series in Table Format

TABLE lets you display series information on the screen, or print series information on a printer.

Because the screen size limits the space available for displaying series data, TABLE displays those series that fit on the screen, beginning with the first series selected. The number of series that can be displayed depends on the column size and precision currently in effect. The program defaults are the floating-decimal display, and a column width of 10. You can change these defaults with the FORMAT menu item.

With the cursor on TABLE, press **RETURN**. A new menu appears offering the choice of SCREEN or PRINTER.

If you select PRINTER from this menu, the entire table to be generated will be printed to a supported printer. Refer to Appendix B for detailed information on graphics printers.

For now, press **RETURN** with the cursor on SCREEN. The list of series in memory appears next below the status area.

With the cursor on XY EARNINGS, press the space bar. An asterisk marks this series for selection along with any other series you mark with an asterisk. You can erase an asterisk by putting the cursor on an asterisked name, and pressing the space bar again. When you press **RETURN**, all series marked with an asterisk, **and** the series currently highlighted by the cursor are selected.

Next, mark XY DIVIDENDS for selection by moving the cursor, and pressing the space bar. Finally, move the cursor to XY BOOK VALUE, and press **RETURN**. You have selected the first three series for the table.

The status area displays a range that represents the **union** of the ranges for the selected series. The union of ranges means the earliest

start date and the latest end date that occur in any of the selected series. You must now specify whether you want to KEEP that range, or CHANGE it. If you decide to CHANGE the range, you are prompted for a beginning date, ending date, and period (if applicable). With the cursor on KEEP, press **RETURN**.

The screen displays series values lined up by date, for easy comparison and evaluation. The dates are displayed in the first column at the left of the screen. The remaining columns display the series in the same order that they were selected. When series names are too long to fit on one line in the column width, they are divided onto two lines. Names that exceed two lines are truncated.

The series table contains information for the XY EARNINGS series, the XY DIVIDENDS series, and XY BOOK VALUE series. Your screen should resemble Figure 2-39.

018-046/P

Figure 2-39. Table of Series

Because the full table cannot be displayed on one screen, the status area displays two choices CONTINUE or EXIT. The EXIT menu item returns you to the Trend menu without displaying the remaining points in the series. Select CONTINUE.

A maximum of 16 periods are displayed on each screen. Each time you select CONTINUE, the successive screen displays 16 more periods, up to the end of the table. When the entire table has been displayed, the status area prompts PRESS ANY KEY. Remember that you must **not** press the RESET key. Press the ESC key, for example, and you are returned to the Trend menu.

The table just created is not saved in memory or on diskette; you can save it only in hardcopy form by printing it. You can recreate the table simply by following the preceding procedure.

To continue with the discussion of ANALYZE, select it again from the Trend menu. Move the cursor to STATS in the Analyze menu, and examine the long prompt in the status area.

Calculating Series Statistics

The STATS menu item displays a table of common descriptive statistical measurements. The table includes:

1. The count of the number of items used in calculations.
2. The minimum and maximum value in each series.
3. The arithmetic mean (average).
4. The variance.
5. The standard deviation.
6. The calculated coefficients of correlation between all pairs of selected series, when multiple series are selected.

The number of series displayed, as in the Table operation, is determined by the current column width and precision. These can be changed by using FORMAT.

With the cursor on STATS, press **RETURN**. The list of series is displayed as it was for TABLE. Select XY EARNINGS, XY DIVIDENDS, and XY BOOK VALUE using the space bar and **RETURN**.

The status area displays a range that represents the **intersection** of the ranges in the selected series. You again have the choice of keeping this range, or changing it. With the cursor on KEEP, press **RETURN**.

When the computations are complete, the calculated values are displayed in columns with each series name at the top. The left-hand column lists the meaning of each value. The bottom of the table lists the range that the data covers. Figure 2-40 shows how the specified statistics are displayed.
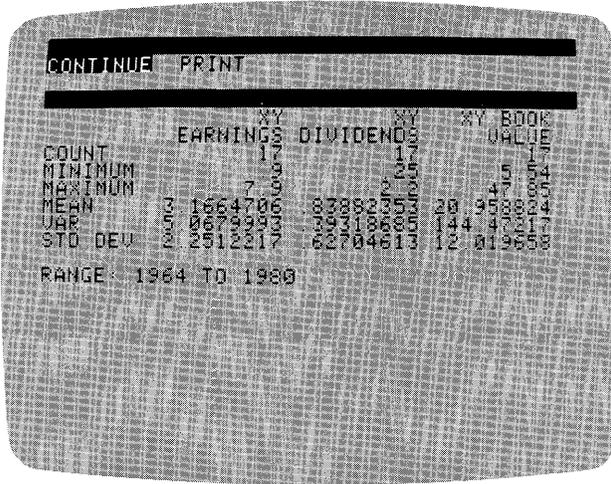
018-047/P

Figure 2-40. Display of Statistics

You have the option to CONTINUE or to PRINT the statistics. The only way to save the statistics is to print them now on your printer; they are not saved on diskette or in memory. After printing, the program automatically continues. Select CONTINUE without first printing.

A display of correlation coefficients appears next on the screen. STATS calculates any coefficients of correlation between the selected series, and displays them in a matrix as shown in Figure 2-41.
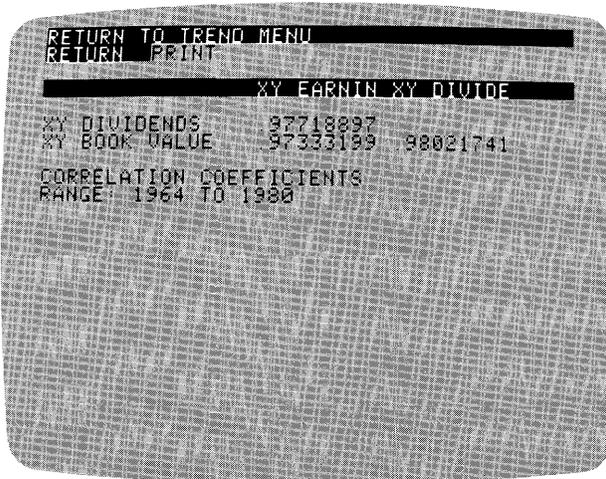
018-048/P

Figure 2-41. Coefficients of Correlation Display

You now have the option to RETURN to the **Trend menu**, or to PRINT the coefficients. Again, the only way to save this information is to print it now on your printer; it is not saved on diskette or in memory. After printing, the program automatically returns to the Trend menu. Select RETURN without first printing.

Performing a Linear Multiple Regression

To continue the discussion of the Analyze menu items, select ANALYZE again from the Trend menu. This time, move the cursor to REGRESS, and examine the long prompt in the status area. REGRESS performs a linear multiple regression (least squares) on selected series. The series in question are referred to as variables.

Multiple regression is a method of developing a formula that relates a single variable (the dependent variable) to other variables (the independent variables). The resulting equation can explain the dependent variable in terms of the independent variables, and an optional constant. Stated simply, REGRESS can tell you if there is a linear relationship between the independent and the dependent series.

The multiple regression technique can typically be used to forecast the output of one industry on the basis of the output of another industry. For example, you could assume that the performance of the auto industry is closely related to that of the steel industry. Multiple regression can likewise be used to forecast the performance of a stock in terms of the measures of the economy.

The technique develops a constant (B) and coefficients (m) for each independent variable (x) such that a point in the dependent variable (y) is approximated from the corresponding period (i) data in the independent variables according to the formula:

$$y(i) = B + m_1x_1(i) + m_2x_2(i) + ... + m_5x_5(i)$$

NOTE: You can do exponential and other types of regressions by using XFORM to convert series to a form acceptable for a linear multiple regression. This XFORM conversion operation is discussed later in this lesson under **WRITING YOUR OWN SERIES TRANSFORMATION**.

REGRESS also calculates and displays the statistical measures of a linear multiple regression. These include the T-statistic, the R-bar squared statistic, the corrected R-bar squared statistic, the standard error for the regression and for the coefficients, the sum of the squared residuals, the F-statistic, and the Durbin-Watson statistic. The formulas used by VisiTrend/Plot for computing these statistics are shown under REGRESS in Chapter 3: REFERENCE.

Two new series are generated by the Regression operation. The first is a fitted series developed from the generated constant and coefficients. The second is a series containing the differences (residuals) between the actual dependent series values and the fitted values. The new series have the same name as the dependent series, plus an extension that serves as an identifier. These identifiers are listed in Table 2-2.

Table 2-2. Name Identifiers for Fitted & Residual Series

Identifier	Series Type	Where
.Fn	Fitted series	n is a program-generated number. The number is the same as the one for a residual series from a single regression.
.Rn	Residual series	n is a program-generated number. The number is the same as the one for a fitted series from a single regression.

Now, you'll practice using multiple regression techniques. With the cursor on REGRESS, press **RETURN**.

The list of series in memory is again displayed. The status area prompts you to select a dependent variable. This example will test the assumption that the price/earnings ratio can be explained by earnings, dividends, and book value. Move the cursor to XY PE RATIO, and press **RETURN**.

The list is erased and immediately redisplayed. This time the status area prompts you to select the independent variables. You can select from one to five series as independent variables. The independent variables must have the same period as the dependent variable. With the cursor on XY EARNINGS, press the space bar. Do the same for XY DIVIDENDS. Then put the cursor on XY BOOK VALUE, and press **RETURN**.

The status area displays a range that represents the **intersection** of the ranges in the dependent and independent variables. Intersection means that the limits of the range are the earliest date and latest date that are common to all the selected series. You again have the choice of keeping this range, or changing it.

You must consider one important point on the subject of the range: as a minimum, there must be two more data points in the range than there are independent variables, regardless of whether or not a constant is used in the regression. For example, when you select three independent variables, you must have five data points in the intersection of the ranges in the dependent and independent variables.

The range displayed in the status area is appropriate for this example. With the cursor on KEEP, press **RETURN**.

Next, the status area prompts you to choose whether or not a constant is used in generating the regression. With the cursor on YES, press **RETURN**.

The time necessary to compute the regression increases as the number of data points and number of independent series increase. As the computation is completed, the regression analysis is displayed as shown in Figure 2-42.
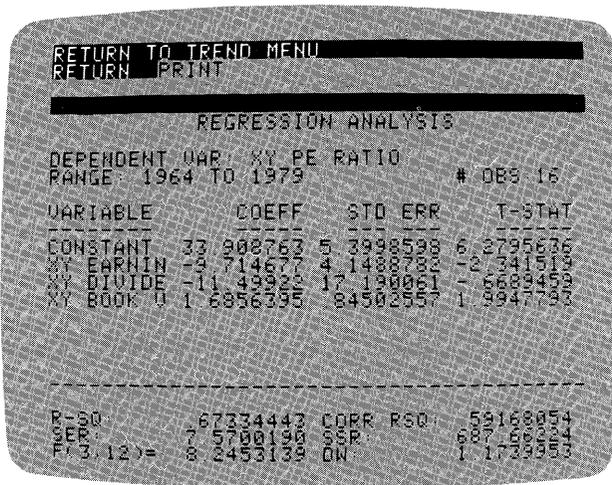
018-049/P

Figure 2-42. Regression Analysis Display

You now have the option to RETURN to the Trend menu, or to PRINT the regression analysis screen display. Again, the only way to save this information is to print it now on your printer; it is not saved on diskette or in memory. Select RETURN without first printing.

Before erasing the regression analysis from the screen, the program asks if you want to save the series that were generated to contain the fitted and residual values. If you select NO, the series are discarded,

and you must perform the regression again if you want these series later. Select YES to save the series. The Trend menu reappears in the status area.

To see that the new series have been saved in memory, move the cursor to DISPLAY, and press **RETURN**. Note that the bottom two items in the list of series are XY PE RATI.FO and XY PE RATI.RO. The series names are the same as that of the dependent series, plus an extension that identifies them as either fitted (F) or residual (R). The program supplied the same number for both series generated from this regression. To examine the values in these series, follow these steps:

1. Select RETURN to display the Trend menu.
2. Select ANALYZE from the Trend menu, then select TABLE from the Analyze menu.
3. Select SCREEN to display the table of values on the screen.
4. Use the space bar, arrow keys, and final **RETURN** to select XY PE RATIO, XY PE RATI.FO, and XY PE RATI.RO.
5. When the range is displayed in the status area, select KEEP.

The values for the series are displayed in three columns. The corresponding dates in the specified range occupy the first column.

Figure 2-43 shows a line chart that was created in the Plot subprogram. On this chart, the actual data and the fitted data have been plotted together for easy comparison.
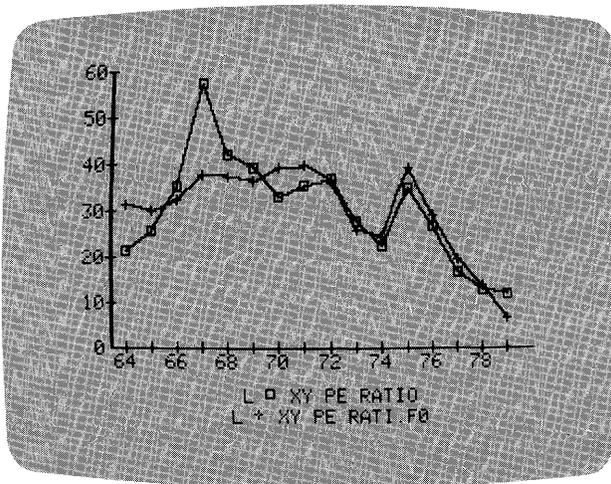
018-050/P

Figure 2-43. Actual and Fitted Series Line Chart

The status area displays the message PRESS ANY KEY. **Press ESC,** for example, and you return to the Trend menu.

Performing Trend Forecasting

The Regression operation also performs trend forecasting by calculating the best fitted straight line for the dependent variable. You are prompted for the number of periods to forecast. The fitted straight line is extended for the specified number of periods.

When performing trend forecasting, REGRESS generates the same output that is generated in multiple regression: a regression analysis screen display, a fitted series, and a residual series. Therefore, you must have enough space in memory for at least two more series in order to complete the Regression operation.

If there is not enough memory space for the two generated series, the program displays the message CAN'T! NO ROOM. In such a case, the operation ends before completing all calculations, but the screen displays as much of the analysis as was performed before space was depleted.

To free some memory space before beginning this operation, select CLEAR from the Trend menu, and remove the fitted and residual series you created earlier. Move the cursor to XY PE RATI.FO, press the space bar, move the cursor to XY PE RATI.RO, and press **RETURN.**

A complete list of series in memory is redisplayed, showing that the fitted and residual series are gone. With the cursor on RETURN, press **RETURN** to go back to the Trend menu.

For this example, you will generate a five-period forecast of the XY PE RATIO series. Select the menu items ANALYZE, then REGRESS. For the dependent variable, select XY PE RATIO.

You cannot include any series as independent variables when doing a trend forecast. When the prompt to select the independent variables is displayed, the bottom item in the list is [TREND]. Move the cursor to [TREND], and press **RETURN.**

Next, you are prompted to specify the number of periods to be forecast. Type **5,** and press **RETURN.** The maximum number of periods to be forecast is limited to the number of data points in the dependant series. Larger numbers are treated as 0 by the program, though no error message is displayed. When the range of the dependent variable is displayed in the status area, select KEEP. The regression analysis display appears on the screen.

You now have the same options you had with the multiple regression operation: to RETURN to the Trend menu, or to PRINT the regression analysis screen display. Again, the only way to save this information is to print it now on your printer; it is not saved on diskette or in memory. Select RETURN without first printing.

Before erasing the regression analysis from the screen, the program also asks if you want to save the series that were generated here to contain the fitted and residual values. The fitted series is the 5-year forecasted trend series of the dependent variable. Select YES to save these new series. The Trend menu reappears in the status area.

Figure 2-44 shows a Line chart of the fitted series and the actual series plotted together in the Plot subprogram.
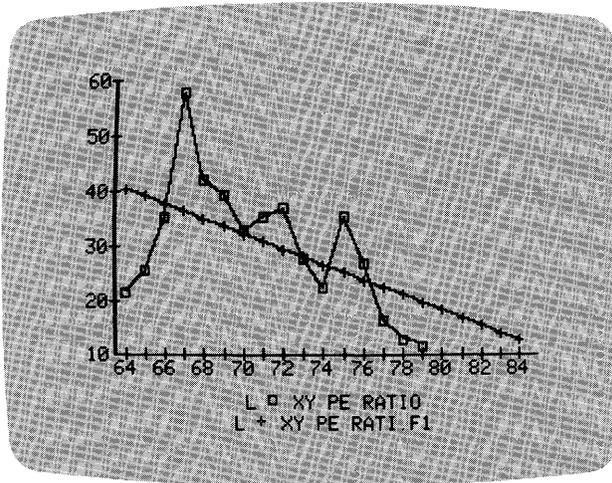
018-051/P

Figure 2-44. Trend Forecast Chart

USING THE FUNCTION OPERATION

The FUNCTION menu item in the Trend Menu displays its own menu containing seven different functions. You can use these functions to perform various computations and shifting of values in your series.

Each item in the FUNCTION menu generates a new series. Before selecting FUNCTION, therefore, you must have enough space in memory for at least one more series in order to complete the operation.

If there is not enough memory space for a function to be performed, the program displays the message CAN'T! NO ROOM when you select the FUNCTION menu item. You must first use CLEAR to remove at least one series from memory.

Select FUNCTION from the Trend menu. When the Function menu is displayed, move the cursor to each item as it is described, and examine the long prompt at the top of the status area.

Each function generates a new series that has the same name as the source series, plus an extension that serves as an identifier. The identifiers added to the series name for each function are shown in Table 2-3.

Table 2-3. Name Identifiers for Function Series

Function	Identifier	Where
Moving Average	.Mn	n = number of periods averaged
Smoothing	.S	
Percent Change	.%	
Lag	.−n	n = number of periods lagged
Lead	.+n	n = number of periods leading
Difference	.D	
Total	.T	

All the items in the Function menu operate in much the same way. After selecting an item, you select the source series from the list of series in memory. Some functions require no further input, while others prompt for an additional factor. This lesson describes each function. After the functions are individually discussed, an example is given using the moving average function.

Computing Moving Average

The MOVE AVG function calculates the moving average of the source series over a specified number of periods. The three common methods of calculating a moving average are:

- The N + 1 method which locates the first point of the moving average series at one point beyond the periods being averaged. This is the method used by the Trend subprogram, as shown in Figure 2-45.
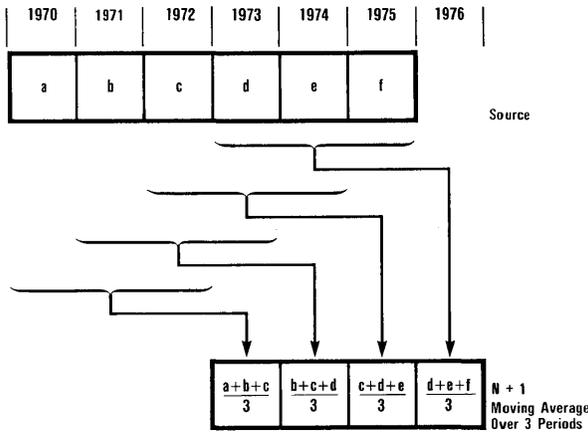
Figure 2-45. Diagram of N+1 Moving Average Method

- The N method which locates the first point of the moving average series at the last point of the periods being averaged. This method is shown in Figure 2-46.
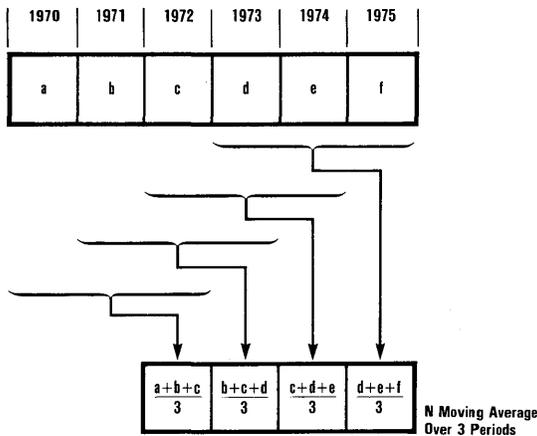
Figure 2-46. Diagram of N Moving Average Method

- The Centered method which locates the first point of the moving average series at the center of the periods being averaged. This method is shown in Figure 2-47.
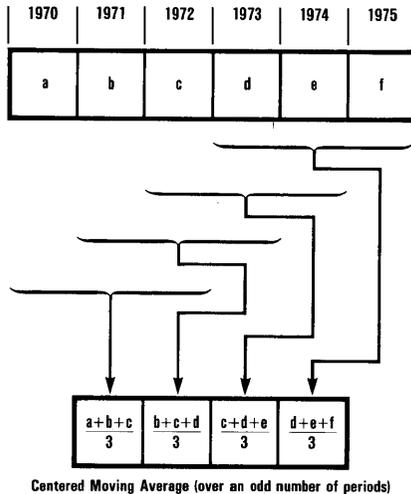
Centered Moving Average (over an odd number of periods)   003-005

Figure 2-47. Diagram of Centered Moving Average Method

You can convert the Trend N + 1 moving average to an N or Centered moving average. See the MOVE AVG section of Chapter 3: REFERENCE for a detailed discussion.

The moving average is essentially a smoothing technique. A common use of this function is to remove the noise (seasonal factors) from monthly or quarterly data. For example, if you have monthly sales data for several years and want to see the trends without the month-to-month fluctuations, you can generate a moving average over a 12-month period. For quarterly data that contains seasonal noise, you can generate a moving average over a four-quarter period.

After you have selected MOVE AVG, you select the source series from the list of series in memory, then you are prompted for the number of periods.

Performing Exponential Smoothing

The SMOOTH function performs a single exponential smoothing on the source series. The forecast generated by this technique is based on the most current data point and current forecast, and lags the source series by one period.

You are prompted for a smoothing factor (λ) which must be greater than 0 and less than 1. The smoothed series (Y) is generated from the source series (X) according to the following formulas.

For the value $i = 1$:

$$Y_i = X_i$$

For the remaining i values:

$$Y_i = \lambda \quad X_{i-1} + (1 - \lambda) Y_{i-1}$$

where:

i is an integer ranging from 1 through the number of series data points.

A high smoothing factor (a value greater than 0.5) gives greater weight to the more current point, and a low smoothing factor gives greater weight to the earlier point. The generated series lags the source series by one period, as shown in Figure 2-48. This lag is a one-period forecast for the data in the source series.
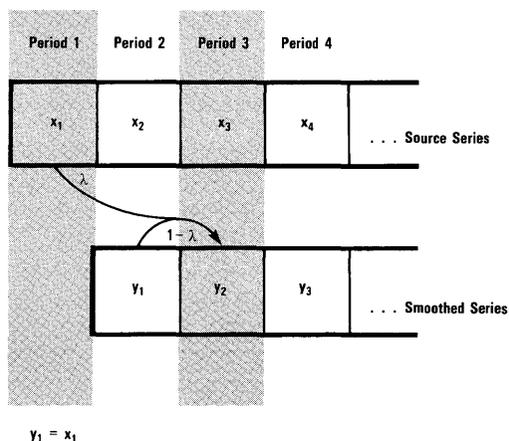
Figure 2-48. Diagram of Smoothed Lag

Computing Percent of Change

The PERCENT function calculates the percent of change between the dates represented by n and n + 1. The value is placed at date n + 1 in the new series. With this function, you can evaluate the change in related values, rather than trying to compare divergent magnitudes in the original values. For example, you may generate percent-of-change series for sales and cost-of-sales data. The original data could seem to demonstrate a low correlation; when, in fact, the percent of change shows a positive cause-and-effect relationship.

Computing Adjacent Difference

The DIFF function computes the difference between adjacent data points in a series. When DIFF is selected, you select a source series from the list of series currently in memory.

Shifting Series to the Future

The LAG function shifts the values in the source series a specified number of periods to the future in the new series. A common use of this technique is to align data in time in a meaningful fashion. For example, if you spend X dollars on advertising in January, the effect of the expenditure will be seen in February sales. The LAG function shifts the advertising expenditures in time where they can be evaluated against the sales they prompted, that is:

Sales(i) = f(advertising expenditure(i-1))

You are prompted to specify the number of periods to be lagged. The new series begins and ends the specified number of periods later than the source series. Figure 2-49 shows the effect of a one-period lag on a series.
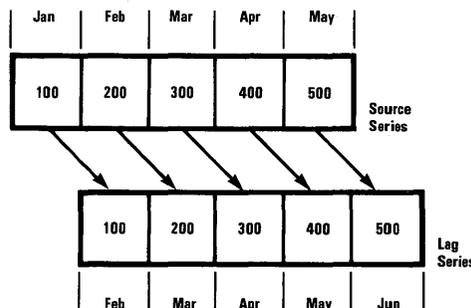
012-006

Figure 2-49. Diagram of a One-period Lag

Shifting Series to the Past

The LEAD function shifts the values in the source series a specified number of periods to the past in the new series. This function is the reverse of the LAG function. Using the same example, LEAD would allow you to shift the sales data back to the expenditure of advertising dollars for evaluation.

You are prompted to specify the number of periods to be led. The new series ends the specified number of periods before the source series. Figure 2-50 shows the effect of a one-period lead on a series.
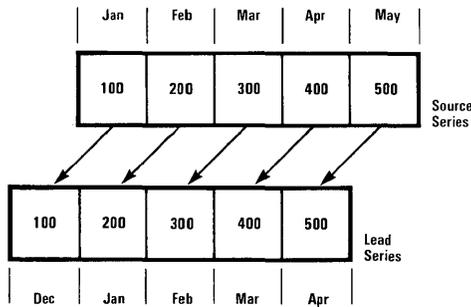
012-007

Figure 2-50. Diagram of a One-period Lead

Computing a Cumulative Total

The TOTAL function calculates the running total of specified points in the source series. A given point in the new series is the total of all preceding points in the source series. The most common use of this function is to generate year-to-date totals of monthly or quarterly data.

PRACTICING WITH THE MOVING AVERAGE FUNCTION

This is an example of using the MOVE AVG function. Before starting, select EXIT from the Function menu; then select DISPLAY from the Trend menu. Examine the last line of the series display to be sure you have enough memory space for one more series. If you already have 16 series in memory, remove one with CLEAR.

Select FUNCTION from the Trend menu. The Function menu is again displayed.

With the cursor on MOVE AVG, press **RETURN**. The list of series in memory is displayed. To select a series on which to calculate the moving average, move the cursor to XY DIVIDENDS, and press **RETURN**. Next you are prompted to enter the number of periods over which the average is to be calculated. Type **3**, and press **RETURN**.

The status area prints the message PLEASE WAIT... while the new series is being calculated. Then the program returns to the Trend menu. In order to view the new series, you will use TABLE from the Analyze menu.

Move the cursor to ANALYZE, and press **RETURN**. With the cursor on TABLE, press **RETURN**. Select SCREEN for the table display. When the series list appears, move the cursor to XY DIVIDENDS, and press the space bar. Then, move the cursor to the new series named XY DIVIDEN.M3, and press **RETURN**. When the range prompt is displayed, select KEEP. Your screen should resemble the table of the two series in Figure 2-51. Select CONTINUE to see the remainder of the table on the next screen. Then press **ESC** to return to the Trend menu.

018-052/P

Figure 2-51. Table of Series After Moving Average

You can convert the VisiTrend N + 1 moving average to an N or Centered moving average. These conversions are for an average over an odd number of periods, and over an even number of periods. Procedures for these conversions are detailed in the MOVE AVG section of Chapter 3: REFERENCE.

WRITING YOUR OWN SERIES TRANSFORMATION

While the FUNCTION and ANALYZE menu items offer many series data functions, they cannot meet all your needs. The XFORM menu item allows you to do series transformations. This can include the conversion of exponential values to first order values for inclusion in a linear multiple regression.

For example, if you think that there may be a meaningful correlation such that:

$Y = f(X^2)$ where $f(.)$ is a linear function

you can transform the X^2 values to first order values with XFORM to create a new series (Z) that is equal to X^2. then you use the new series (Z) as an independent variable to perform the linear regression:

$Y = f(Z)$

As a further example of the use of XFORM, suppose you suspect that dependent variable (D) is related to the sine of the cube of independent variable (I):

$D = f(\sin(I^3))$

To test this hunch, use XFORM to compute:

$II = \sin(I^3)$

then do a linear regression with D as the dependent variable and II as the independent variable:

$D = f(II)$

If the regression shows a good fit, your hunch about the relationship between D and $\sin(I^3)$ is correct.

The XFORM function lets you write your own transformation formula. Formulas are limited to two lines (80 characters). You have the use of the following mathematical, logical, and comparative operators in writing your transformation formula:

- Mathematical operators: + (addition), − (subtraction), * (multiplication), / (division), and ∧ (exponentiation).
- Logical operators: AND, OR, and NOT.
- Comparative operators: < (less than), < = (less than or equal to), = (equal to), > (greater than), and > = (greater than or equal to).

You can use parentheses to control the execution order of the formula. All operations in parentheses are performed before the operations outside the parentheses. All parentheses must be closed or an error will occur.

In addition to the mathematical, logical, and comparative operators, you can use the following functions:

- SGN: Sign
- INT: Integer part of
- SQR: Square root
- LOG: Natural logarithm
- EXP: e to the power of
- RND: Random number between 0 and 1
- ABS: Absolute value of
- SIN: Sine
- COS: Cosine
- TAN: Tangent
- ATN: Arctangent

These functions are used as they are in a **BASIC** program. The only difference here is that you can use a series as the variable on which the function operates. In this case the function is performed on each data point in the series. For example, SQR(XY EARNINGS) generates a series with the same beginning and ending dates and period. Each data point in the new series is the square root of the corresponding data point in **XY EARNINGS.**

You must include at least one series name in your transformation formula. The **XFORM** function displays the list of series currently in memory. You select a series by pressing → to move the cursor into the list of series. Then you move the cursor to the desired series name, and press **RETURN.**

The following example creates a new series with the name BD AVG. The new series is the average of the daily high and low stock prices contained in the series BD HIGH and BD LOW.

Before beginning, use DISPLAY (and CLEAR, if necessary), to make sure you have enough memory space for a new series.

From the Trend menu, select XFORM. The program prompts you to name the series that will contain the transformed data. Type **BD AVG,** and press **RETURN.**

If you don't enter a series name, the Trend subprogram automatically supplies a name in the form SERIESn, where n is a sequential number.

A list of the series in memory is displayed. The top line of the status area prompts ENTER TRANSFORM, →, OR RETURN. Your choices are:

- You can enter any transform operator or function from the keyboard.
- You can enter a series name into a formula by first moving the cursor into the list with →. You continue pressing → or ← until the the correct series name is highlighted by the cursor and appears in the status area. Then press RETURN.
- You can press RETURN to indicate that the formula is complete.

The transform formula you will practice uses all of these.

When you want to erase part of a formula you have entered, press ESC. If a series name is in the formula when the ESC key is pressed, it is enclosed by slashes for easier reading. If you press ESC to correct a series name, the whole name is erased with a single press of the key. You do not have to erase each letter of the name.

Type a left parenthesis. Next, press →. The cursor moves into the series list, highlighting the first name in the list. This series name also appears in the formula line in the status area. Press → again; the cursor moves down, and the name in the status area changes accordingly. Move the cursor to BD HIGH, and press RETURN. The cursor disappears from the list and BD HIGH remains in the formula.

Type the plus sign (+), and again press →. This time, move the cursor to BD LOW in the series list, and press RETURN.

Type a right parenthesis, a slash (for division), and 2. You now have a formula in the status area that reads:

(BD HIGH + BD LOW)/2

To generate a new series from this formula, press RETURN. If the last item in the formula had been a series name, you would have had to press the RETURN key twice: once to enter the series name, and once to execute the formula.

When the Transform operation has finished, the Trend menu is displayed. Select DISPLAY to see the new series named BD AVG at the end of the list. Select RETURN to redisplay the Trend menu.

Figure 2-52 shows an overlay chart created in the Plot subprogram. The new series is plotted as a Line, overlaying a High-Low-Close chart of BD HIGH, BD LOW, **and** BD CLOSE.
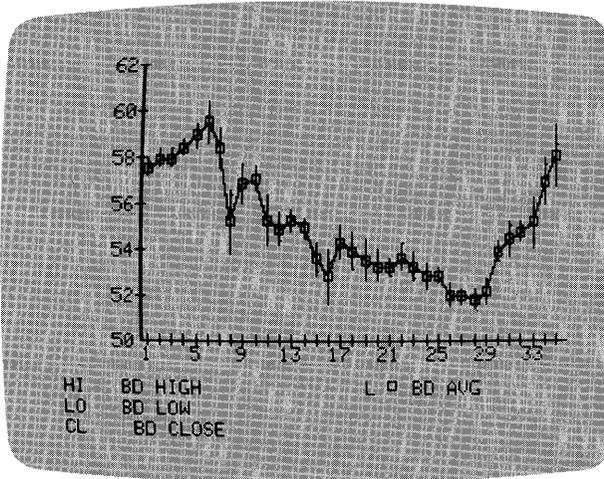
018-053/P

Figure 2-52. Chart After Transformed Series

CONTINUING WITH THE TREND SUBPROGRAM

You can go back to the functions you have used in this lesson and analyze your data. You should be able to practice with the Function menu items that you have not yet used. Finally, you should know how to save your Trend series output on the data diskette, and plot the data with the Plot program.

If you are unsure of any of the VisiTrend operations, review this lesson, and refer to the detailed sections of each menu item in Chapter 3: REFERENCE. For a review of the Main subprogram, see Lesson Two; and for a review of the Plot subprogram, see Lesson One.

FUNCTIONAL SUMMARY

Operation	From	Select or Type
Load Trend sub-program	Main menu	1. TREND
Construct a table of series	Trend menu Analyze menu	1. ANALYZE 2. TABLE 3. SCREEN/PRINTER 4. ← or → to series name(s) 5. space bar/RETURN 6. KEEP/CHANGE then start and end years 7. ESC
Calculate series statistics	Trend menu Analyze menu	1. ANALYZE 2. STATS 3. ← or → to series name(s) 4. space bar/RETURN 5. KEEP/CHANGE then start and end years 6. CONTINUE/PRINT 7. RETURN/PRINT
Perform a linear multiple regression using your own variables	Trend menu Analyze menu	1. ANALYZE 2. REGRESS 3. dependent variable series name 4. 1 to 5 independent variable series names ←, →/space bar/RETURN 5. KEEP/CHANGE then start and end years 6. YES/NO (use constant) 7. RETURN/PRINT 8. YES/NO (save fitted and residual values)

(Continued)

Operation	From	Select or Type
Perform a linear multiple regression using program-supplied variables (Trend Forecasting)	Trend menu Analyze menu	1. ANALYZE 2. REGRESS 3. dependent variable series name 4. [TREND] 5. number of periods to forecast 6. KEEP/CHANGE then start and end years 7. RETURN/PRINT 8. YES/NO (save fitted and residual values)
Perform single exponential smoothing of a series	Trend menu Function menu	1. FUNCTION 2. SMOOTH 3. name of series to be smoothed 4. smoothing factor (between 0 and 1)
Calculate percent of change between points in a series	Trend menu Function menu	1. FUNCTION 2. PERCENT 3. series name
Compute the difference between adjacent data points in a series	Trend menu Function menu	1. FUNCTION 2. DIFF 3. series name
Shift values to the future	Trend menu Function menu	1. FUNCTION 2. LAG 3. series name 4. number of periods
Shift values to the past	Trend menu Function menu	1. FUNCTION 2. LEAD 3. series name 4. number of periods
Compute cumulative totals in a series	Trend menu Function menu	1. FUNCTION 2. TOTAL 3. series name

(Continued)

Operation	From	Select or Type
Calculate a moving average	Trend menu Function menu	1. FUNCTION 2. MOVE AVG 3. series name 4. number of periods
	Trend menu Analyze menu	5. ANALYZE 6. TABLE 7. SCREEN/PRINTER 8. ← or → to source series name 9. space bar 10. ← or → to new series name 11. RETURN 12. KEEP/CHANGE then start and end years 13. CONTINUE/EXIT 14. ESC
Write a series transformation	Trend menu	1. XFORM 2. name series to contain transformed data
	Series list	3. formula with functions, operators, series names (use → ,RETURN) 4. RETURN

LESSON FIVE: PLOTTING EXAMPLES

This lesson presents a series of step-by-step examples showing how to make VisiTrend/Plot charts. The data series that are used in these examples are stored on the VisiTrend/Plot example diskette in the three files named ACME REPORT, REGIONAL, and XYCHART.

- ACME REPORT contains series that record annual revenue, units shipped, annual expenses, and income taxes for the year 1981.
- REGIONAL contains series that show total Acme Company sales by geographic region in the year 1981.
- XYCHART contains two series of values for two math functions.

Before beginning this lesson, make sure you have read and used the operations described in LESSON ONE: THE PLOT SUBPROGRAM, and LESSON TWO: THE MAIN SUBPROGRAM.

GETTING STARTED

- If you are not continuing directly from Lesson Four, make sure your computer is OFF; then load the program diskette according to the directions in the section LOADING THE VISITREND/PLOT PROGRAM in Chapter 1. Your screen displays the Main menu.
- If you are continuing directly from Lesson Four, your screen displays the Trend menu. Select CLEAR, and then [KEEP NONE] to empty the computer memory. When the Trend menu is redisplayed, select MAIN to load the Main subprogram. Your screen displays the Main menu.

Select LOAD from the Main menu. When the list of files appears, load the files ACME REPORT, REGIONAL, and XYCHART into memory. Files are loaded one at a time, so you must select LOAD three times from the Main menu. Now load the Plot subprogram. The Select menu appears in the status area at the bottom of the screen.

The examples in this lesson show you how to generate many different charts, and how to combine charts. Each exercise begins with a picture of the chart that you will create. The picture is followed by a list of steps used to generate the chart. A word or phrase printed in light typeface indicates where the cursor must be positioned, before you press the following key. A word or phrase enclosed in quotation marks indicates that you must type the word or phrase at the keyboard, before you press the following key. For example:

LINE **RETURN** — move the cursor to LINE, and press the **RETURN** key.

"0" **RETURN** — Type 0 at the keyboard, and press the **RETURN** key.

SPACE BAR — press the space bar.

ESC — press the ESC key.

GENERATING A SINGLE-LINE CHART
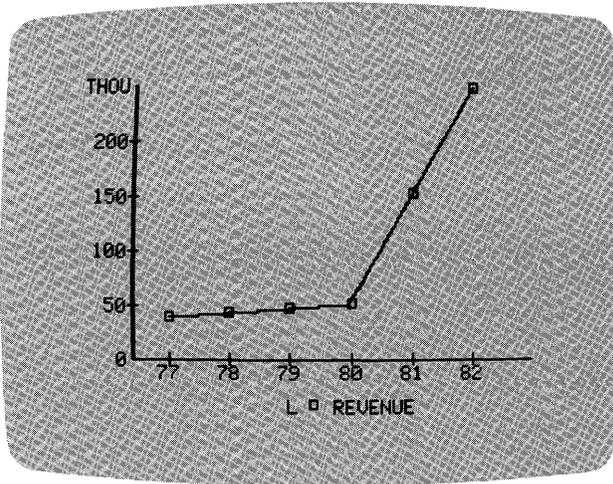
018-054/P

Figure 2-53. Sample Single-Line Chart

Beginning in the Select menu, follow these steps:

LINE **RETURN**

REVENUE **RETURN**

PLOT **RETURN**

You generated several single-line charts like this one in Lesson One. This chart has a different Y-axis scale. The Y-axis scale is labeled THOU at the top, indicating that the values represent thousands: 50,000, 100,000, etc. Press ESC to display the Plot menu.

GENERATING A TWO-LINE CHART
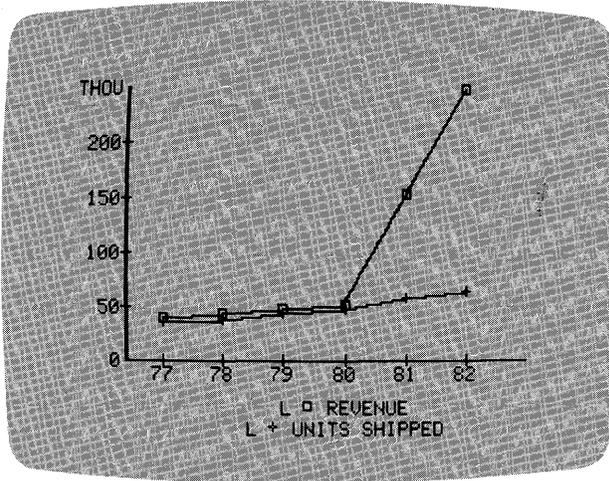
018-055/P

Figure 2-54. Sample Two-Line Chart

Beginning in the Plot menu, follow these steps:

NEW **RETURN**

SELECT **RETURN**

LINE **RETURN**

REVENUE **SPACE BAR**

UNITS SHIPPED **RETURN**

PLOT **RETURN**

This chart contains two lines instead of one. Each line is plotted with a different symbol: the square (which is always the first symbol used by the program), and the plus sign (+). The two-line legend at the bottom of the chart identifies the chart type for each series, shows which plotting symbol was used, and lists the series name. Press ESC to display the Plot menu. The bottom line of the status area lists the first series selected, the type of chart, and three dots. These dots indicate that you selected multiple series.

Note that both series were selected before the chart was plotted.

GENERATING A THREE-LINE CHART
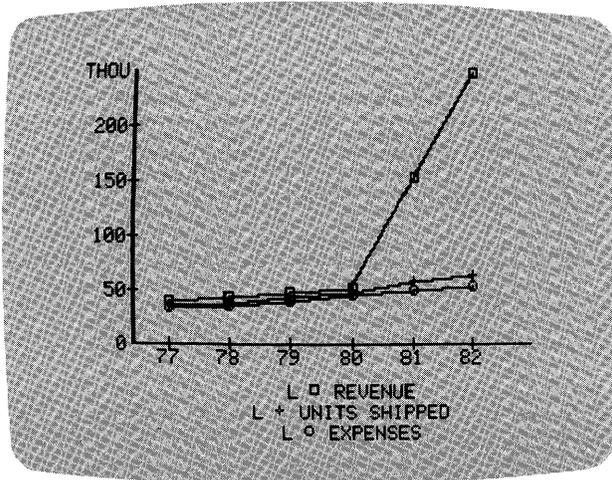
018-056/P

Figure 2-55. Sample Three-Line Chart

Beginning in the Plot menu, follow these steps:

NEW **RETURN**
SELECT **RETURN**
LINE **RETURN**
REVENUE **SPACE BAR**
UNITS SHIPPED **SPACE BAR**
EXPENSES **RETURN**
PLOT **RETURN**

The new feature of this chart is the use of the circle (o) as the plotting symbol of the third series.

This chart is rather difficult to read. The information for the years 1977 through 1980 is fit tightly into a small space. The only plot line that shows up well is the 1980-1982 annual revenue. This chart might be satisfactory if its purpose is to show the revenue increase beginning in 1980. However, if the other information is equally important, it might be a good idea to change the range to 1975 through 1980. You could then handle the 1980 through 1982 revenue figures in a separate chart.

Another approach might be to change the scale to show the earlier data clearly, and let 1980-82 revenues go off the chart. You could indicate important value(s) with a moveable title. Be aware that rescaling this chart works only if the series to be truncated is selected last. Before rescaling, reverse the order of the series: select EXPENSES, UNITS SHIPPED, then REVENUE. You'll also need to label the plots with moveable titles, since generating an off-scale chart won't produce any legends. This is the approach used in Figure 2-56.
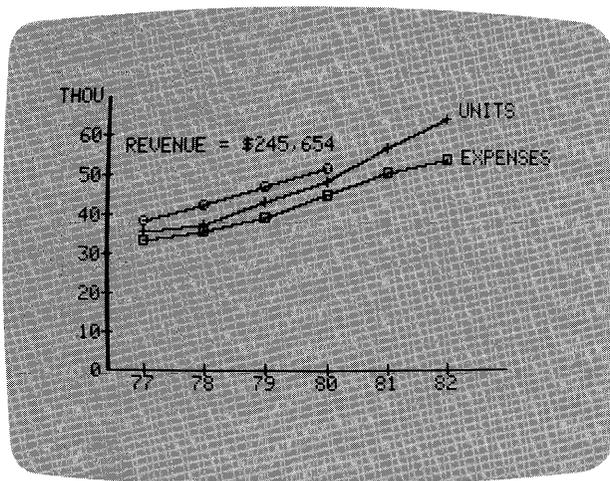
018-057/P

Figure 2-56. Rescaled Three-Line Chart

Experiment with the improvements to this chart that were suggested in the preceding paragraphs. After you've made these improvements, return to the Plot menu. When the Plot menu appears, go to the Select menu. Select the LINE chart type; then observe the series list that appears, but do not select any series.

You'll now select the same three series — but this time, with a shortcut. Notice that the last entry in the list is [SAME]. Choosing [SAME] selects all the series that were plotted in the preceding chart. Instead of selecting each series separately, you only need to position the cursor on [SAME], and press RETURN. Do that now.

When the Plot menu reappears, select PLOT. The chart is replotted in its original form with the same three series.

[SAME] can be used as a shortcut in plotting any chart type except a Pie chart and an XY chart. The [SAME] setting is cancelled once you select NEW from the Plot menu, or if you transfer to the Main subprogram or Trend subprogram, then return to the Plot subprogram.

So far, you've used the Plot subprogram to generate single and multiple-series plots with up to three series. As you've noticed, each series has a corresponding legend at the bottom of the chart.

Although up to 16 series can be plotted on the same chart using a combination of PLOT and OVERLAY, a maximum of the first six legends can be displayed on the bottom of a chart. Three or fewer legends are centered under the X-axis of the chart, as shown in the preceding photograph. Four, five, or six legends are laid out somewhat differently. Follow the steps below to plot four series in a Line chart. You cannot use the [SAME] shortcut, since you're adding a series to the original set of three.

> **ESC**
> SELECT **RETURN**
> LINE **RETURN**
> REVENUE **SPACE BAR**
> UNITS SHIPPED **SPACE BAR**
> EXPENSES **SPACE BAR**
> MARKET **RETURN**
> PLOT **RETURN**

The chart is drawn on the screen with four series and four corresponding legends. Notice that the legends are still under the X-axis, but they are now in two columns. When you are ready to continue, press ESC to display the Plot menu.

GENERATING A SINGLE BAR CHART
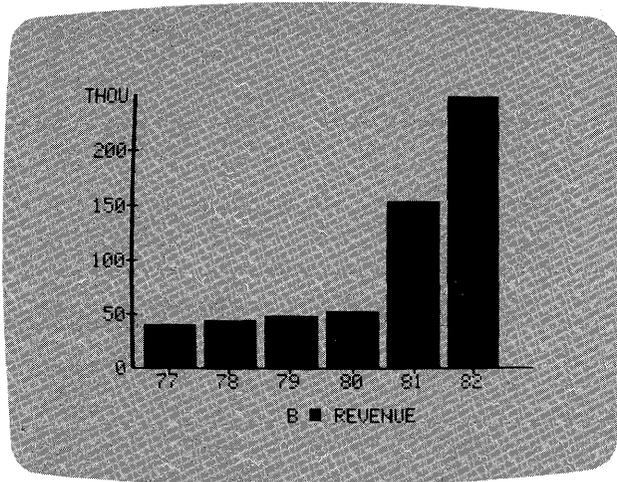
018-058/P

Figure 2-57. Sample Single Bar Chart

Beginning in the Plot menu, follow these steps:

NEW **RETURN**
SELECT **RETURN**
BAR **RETURN**
NORMAL **RETURN**
REVENUE **RETURN**
PLOT **RETURN**

Again, this chart is very similar to the bar charts you plotted in Lesson One. However, the chart can be plotted differently by selecting half-width bars. Press ESC to display the Plot menu. Repeat the sequence of steps above, but this time substitute LEFT for NORMAL in the fourth step. The chart is plotted as shown in Figure 2-58.
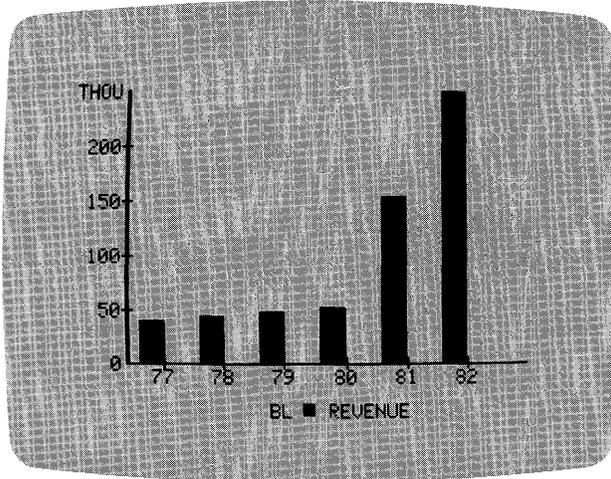
018-059/P

Figure 2-58. Sample Left-Bar Chart

Press ESC to redisplay the Plot menu. The only differences in this chart are the width of the bars, and the bottom line of the status area which designates LEFT BAR where BAR was previously listed.

The half-width bars are most useful for plotting comparative charts, as shown in the next example.

GENERATING A COMPARATIVE BAR CHART
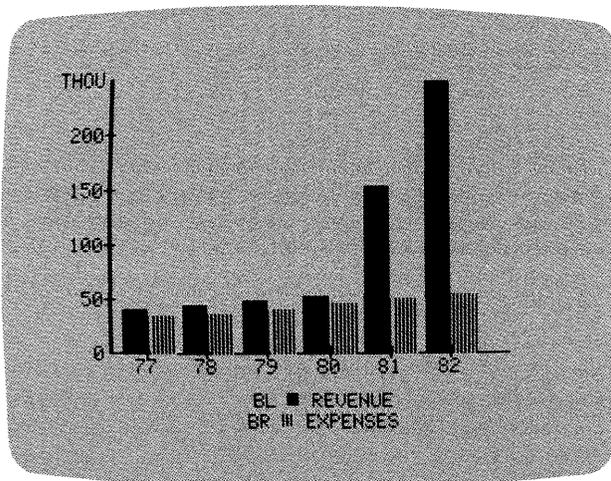
018-060/P

Figure 2-59. Sample Comparative Bar Chart

Beginning in the Plot menu, follow these steps:

NEW **RETURN**

SELECT **RETURN**

BAR **RETURN**

LEFT **RETURN**

REVENUE **RETURN**

PLOT **RETURN**

ESC

SELECT **RETURN**

BAR **RETURN**

RIGHT **RETURN**

EXPENSES **RETURN**

OPTIONS **RETURN**

COLOR **RETURN**

BLUE **RETURN**

OVERLAY **RETURN**

There were two differences between the way this chart was generated, and the way you generated the multiple Line charts:

1. Instead of choosing multiple series at once and plotting them, you selected and drew each series on a separate pass through the Select menu. The OVERLAY choice, in effect, plotted a second chart on top of the first.

2. You selected the color blue for the second set of bars. Alternatively, you could have selected a format (outlined or shaded) instead of a color, with the FORMAT item in the Options menu.

   If you had followed the steps above, but had selected neither a color nor a format with the Options menu, both sets of bars would have been the same color. The half-bars on the two overlaid charts wouldn't have shown up as clearly.

You can create a comparative Bar chart more quickly by selecting BOTH from the Bars menu. The program prompts you to select the left series from the list; then the list is displayed again and you are prompted to select the right series. The two series are plotted on the same pass. When multiple series are plotted this way, the program chooses a color for the second set of bars; in this case, the color would be green. The color chosen depends upon the current background color, and the chart type. See the BACKGR section in Chapter 3: REFERENCE for details.

To try this method, press ESC to display the Plot menu, and follow these steps:

NEW **RETURN**

SELECT **RETURN**

BAR **RETURN**

BOTH **RETURN**

REVENUE **RETURN**

EXPENSES **RETURN**

PLOT **RETURN**

When you select NORMAL width from the Bars menu, the program allows you to select multiple series at the same time from a single series list. You use the space bar to place an asterisk by each series to be selected. When you select PLOT, a different type of Bar chart is drawn. The series chosen together from the same list are stacked on top of each other as shown in Figure 2-60.
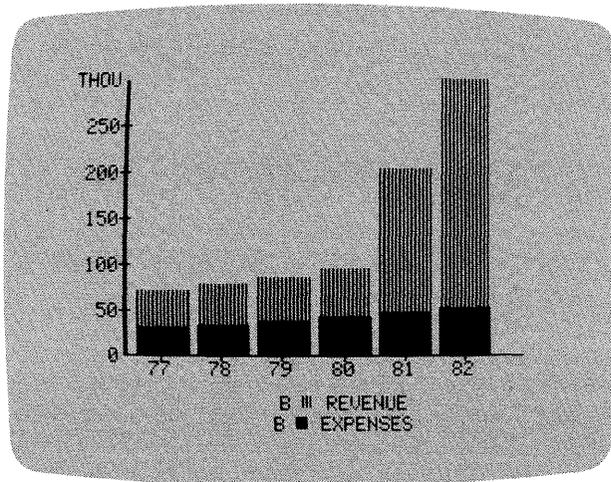
018-061/P

Figure 2-60. Stacked-Bar Chart

The values of the series are added. You can use this style of Bar chart when you are interested in graphically displaying the sum of multiple series. When bars are stacked, the legends reflect the order of stacking. That is, the first legend corresponds to the topmost set of bars, the second legend corresponds to the next lower set of bars, and so on.

USING OVERLAYS WITH LEGENDS AND TITLES

When you plotted the first comparative Bar chart, you used OVERLAY rather than PLOT for the last step. OVERLAY draws a new chart on top of the existing chart. It uses the same range and scale as the existing chart. Up to 15 overlays can be drawn on a single chart.

Overlaying the REVENUE series chart also preserved the REVENUE series legend, and added a second legend to correspond with the EXPENSES series overlay. However, overlaying does not always treat legends in this way. To see what other effects overlaying can have on legends, follow the steps in the next exercise.

Redisplay the Plot menu, then draw a Bar chart for the MARKET series, using Left bars. You are going to write-over the current legend with a First bottom title. Display the Plot menu, select OPTIONS, and then select TITLE.

When the Title menu appears, select FIRST. The flashing cursor appears on the title-entry line of the status area. Type **MARKET**, and press RETURN. When the Typeface menu appears, select NORMAL. Erase the Title menu by pressing ESC, and you see that the original one-line legend has been replaced by the MARKET title. Your screen should resemble Figure 2-61.
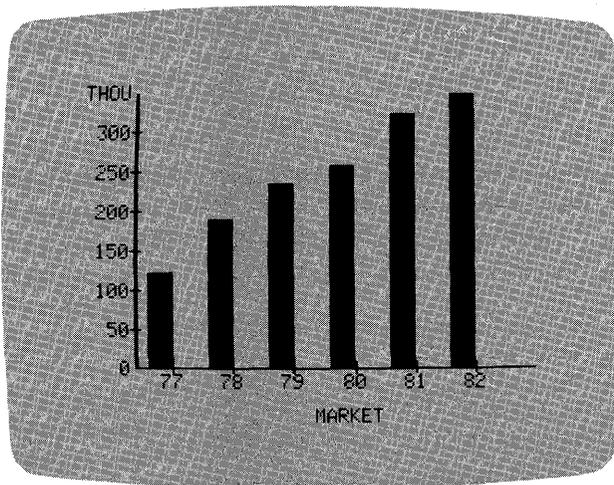
018-062/P

Figure 2-61. Chart With Modified Legend

Now overlay the displayed chart as you did earlier. First press ESC, then select EXIT to return to the Plot menu. Now follow this sequence of steps:

SELECT **RETURN**
BAR **RETURN**
RIGHT **RETURN**
REVENUE **RETURN**
OPTIONS **RETURN**
COLOR **RETURN**
GREEN **RETURN**
OVERLAY **RETURN**

This time the overlay **EXPENSES** chart did not generate a corresponding **EXPENSES** legend, because you supplied a bottom title line for the first series plotted. The legend for the overlaid series is also suppressed if you add a moveable title to the existing chart. Your chart should resemble Figure 2-62.
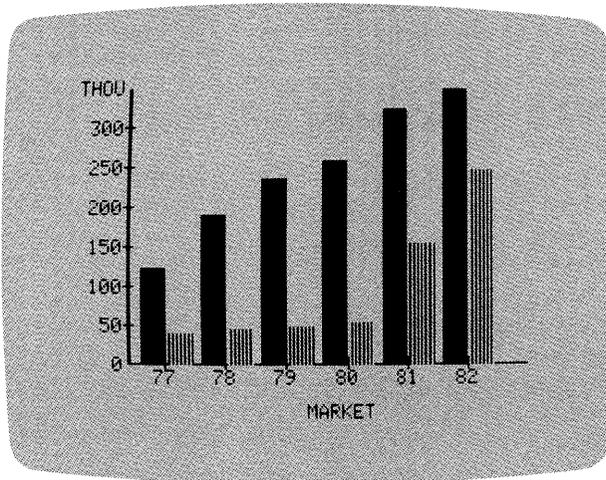
018-063/P

Figure 2-62. Overlaid Chart With Modified Legend

If you want to add a legend corresponding to the overlay, use the TITLE item again, and place the overlay legend on the Second bottom title line.

One more feature regarding overlays and legends is helpful when experimenting with a chart layout. The legend corresponding to the most recent overlay can be displayed by selecting the LEGEND item in the Title menu. Be aware, however, that displaying that legend erases any title residing on the same legend line.

Even if more than six series are plotted and overlaid on a chart, the maximum number of legends that can appear on one chart is six. When there are more than three legends, their order is always columnar: top-to-bottom and left-to-right. This order holds true whether the chart was drawn with multiple-series plots, overlays, or a combination of the two. See the discussion of PLOT or OVERLAY in Chapter 3: REFERENCE for details on plotting up to 16 charts.

REDRAWING OFF-SCALE DATA DURING AN OVERLAY

When you used OVERLAY to create a comparative Bar chart with the example series, you encountered no problems with scale, range, or other plotting factors. However, when you use the Overlay operation on your own charts, it's often easy to create off-scale charts.

In Lesson One, you encountered an off-scale condition when overlaying was not involved. The program gave you two choices: PROCEED or CANCEL. When overlaying is involved, the program gives you a third choice: REDRAW. This section of Lesson Five will let you experiment with REDRAW for off-scale Overlay operations.

Return to the Plot menu and select NEW. Then SELECT a LINE chart type, choose the REVENUE series, and PLOT it. Press **ESC** to redisplay the Plot menu, then select OPTIONS, TITLE, and MOVEABLE. Type **REVENUE**, and press **RETURN**. Use M, I, and the arrow keys to move the title, until it is just above the point for the year 1977. Press **RETURN** to display the Typeface menu, and FIX the title (NORMAL typeface is automatically chosen). When you have completed these steps, your screen should resemble Figure 2-63.
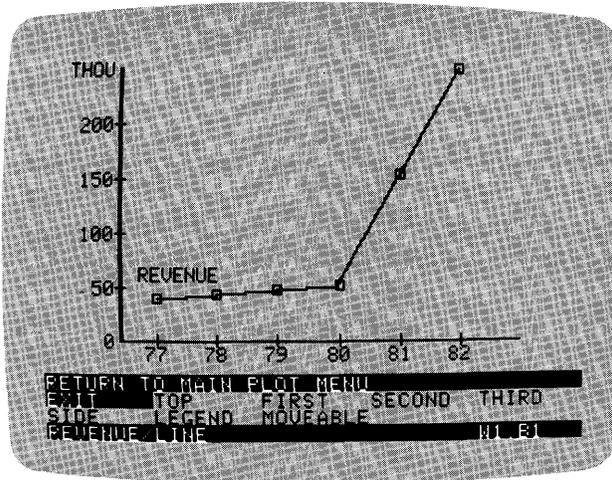
018-064/P

Figure 2-63. Line Chart With Moveable Title

   Next, plot a second series using the Overlay operation. EXIT from the
Title menu. When the Plot menu appears, the sequence of steps is:
SELECT, LINE, UNITS SHIPPED, and OVERLAY. Notice that the legend for the
overlaid series is not displayed. This is because you added a Moveable title
to the existing series. The overlay legend is also suppressed when any bot-
tom title is added to the existing chart. You can always supply missing
legend(s) by using the moveable or bottom title menu items. You can also
display the legend of the most recent overlay by selecting LEGEND from
the Title menu. Try this last method by selecting OPTIONS, TITLE, and
LEGEND. Remove the menu with ESC, and you see the second legend.

   Now, label the lower line for the series UNITS SHIPPED with a
Moveable title, UNITS. Fix the title UNITS just above the point for the
year 1982, in NORMAL typeface.

So far, you have been able to plot two series on the same scale using the Overlay operation. Your screen should resemble Figure 2-64.
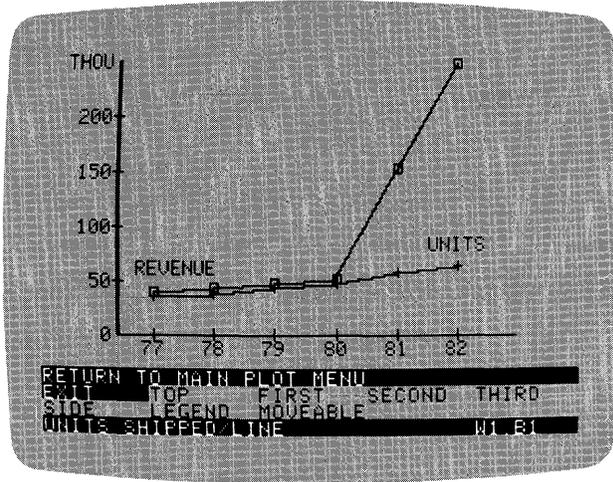
018-065/P

Figure 2-64. Overlaid and Titled Line Chart

Next, you'll use another Overlay operation to plot a third series on this chart. Once again, EXIT to the Plot menu. Follow this sequence of steps: SELECT, LINE, MARKET, and OVERLAY. This time, the overlay didn't proceed because the data in the **MARKET** series is off-scale. You now have three choices, as indicated by the menu in the status area: PROCEED, REDRAW, or CANCEL. PROCEED and CANCEL operate as you saw in Lesson One. REDRAW, however, rescales the chart, then redraws it. This has several consequences, as you will see.

Select REDRAW. **The message** WARNING! INTERMEDIATE SERIES LOST
appears briefly in the bottom status area. Your screen should resemble
Figure 2-65.
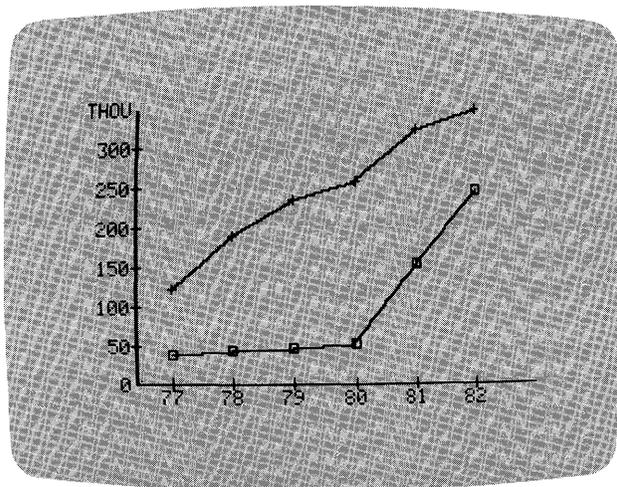
018-066/P

Figure 2-65. An Off-scale Chart Redrawn

Notice that all plot labels disappeared, and so did the UNITS SHIPPED
series. Using REDRAW after overlays erases all previously overlaid
series; it also erases all legends, and any titles. Only the originally plot-
ted series and the series produced by REDRAW remain.

The relationships among legends, overlays, and the REDRAW function are illustrated in Figure 2-66.
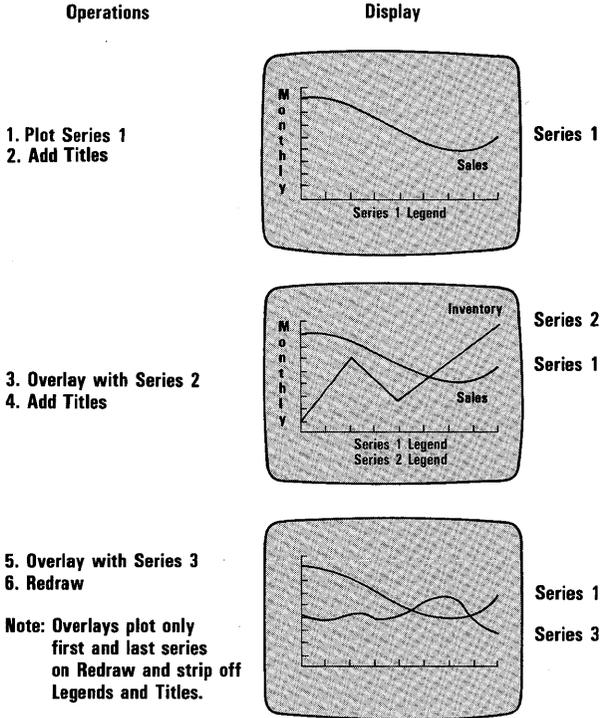
Figure 2-66. Relationships Among Legends, Overlays, & REDRAW

When you are ready to continue, press ESC to display the Plot menu.

GENERATING AN XY CHART
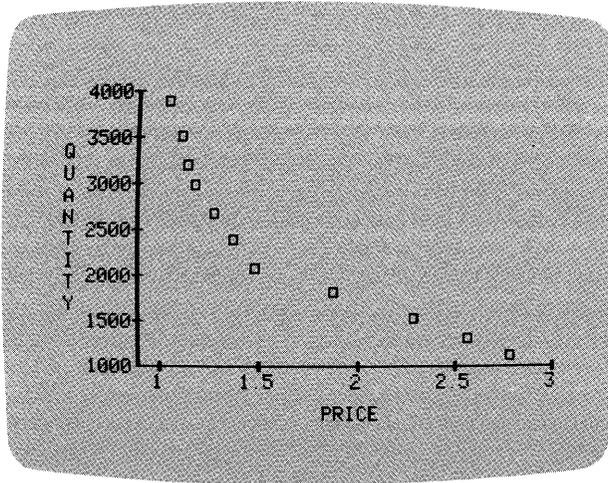
018-067/P

Figure 2-67. Sample XY Chart

Beginning in the Plot menu, follow these steps:

NEW **RETURN**

SELECT **RETURN**

XY **RETURN**

PRICE **RETURN**

QUANTITY **RETURN**

PLOT **RETURN**

An **XY** chart consists of two sets of series values plotted against each other. This type of chart graphically indicates the presence or absence of a correlation between the two sets of values.

As you can see, this chart does not have a time axis; instead it has two scale axes. The Y-axis contains the scale for the QUANTITY series, and the X-axis contains the scale for the PRICE series.

The plotted points represent the correlation of values from the two series. The two series must have the same periodicity, and their ranges must intersect. The VisiTrend/Plot program determines correlation values between the two series when data points in the two series have matching dates (and periods). Each time the date of a data point in one series matches the date of a data point in the other series, a correlation value is determined. Each correlation value results in one point on the XY chart.

To plot an XY chart for two series when the data points in question do not have matching dates, use the Edit operation in either the Main or the Trend subprogram. Then select SPECS, and change the start and end years and/or period of one of the series.

The VisiTrend/Plot program automatically plots an XY chart with hollow square symbols to indicate each correlation point. You can cause data points to be drawn with lines only, points only, or both symbols and lines, by selecting OPTIONS from the Plot menu. Then select FORMAT, choose LINES, POINTS, or BOTH, and plot the chart again. As with other chart types, you can respecify that only symbols be used by repeating the procedure and selecting SYMBOLS from the Format menu.

NOTE: the Overlay operation cannot be used with an XY chart.

USING A WINDOW TO DISPLAY TWO CHARTS

When you are ready to continue with the lesson, press ESC to display the Plot menu.

The WINDOW menu item divides the screen into two parts, either vertically or horizontally. You can plot different charts in each window. Any chart type can be displayed in a window, except a Pie chart. Plotting a Pie chart requires the use of the entire screen.

When you select WINDOW from the Plot menu, a Window menu is displayed in the status area. Your choices are:

EXIT	returns to the Plot menu, retaining the current display.
HORIZ	creates top and bottom windows.
VERT	creates left and right windows.
SWITCH	switches windows, thus making the other window the active window.
NONE	cancels the Window operation, and returns to one full screen display.

The first active window is the top one when you choose HORIZ windows, and the left window when you choose VERT windows.

When you switch between windows, the series and options for the window you are leaving are no longer active. If you return to a window and want to change an option, you must start over, and PLOT the chart again. You should, therefore, try to complete all refinements to one chart before switching windows to plot and refine the other chart.

Two series, BEFORE and AFTER, will be plotted in horizontal windows for this example. BEFORE has only three data points representing three existing sales regions. AFTER has four data points that include an additional fourth sales region. It is often desirable to show different forms of data in two different charts at the same time.

The following practice in using windows directs you to create a display resembling Figure 2-68.
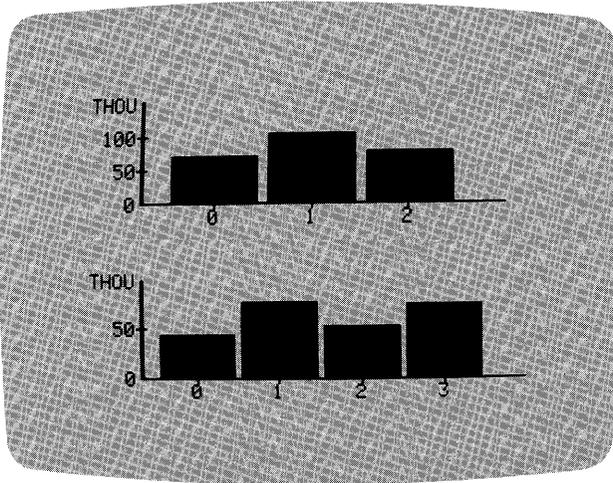
018-068/P

Figure 2-68. Sample Window Charts

Beginning in the Plot menu, follow these steps:

NEW **RETURN**
WINDOW **RETURN**
HORIZ **RETURN**
BAR **RETURN**
NORMAL **RETURN**

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BEFORE **RETURN**

PLOT **RETURN**

ESC

WINDOW **RETURN**

SWITCH **RETURN**

BAR **RETURN**

NORMAL **RETURN**

AFTER **RETURN**

PLOT **RETURN**

Press ESC to redisplay the status area. Your currently active window is indicated by a code on the extreme right of the bottom status line. The code is W for window; followed by T for top, B for bottom, R for right, or L for left. In this case, the code is WB, meaning that the bottom horizontal window is the active window.

Legends are not included in charts drawn with the Window operation. You must create any required legends using the Title menu. Only the Moveable title can be used on a chart occupying the space of one window. You could include the meaning of the numbers under each column, replace the numbers with descriptive names, or supply meaningful abbreviations such as N, W, S, and C — for North, West, South, and Central.

Figure 2-69 shows one of the ways the charts could be enhanced using the Moveable title item.
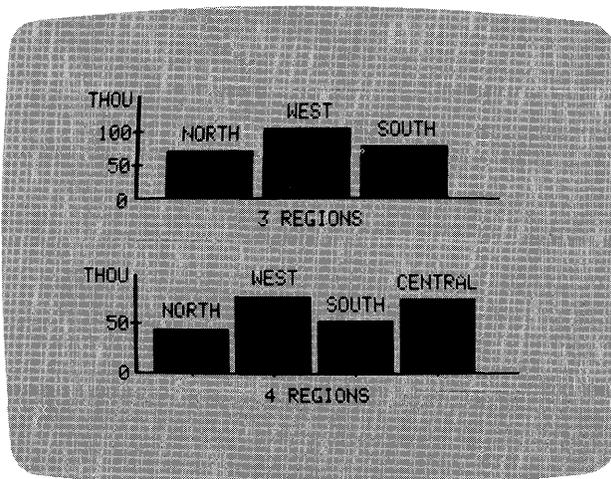
018-069/P

Figure 2-69. Sample Annotated Window Charts

There are two ways to cancel the Window operation. You can select NEW from the Plot menu, or NONE from the Window menu. With the Plot menu displayed, select NEW. The Window operation is cancelled, the screen clears, and the Plot menu is redisplayed.

GENERATING A PIE CHART

In the following sections, you are going to plot Pie charts. The VisiTrend/Plot program has three important requirements for data series that are to be drawn as Pie charts. These requirements are:

- Each value to be used in a Pie chart must be from a different series. The value from each series becomes a slice of the pie. Up to 8 series can be used effectively.

- All the series used in a Pie chart must have the same period. The steps for plotting a Pie chart give you an opportunity to check the period before selecting each series.

- All values to be plotted must be at the same location in each series. In other words, at least one location must be common to all the series used for a Pie chart. For example, if you specify a Pie chart to show data for 1978, each series being used must contain a value for 1978.

Pie charts can use values that are keyed to points in time, or to a set of circumstances. In the next exercise, values are keyed to a set of circumstances: data point 0 represents revenues split among three regions; data point 1 represents revenues split among four regions. If keyed to points in time, the values could represent, for example, total revenues for each month of the year.

A Pie chart shows a single point in time (or a single set of circumstances), instead of a comparison of different points (or circumstances) as other charts can.

Figure 2-70 shows how these Pie chart requirements apply to four data series.
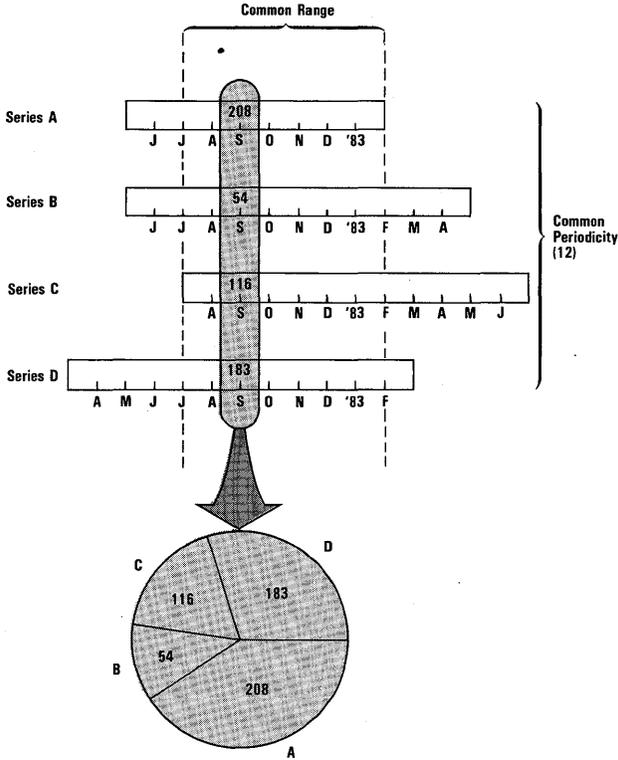
Figure 2-70. Choosing Series for a Pie Chart

The data for the charts you'll plot in this exercise are contained in three series: NORTH, WEST, and SOUTH. Each series has two data points. The first data point in each series represents the total revenue attributed to four existing regions. The second data point in each series reflects the allocation of total revenue if a fifth region were added.

Figure 2-71 shows the first example Pie Chart.
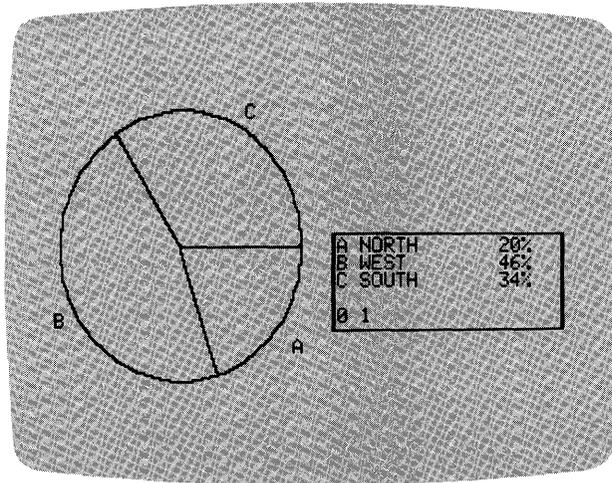
018-070/P

Figure 2-71. Sample Pie Chart

Beginning in the Plot menu, follow these steps:

SELECT **RETURN**
PIE **RETURN**
NORTH **SPACE BAR**
WEST **SPACE BAR**
SOUTH **RETURN**
"0" **RETURN**

Each segment of the pie is labeled with a letter. The letter refers to the items in the legend. This order of the series around the pie and in the legend is significant; it is the order in which you selected them. If you had selected the series in the opposite order, A would be SOUTH, and C would be NORTH. Also, their relative positions on the pie would be reversed. The first series always begins at the 3 o'clock position, and subsequent series extend in a clockwise direction.

The bottom line of the legend contains a 0 and a 1. Zero is the date or reference number of the selected data. One is the periodicity.

Next, you'll add some enhancements to the Pie chart. Remember that neither the Overlay nor the Window feature is available with Pie charts.

Shading and Titling a Pie Chart

Press ESC to display the status area, and proceed to the Shading operation.

The Shading operation first prompts you to enter a letter, or press RETURN. A letter indicates the label of the pie segment to be shaded, and RETURN exits the Shading operation (after you confirm the end). You can specify labels in any order, and you can skip any segments you don't want shaded. If you change your mind, you can change the shade of any segment.

Type **A**, and press RETURN. The Shade menu is displayed. If you have a color display unit, you can choose any color. Refer to the sections on PIE and COLOR in Chapter 3: REFERENCE for details on compatible colors in a Pie chart. If you have a black-and-white display unit, you should limit your selections to black, white, and one other color. All other colors look the same on a black-and-white monitor. For now, select WHITE1 or WHITE2, and press RETURN. Segment **A** is filled in.

The same prompt returns, allowing you to continue shading. Type **B**, and press RETURN. This time, select GREEN, and press RETURN. The B segment is filled in. Leave the C segment as it is, in black. Press RETURN. You are asked to confirm that you want to exit the Shading function. This confirmation is provided because you have only one chance to shade a Pie chart. When you leave this operation, you cannot return to it without selecting and plotting the chart again from the beginning.

Type **Y**, and when the Pie Chart Option menu appears, select TITLE.

The Title menu for Pie charts contains the same items as the Title menu for other chart types. There is one important difference: The LEGEND item for all other charts was used to restore the legend that was covered by bottom title(s) and overlays. With Pie charts, LEGEND is used to **remove** the current legend, and the segment labels. Move the cursor to LEGEND, and press RETURN.

The MOVEABLE title item for Pie charts offers the choices of the Typeface menu, and the opportunity to descriptively label all the elements of the chart. Use Moveable titles to enhance your chart so that it resembles the one in Figure 2-72. If you need to review, see the sections on Moveable titles in Lesson One.
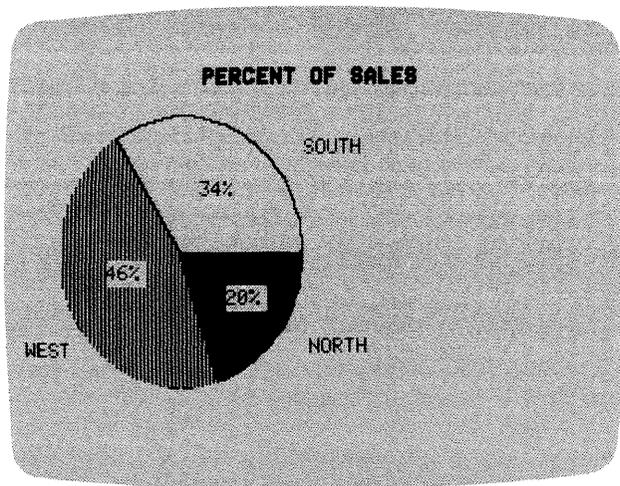
018-071/P

Figure 2-72. Shaded and Titled Pie Chart

When you've finished retitling the Pie chart, select EXIT from the Title menu. The Pie Chart Option menu reappears. SCREEN saves the Pie chart image on diskette, or loads another chart image, as described in Lesson One. PRINT prints the Pie chart on a supported printer, also as described in Lesson One. TEXT is described in the following section CREATING ANNOTATED CHARTS AND TEXT PAGES. EXIT erases the Pie chart from the screen, and displays the Select menu from which you can choose another chart, or go to the Plot menu.

Experiment now with plotting another Pie chart. Use the same three series, plus the CENTRAL series; and type 1 for the year, instead of 0. When you are ready to continue with the lesson, select NONE from the Select menu. The Plot menu is displayed in the status area.

CREATING ANNOTATED CHARTS AND TEXT PAGES

Suppose you've created a chart on the screen, and you'd like to use it in a management report or in a slide presentation. The chart itself might need some enhancements, such as a boldface title, different X-axis label-ing, and a supporting page of supplementary information. You could use the Title operation to make some of these enhancements, but not all of them.

Another VisiTrend/Plot program feature, the Text operation, does everything that the Title operation can do, and more. TEXT allows you to place text in a variety of styles, anywhere on a displayed chart. With

TEXT, you can also create entire pages of text, and combine a chart on the same page with that text.

You'll use this example of a slide presentation to practice the features of the Text operation in this lesson. You are going to enhance an existing chart image from the sample diskette, and then create a page of supplementary notes in support of the chart.

The chart you need is on the data diskette in the file named ACME1.PIX. To load this chart image, you'll follow the same steps that were described in Lesson One. From the Plot menu, select SCREEN. Then select LOAD , move the cursor in the list to the file named ACME1.PIX, and press **RETURN**. When the chart is completely loaded on the screen, it should resemble Figure 2-73.
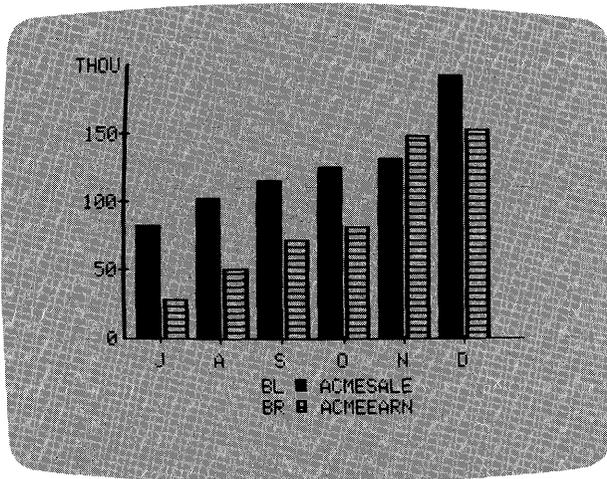
018-072/P

Figure 2-73. Chart for Text Exercise

To begin the Text operation, press ESC. In a moment, the Screen menu appears. Select EXIT to return to the Plot menu, then select TEXT. The status area disappears, and the cursor appears as a small rectangular block in the upper-left corner of the screen. The location of the cursor is where the characters you type at the keyboard will appear on the screen. Certain keys allow you to move the cursor anywhere on the screen.

First, take a few minutes to experiment with moving the cursor in the Text operation. The → key and ← key move the cursor one space to the right and one space to the left, respectively. **RETURN** moves the cursor

to the beginning of the next line, much like the return key on a typewriter. CTRL-O moves the cursor straight up one space, and CTRL-L moves the cursor straight down one space. These cursor-movement keys are the only way that the cursor can be moved onto the chart itself, without blanking out anything. The space bar also moves the cursor, but erases existing spaces as the cursor moves.

When you've familiarized yourself with these cursor-movement keys, position the cursor back in the upper-left corner of the screen. Take a look at Figure 2-74. It shows what the currently loaded chart will look like after you've changed it.
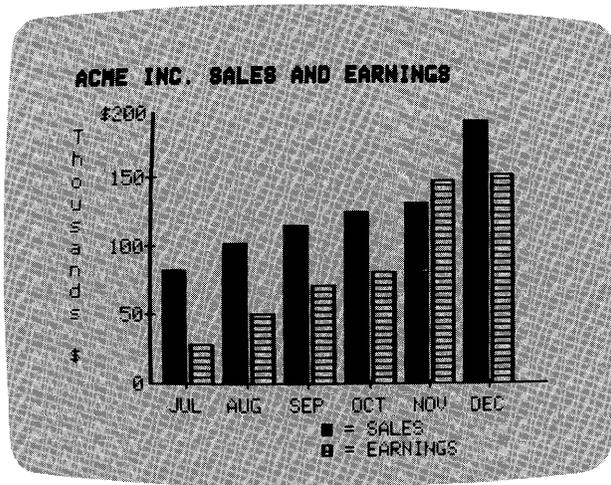
018-073/P

Figure 2-74. Chart Enhanced With Text Operation

The first change consists of titling the chart in bold typeface. To turn on the bold typeface, press CTRL-B. Type **ACME INC. SALES AND EARN-INGS** on the top line, beginning in column 1. Now, return to normal typeface by pressing CTRL-B a second time.

Next, you'll replace the THOU indicator on the Y-axis with the scale value $200. To do this, you must first erase THOU, then type $200 in its place. Move the cursor over the T using RETURN and →. Now press the space bar five times to erase THOU. Even though most of THOU is now erased, you see some residue of the bottoms of the letters, because the word was not resting directly on the second line. You need to position the cursor in smaller increments so that the space bar can erase the residue.

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CTRL-Z changes the cursor to a dot that moves only a tiny increment. This increment change is useful for such tasks as erasing small areas of a chart, positioning the cursor between normal lines, and typing superscript or subscript characters.

Before changing the cursor movement, position the cursor at the beginning of the line containing the residue.

Now, press CTRL-Z. The block cursor is reduced to a single dot positioned at the top-left corner of the former block. Pressing CTRL-Z a second time restores the remainder of the block cursor. Pressing the cursor movement keys with CTRL-Z in effect, moves the dot only a tiny fraction of the normal cursor movement. Practice moving it around now.

When the dot cursor is positioned where you want it (slightly above the residue), press CTRL-Z again. The block cursor returns and normal cursor movement is again in effect.

Now, press the space bar again to erase the remaining residue of the word THOU, move the cursor back by pressing ← three times, then type **$200**.

The next enhancement is a vertical label along the left side of the Y-axis. The label reads "Thousands $" to explain the abbreviated Y-axis values. Press RETURN to move the cursor to the beginning of the next line, and type **T**. Now press CTRL-A to turn on lower-case letters. Then alternate RETURN with the remaining letters of the word down the side of the screen. Skip a line, and type **$**. Turn off lower-case letters by pressing CTRL-A twice.

Your next task is to expand the letter abbreviations along the X-axis. Move the cursor to the line containing the letter abbreviations, and erase them by pressing the space bar; use the dot cursor, as necessary, for positioning.

Move the cursor to the beginning of the X-axis to enter the month abbreviations. For clarity's sake, each three-letter abbreviation should be centered under the tick mark representing that month. However, if you use only normal cursor movement across the line, your later words will be slightly off-center. You'll need to use some trial-and-error, and repositioning with the dot cursor, in order to center each abbreviation under a tick mark.

The last change is to modify the legend. Again, you must erase the existing words in the legend first, then type the new words. **Be careful to erase only the words in each legend item**. If you accidentally erase a plotting symbol, the only way to restore the symbol is to reload the chart. The reloading will destroy all the changes you've made so far.

First, position the cursor directly on top of the first B (use the CTRL-Z dot cursor as needed), and press the space bar twice to erase BL. Now press → three times, and use the space bar to erase ACMESALE. Back up the cursor with ←, and type = **SALES** to the right of the plotting symbol. When you've finished changing the first legend, repeat these steps to alter the second legend. You should have the words = **EARNINGS** after the second symbol.

Your completed enhancements on the loaded chart should now resemble Figure 2-74, shown earlier.

Because this lesson assumes you are using the enhanced chart for part of a slide presentation, you should store it on a diskette file. Press **ESC** to terminate the Text operation, and display the Plot menu. Select SCREEN, and then select SAVE. A list of file names appears with the extension .PIX appended to each name. At the bottom of this list is [NEW FILE]. Move the cursor to [NEW FILE], and press **RETURN**. The list disappears, the chart you're going to save reappears, and the status area prompts for a file name. Type **SLIDE1**, then press **RETURN**. As soon as the screen has been saved on the diskette file, the Screen menu reappears. Select EXIT to return to the Plot menu; then select TEXT again.

The modified chart remains on the screen, but it must be erased before the next exercise can begin. To erase the screen press CTRL-@. Hold down CTRL while you press SHIFT and @ together. The only thing you should see on the screen now is the block cursor in the upper-left corner. The Text operation is still active, and you are ready to begin the next exercise.

In the next example, you'll practice using the Text operation to create a text-only page. The page you are going to create will resemble Figure 2-75.
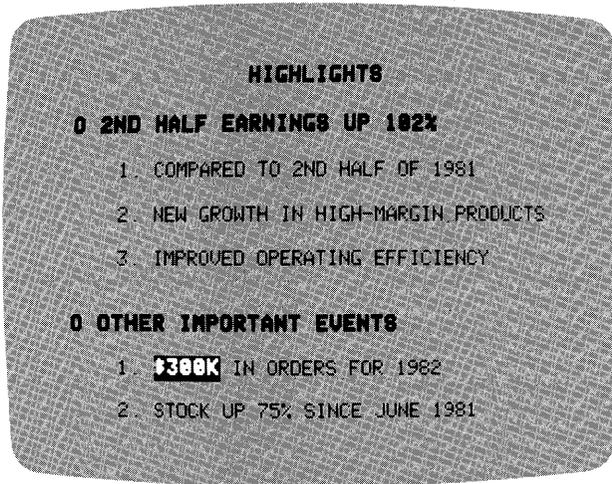
018-074/P

Figure 2-75. Sample Text Page

Again, you'll use most of the same Text features that you used to enhance the Sales and Earnings Bar chart image. In addition, you'll try two new features: tab and inverse video.

As the figure shows, you must first center a title, in boldface type, at the top of the page. Then you'll add boldface bulleted subtitles, followed by numbered items in normal typeface. Follow these steps:

1. Press CTRL-I three times to tab the cursor toward the center. Each pressing of CTRL-I jumps the cursor ahead five spaces.

2. Press CTRL-B to turn on boldface.

3. Type **HIGHLIGHTS**, and press RETURN twice to skip a line after the title.

4. With the boldface feature remaining in effect, type the letter **O** for a bullet. Press the space bar, then type **2ND HALF EARNINGS UP 102%**.

5. Press CTRL-B to turn off boldface, then press RETURN twice to skip a line after the subtitle. Use the space bar to indent, and the RETURN to double space your next entries. Type the three numbered items, and the second subtitle as shown.

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Notice that the first item under the second subtitle shows $300K in inverse video and boldface characters. To create this combination, press CTRL-B for boldface, then press CTRL-R for inverse video. This sequential order is not required. You could also turn on inverse video before boldface. After you've typed $300K, remember to turn off each feature by pressing CTRL-B and CTRL-R again.

When you've finished creating the text page, store it in a diskette file just as you stored the chart — with the SAVE item in the Screen menu.

In these last two exercises, you've learned all the features of the Text operation, and you've seen how some features can be combined for special effects. All features of the Text operation can be combined with each other, as desired.

FUNCTIONAL SUMMARY

Operation	From	Select or Type
PLOTTING SERIES		
Draw multi-Line chart	Plot menu	1. SELECT
	Select menu	2. LINE
		3. ← or → to series name(s)
		4. space bar/ RETURN
	Plot menu	5. PLOT
Draw single Bar chart	Plot menu	1. SELECT
	Select menu	2. BAR
	Bar menu	3. NORMAL
		4. series name
	Plot menu	5. PLOT
Draw comparative Bar chart with user-selected formatting	Plot menu	1. SELECT
	Select menu	2. BAR
	Bar menu	3. LEFT
		4. series name
	Plot menu	5. OPTIONS
	Options menu	6. FORMAT (or COLOR)
	Format menu	7. OUTLINED/ SHADED/ SOLID (or color)
	Plot menu	8. PLOT
		9. ESC
	Plot menu	10. SELECT

(Continued)

Operation	From	Select or Type
PLOTTING SERIES (Continued)		
Draw comparative Bar chart with user-selected formatting (Continued)	Select menu	11. BAR
	Bar menu	12. RIGHT
		13. series name
	Plot menu	14. OPTIONS
	Options menu	15. FORMAT (or COLOR)
	Format menu	16. OUTLINED/ SHADED/ SOLID (or color)
	Plot menu	17. OVERLAY
Draw comparative Bar chart with program-selected formatting	Plot menu	1. SELECT
	Select menu	2. BAR
	Bar menu	3. BOTH
		4. left series name
		5. right series name
	Plot menu	6. PLOT
Draw stacked Bar chart	Plot menu	1. SELECT
	Select menu	2. BAR
	Bar menu	3. NORMAL
		4. ← or → to series names
		5. space bar/RETURN
	Plot menu	6. PLOT
Draw, shade, and title Pie chart	Plot menu	1. SELECT
	Select menu	2. PIE
		3. ← or → to series names
		4. space bar/RETURN
		5. year or reference number
	Displayed chart	6. ESC
		7. segment letter
	Shade menu	8. (color)/program default shading
		9. RETURN (to end)
		10. Y (to confirm)
	Pie options menu	11. TITLE
	Title menu	12. TOP/BOTTOM/ SIDE/ MOVEABLE (see SUMMARY for Lesson One)

(Continued)

Operation	From	Select or Type
PLOTTING SERIES (Continued)		
Remove Pie chart legend	Title menu	13. LEGEND
		14. EXIT
	Pie options menu	15. SCREEN/PRINT/ TEXT/EXIT
Draw XY chart	Plot menu	1. SELECT
	Select menu	2. XY
		3. series name for X-axis
		4. series name for Y-axis
	Plot menu	5. PLOT
Replot previously- selected series	Plot menu	1. SELECT
	Select menu	2. (chart type)
		3. [SAME]
	Plot menu	4. PLOT
USING WINDOWS		
Display two charts at once	Plot menu	1. WINDOW
	Window menu	2. HORIZ/VERT
	Select menu	3. (chart type)
		4. first series name
	Plot menu	5. PLOT
		6. OPTIONS (if needed)
	Plot menu	7. WINDOW
	Window menu	8. SWITCH
	Select menu	9. (chart type)
		10. second series name
	Plot menu	11. PLOT
Add titles to window charts	Window display	1. ESC
	Plot menu	2. OPTIONS
	Options menu	3. TITLE
	Title menu	4. MOVEABLE (see SUMMARY for Lesson One)

(Continued)

Operation	From	Select or Type
USING TEXT FEATURE		
Annotate charts and create text screens	Plot menu Block cursor	1. TEXT 2. Type desired text; select a function as follows:
Change cursor movement intervals		CTRL-Z
Move cursor up		CTRL-O
Move cursor down		CTRL-L
Move cursor left		←
Move cursor right		→
Tab cursor five spaces to right		CTRL-I
Move cursor to beginning of next line		RETURN
Erase character		Space Bar
When upper case, change all subsequent characters to lower case		CTRL-A
When lower case, change only next character to upper case		CTRL-A
When lower case, change all subsequent characters to upper case		CTRL-A twice
Turn on bold face (upper case case only)		CTRL-B
Turn off bold face		CTRL-B
Turn on inverse video		CTRL-R
Turn off inverse video		CTRL-R
Clear entire screen		CTRL-@
Return to Plot menu		ESC

REFERENCE

   Chapter 3: REFERENCE is designed to give you quick and easy access to specific information about the VisiTrend/Plot program. You can use the Reference sections during the lessons, or any time you need to refresh your memory and enhance your knowledge of program details.

   The first several pages of this chapter discuss general information and program concepts. These include:

* Useful Facts About Program Operations
* Keyboard Usage
* Status Areas
* Color Codes
* Series Naming Conventions
* Ranges
* Scales

   The remainder of this Reference chapter presents all VisiTrend/Plot menu items in alphabetical order. This second part of the chapter begins with a three-part diagram of program flow between menus in each of the VisiTrend/Plot subprograms. The sections that follow describe each menu item, and identify that item with the subprogram and with the specific menu in which the item appears.

USEFUL FACTS ABOUT PROGRAM OPERATIONS

* You can load or create up to 645 data points or 16 series in memory.
* Any one series can contain up to 150 data points.
* Up to 16 series can be plotted on the same chart, except for a Pie chart which can effectively plot 8 series.
* A maximum of six legend lines can appear on a multi-series plot.
* An intersection of the ranges of two or more series must contain at least one data point.
* A union of the ranges of two or more series can contain a maximum of 150 data points.
* You can select one dependent variable and up to five series as independent variables in a linear multiple regression.

- The intersection of ranges in a linear multiple regression must contain at least two more points than the number of independent variables, regardless of whether or not a constant is used in the regression.

- An XFORM formula can contain a maximum of 80 characters.

- A Moveable title can contain up to 37 characters.

- A Top or any bottom title can contain up to 37 characters.

- A Side title can contain up to 14 characters.

- A file name can contain the maximum number of characters allowed by DOS (1 to 30); the VisiTrend/Plot program shortens the name to 16 characters for display.

- Up to 37 characters can be entered for a series name; however, the VisiTrend/Plot program shortens the name to 14 characters for display.

KEYBOARD USAGE
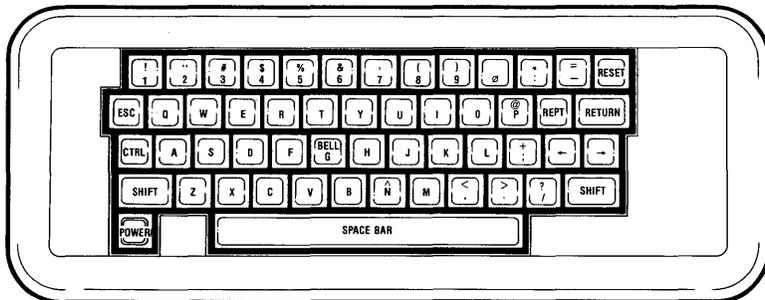
001-002

Figure 3-1. The Keyboard

Most of the keys on the keyboard in Figure 3-1 are self-explanatory. A few keys have special uses:

RETURN   selects the item highlighted by the cursor from a menu or from a list, and enters data typed at the keyboard. In the Text operation, RETURN moves the cursor to the beginning of the next line on the screen.

Space Bar   marks (with an asterisk) and unmarks list items when multiple selection is allowed. In a menu, the space bar moves the cursor up or down one line. In the Text operation, the space bar moves the cursor to the right, erasing text as the cursor moves.

→   moves the cursor to the right in a menu line, and down in a list; at the end of the list or line, → causes the cursor to wrap around to the beginning. For Moveable titles, → moves the title to the right. In the Text operation, → moves the cursor to the right without disturbing any existing characters.

←   moves the cursor to the left in a menu line, and up in a list; at the beginning of the list or line, ← causes the cursor to wrap around to the end. For Moveable titles, ← moves the title to the left. In the Text operation, ← moves the cursor to the left without disturbing any existing characters.

ESC   corrects errors during data entry by erasing characters to the left of the cursor, beginning with the last character typed. This key also removes and redisplays the status area when a chart is displayed.

Y   is an affirmative response to the prompts that verify your request to change programs, initialize (format) files, delete files, exit the Pie chart shading function, and exit (QUIT) the VisiTrend/Plot program.

I   moves a Moveable title upward on the screen.

M   moves a Moveable title downward on the screen.

@   when typed as the last character of a top or bottom title, causes that title to be left-justified on the chart.

CTRL   is pressed simultaneously with another key as follows:

            CTRL-C   interrupts the printing of a chart or list.

            CTRL-Z   creates a small-increment dot cursor in the Text operation.

            CTRL-O   moves the cursor up one line in the Text operation.

            CTRL-L   moves the cursor down one line in the Text operation.

            CTRL-I   tabs the cursor five spaces to the right in the Text operation.

            CTRL-A   changes between upper and lower case letters in the Text operation.

            CTRL-B   turns on/off bold face in the Text operation.

            CTRL-R   turns on/off inverse video in the Text operation.

            CTRL-@   clears the screen in the Text operation.

WARNING: NEVER PRESS THE RESET KEY. Pressing RESET will usually take you out of the VisiTrend/Plot program. An asterisk (*) or a right-bracket (]) prompt appears on the screen. The VisiTrend/Plot program diskette and your data diskette can be damaged. If you accidentally press RESET, reload the program as described under LOADING THE VISITREND/PLOT PROGRAM in Chapter 1.

STATUS AREAS

Figure 3-2 shows the Main, Trend, and Plot subprogram status areas and their components.

018-075/P

018-076/P

018-077/P
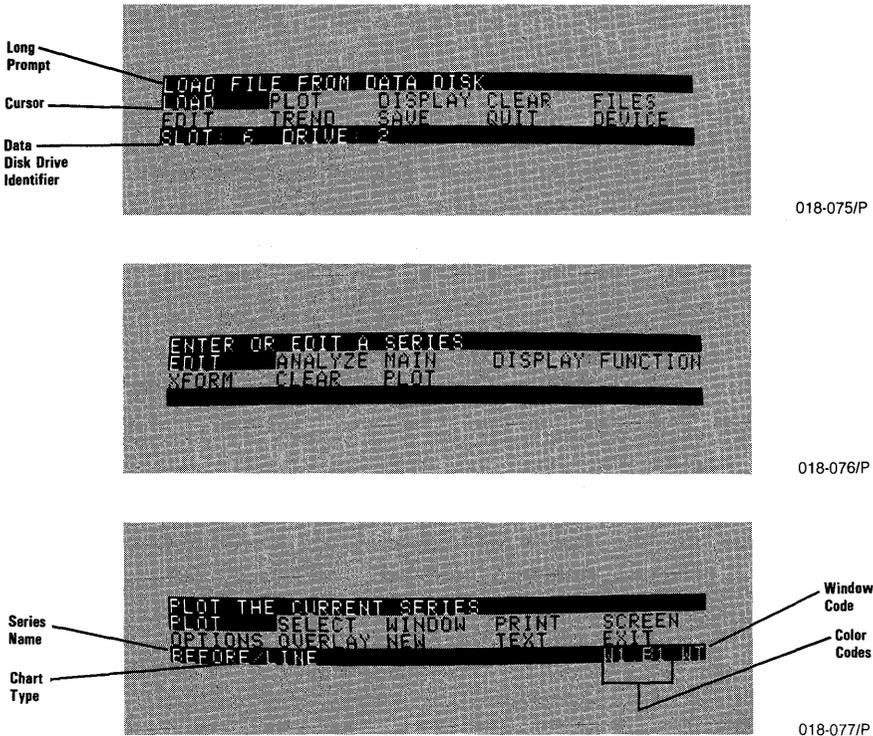
Figure 3-2. Subprogram Status Areas

- The **long prompt** gives a description of the menu item highlighted by the cursor.
- The **cursor** highlights a menu item. The highlighted item is selected when you press the RETURN key.
- The **data disk drive identifier** indicates the drive that contains the data diskette. The LOAD, SAVE, FORMAT, and DELETE operations are directed to the identified drive.

> When a Corvus Hard Disk is connected to the computer and is specified as the data disk, the volume number is also identified.

- The **series name** shows the selected series or the first of multiple selected series (followed by three dots).
- The **chart type** shows the type of chart that was last selected.
- The **menu** contains the items available for selection.
- The **color codes** indicate the plotting color in use (left of the period) and the background color in use (right of the period). When multiple series are selected, only the first plotting color is shown in the status area.
- The **window code** indicates that Window mode is in effect, and which window is currently active: top (WT), bottom (WB), left (WL), or right (WR).

COLOR CODES

Table 3-1 lists each VisiTrend/Plot color, the code that appears in the Plot status area, and the black-and-white representation of that color.

Table 3-1. Color Codes

Color	Code	Black-and-White Representation
Black1	B1	Black
Green	GR	Grey
Violet	VI	Grey
White1	W1	White
Black2	B2	Black
Orange	OR	Grey
Blue	BL	Grey
White2	W2	White

SERIES NAMING CONVENTIONS

The VisiTrend/Plot program creates several series that are computed from existing series. These computed series are produced by the Trend subprogram. The VisiTrend/Plot program uses the name of the source series with an extension appended to the end as the name of the new series. The extension serves as an identifier of the new series type. Table 3-2 lists the identifiers generated by the program, and their meaning.

Table 3-2. Series Name Identifiers

Identifier	Series Type	Where
.Fn	Fitted series	n is a program-generated
.Rn	Residual series	number. The number is the same for a residual and fitted series from the same regression.
.Mn	Moving average	n is the number of periods averaged.
.S	Smoothed series	
.T	Total series	
.%	Percent change	
. −n	Lagging series	n is the number of periods lagging.
. +n	Leading series	n is the number of periods leading.
.D	Computed difference	

RANGES

Range is normally the period of time covered by a plotted chart. The VisiTrend/Plot program plots range against the X-axis (the horizontal axis). Although range is usually measured in units of time, range can also be reference numbers assigned to series items. The VisiTrend/Plot User's Guide treats most ranges as factors of time because most ranges are measured as daily, weekly, monthly, quarterly, or yearly.

A range has two parts: the **major range** which is usually expressed as years, and the **minor range** known as the period. The period divides the range into parts. You can divide the range into any number of parts from 1 (no division) to 99. Periods are most commonly used to divide a year into months (12 parts), quarters (four parts), or weeks (52 parts). However, a major range could represent months, weeks, or even days. Likewise, the period could represent any division you desire.

Calculating the Range

The VisiTrend/Plot program determines the range before plotting each chart by using the date information contained in the selected series.

The range for a single series is the time span from the start date to the end date. The range for multiple series is calculated by the program, and depends on the type of chart being plotted.

The **union** of selected series ranges is used for Line and Area charts. Union means that the start date for the range is the earliest start date from among the selected series, and the end date for the range is the latest end date from among the selected series.

The **intersection** of selected series ranges is used for High-Low-Close, Bar, and XY charts. Intersection means that the limits of the range are the earliest date and latest date common to all selected series.

The maximum number of points allowed in a range is 150, and the minimum number of points is 2. If you try to draw a chart from several series whose combined data points exceed 150, the program displays the error message CAN'T! BAD RANGE.

Figure 3-3 shows how union and intersection apply to two sample series.
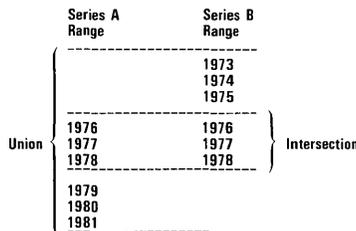
```
                    Series A          Series B
                    Range             Range
                  ┌ ─────────────────────────
                  │                    1973
                  │                    1974
                  │                    1975
                  │ ─────────────────────────  ┐
                  │  1976               1976    │
            Union ┤  1977               1977    ├ Intersection
                  │  1978               1978    │
                  │ ─────────────────────────  ┘
                  │  1979
                  │  1980
                  │  1981
                  └ ─────────────────────────
```
                                                              012-010

Figure 3-3. Example of Union and Intersection of Ranges

These concepts of range do not apply to Pie charts, because a Pie chart is a comparison of different series at a single reference point or date— rather than a comparison of one or more series across different reference points or dates.

Changing the Range

The VisiTrend/Plot program automatically determines a range for whatever series are being plotted. At times, you may want to expand or limit that range. The range you specify must have at least two, but no more than 150, data points. At least two data points in the range must be present in each of the selected series.

The RANGE item in the Options menu allows you to change the program-calculated range.

SCALES

Scale is the scope of values plotted against the Y-axis (vertical axis) of a chart. The scale values depend upon the data being plotted. The values may be positive, negative, or span zero in either direction. The incremental units (intervals) of the scale may be fractional values, or any numbers up to the 38th power.

Calculating the Scale

The VisiTrend/Plot program selects a scale of values to include the highest and lowest values in the series. This scale is rounded up or down to even numeric values. A number of intervals are set to the scale so that, whenever possible, round and even numeric labels appear at the tick marks. The number of intervals is usually 10, but other appropriate numbers occur.

Normally, the program selects a good set of scale values. Occasionally, the resulting values are unrounded and not well-scaled. When this happens, you should use the RESCALE item in the Options menu to create more useful Y-axis labels.

Changing the Scale

The VisiTrend/Plot program automatically determines a scale for whatever series are being plotted. In some circumstances, you may want to expand or limit that scale.

The RESCALE item in the Options menu lets you change the program-calculated scale values and the number of intervals. To choose the number of intervals, subtract the low scale value from the high scale value, and determine a number that divides evenly into that difference.

When prompted for rescale values and a number of intervals, you must enter the values in decimal format as opposed to exponential format. The program converts large and small numbers to exponential notation for display purposes, when necessary. Large numbers may be abbreviated by the program, and a scaling factor supplied at the top of the Y-axis. When a scaling factor (such as THOU) is in effect, values entered for rescaling must be complete; for example, you would type 30000, not 30.

## UNDERSTANDING THE INTERPLAY BETWEEN SCALE AND RANGE

When you change the range of a chart, the scale is automatically recalculated for the data points within the new range. If you change the scale before or after changing the range, the program does not recalculate that scale.

THE VISITREND/PLOT MENU ITEMS

This portion of Chapter 3 describes the VisiTrend/Plot menu items in alphabetical order. Each item is first identified with the subprogram and with the specific menu in which the item appears.

To help you access the various menu items, the following three-part diagram shows the flow between menus in each of the VisiTrend/Plot subprograms. Figure 3-4 details the Main subprogram, Figure 3-5 the Trend subprogram, and Figure 3-6 the Plot subprogram.

Note that to access the other two subprograms, you select PLOT or TREND from the Main subprogram menu, MAIN or PLOT from the Trend subprogram menu, and MAIN or TREND after exiting from the Plot subprogram menu.
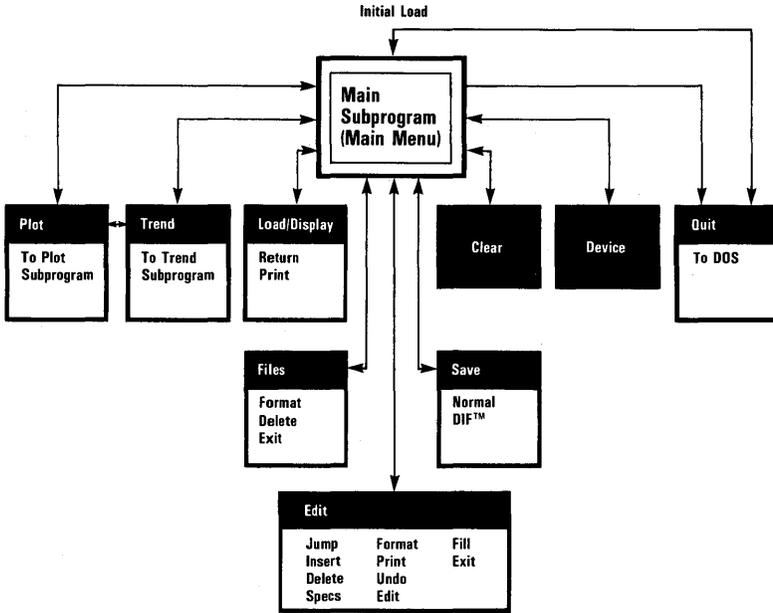
Figure 3-4. Main Subprogram Flow
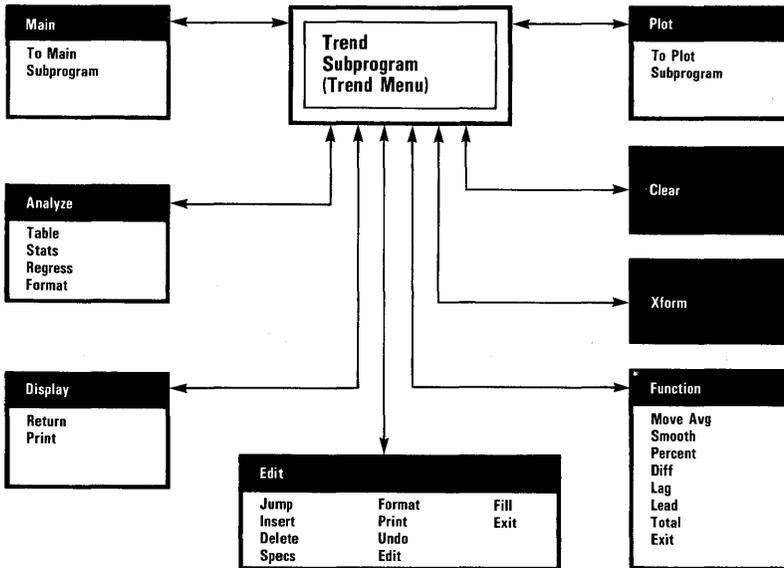
Figure 3-5. Trend Subprogram Flow
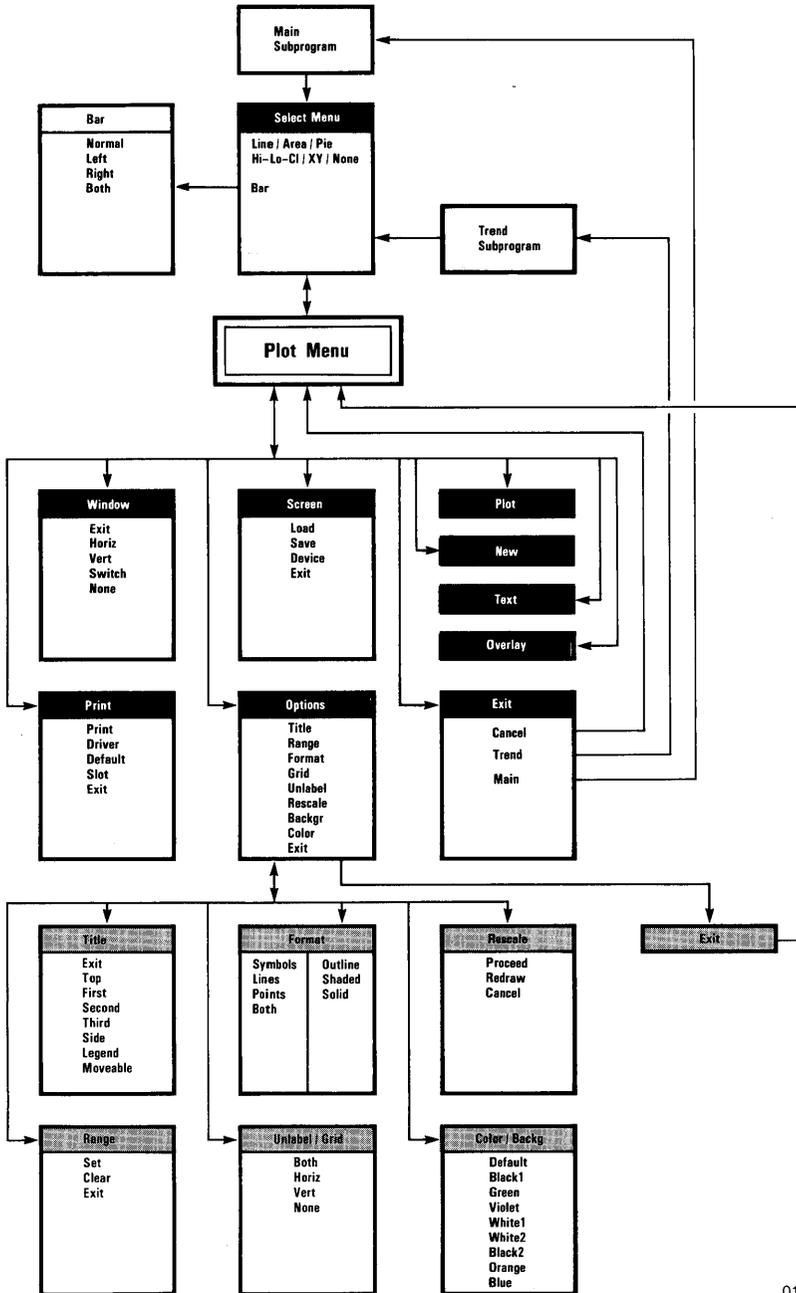
Figure 3-6. Plot Subprogram Flow

018-003

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ANALYZE [Trend subprogram/Trend menu]

ANALYZE invokes the VisiTrend/Plot analysis operations. These operations list series contents, calculate and display series statistics, perform linear multiple regressions and trendline forecasting, and format data. For information on the specific operations, see TABLE, STATS, REGRESS, and FORMAT later in this chapter.

AREA [Plot subprogram/Select menu]

AREA specifies that an Area chart is to be plotted. You choose one or more series from a list. When choosing multiple series, all series must have the same period. When multiple series are plotted, each series is drawn over the previous series. You should select the series with the largest values first, then the next largest, etc. If the series have a mixture of values, you will not get full detail for the series. In this situation, use OVERLAY to plot a Line chart of one or more of the series. All area charts are plotted from the base line; they are not stacked.

ARITH [Main subprogram/Fill menu]
[Trend subprogram/Fill menu]

ARITH inserts new data into the series being edited, beginning at the location of the cursor. The new data is an arithmetic progression. You are prompted for the number of points to be generated. The number can be any value that will not cause the total series to exceed the maximum of 150 points, or 645 points in memory. Next, you are prompted for the factor by which each preceding point is to be increased or decreased. The new data points are inserted immediately following the data point currently highlighted by the cursor.

BACKGR [Plot subprogram/Options menu]

BACKGR sets the background color of a plot. BACKGR can be used with all chart types except a Pie chart. This item displays the Color menu, offering a selection of eight colors. With black-and-white display monitors, only three backgrounds are available; all non-white and non-black colors produce the same grey halftone on the black-and-white screen.

The program displays a code for the color in the lower-right corner of the status area. Two colors are listed; the first is the plotting color and the second is the background color.

Any background color is retained until you explicitly change it with BACKGR, or until you reset the color to the program default with NEW.

When you change background color, the VisiTrend/Plot program automatically changes the plotting color to avoid duplicate colors, and to draw a clear and readable plot. Table 3-3 lists the plotting colors that the program automatically selects with your choice of background color. You can, of course, change the plotting color after changing the background color.

The table shows the plotting colors for both single-series plots and multiple-series plots. If you select and overlay a single series, the series 1 color is used. If you select more than two series, the colors repeat; that is, the third series is plotted in the same color as the first series.

NOTE: If you want three different colors for multiple series charts, you must select the first plotting color with the COLOR menu item. See COLOR for the colors used.

Table 3-3. Plotting Colors Generated by BACKGR

	Line and YX		Area and Bar*	
Selected Background Color	First Color (and 3rd)	Second Color (and 4th)	First Color (and 3rd)	Second Color (and 4th)
Black1	White	White	White	Green
Green	Black	White	White	Black
Voilet	Black	White	White	Black
White1	Black	Black	Black	Green
Black2	White	Orange	White	Blue
Orange	Black	White	White	Black
Blue	Black	White	White	Black
White2	Black	Blue	Black	Blue

* Stacked bar charts may be slightly offset from one series to the next, due to the manner in which the Apple II handles color display.

BAR [Plot subprogram/Select menu]

   BAR specifies that a Bar chart is to be plotted. You choose one or more
series from the list(s). With NORMAL width bars in effect, you can
choose multiple series from the same list. In this case, the bars for the
various series are stacked on top of each other. The first series chosen is
plotted on the base line; and subsequent series, in order, are plotted
from the top of the existing bars.

   Bar charts offer you the choice of full-width (NORMAL) bars centered
on the tick marks, or half-width bars located to the LEFT or RIGHT of the
tick marks. Half-width bars are normally used to draw comparison
charts. A very slight overlap might exist between the left and right bars
of a comparative chart. A slight offset might also occur at the divisions of
stacked-bar charts.

   Negative values can be plotted for Bar charts, but no zero line is drawn
on the screen.

   You can display the bars for a Bar chart in one of three formats using
the FORMAT menu item: solid, outlined, or shaded (outline plus horizon-
tal stripes).

BOLD [Plot subprogram/Title menu]

   BOLD displays the subject title in bold characters. The alternatives to
bold titles are normal or inverse video titles. All chart titles can be
displayed in the bold typeface.

BOTH [Plot subprogram/Bar, Format, Grid, and
        Unlabel menus]

   BOTH specifies that both of the subject items are to be affected.

- In the Bar menu, BOTH means that a left bar and right bar will be plot-
  ted, in contrasting colors, at each major tick mark.
- In the Format menu (Line and XY charts only), BOTH means that plot-
  ting symbols and lines are to be drawn on the chart.
- In the Grid menu, BOTH means that horizontal and vertical grid lines
  are to be drawn on the chart.
- In the Unlabel menu, BOTH means that horizontal and vertical labels
  are to be erased from the chart.

CANCEL [Plot subprogram/data-off-scale condition]
[Plot subprogram/Moveable title Typeface menu]
[Plot subprogram/Exit menu]

When the message DATA OFF SCALE, CHOOSE ACTION appears during
an attempted plot, you may select CANCEL. This choice cancels the PLOT or
OVERLAY request, and returns to the Plot menu. The alternate choices are
PROCEED and, in an Overlay operation, REDRAW.

In the Typeface menu for a Moveable title, CANCEL erases the title and
returns to the Title menu.

In the Exit menu, CANCEL returns to the Plot menu instead of exiting from
the Plot subprogram.

CLEAR [Main subprogram/Main menu]
[Trend subprogram/Main menu]
[Plot subprogram/Range menu]

In the Main and Trend subprograms, CLEAR removes the selected series
from the computer memory. You can select all, none, or any number of
specific series to be removed. This operation does not affect the files stored
on diskette.

In the Plot subprogram, CLEAR disregards the range values you
previously SET, and uses the range values stored with the series. This
item has no effect if you did not previously set a range.

COLOR [Plot subprogram/Options menu]

COLOR changes the plotting color used to draw a chart. This item
displays a Color menu with a selection of eight colors. With black-and-
white monitors, only three colors are available; all non-white and non-
black colors produce the same halftone grey on the black-and-white
screen.

A code for the chosen color is displayed in the lower-right corner of
the status area. Two color codes are shown; the first is the plotting color
and the second is the background color.

The program automatically changes the plotting color when the
background color is changed. See BACKGR for a listing of the plotting
colors generated when BACKGR is used. Note that only two plotting
colors are used when you choose a BACKGR color.

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Table 3-4 lists the colors used for second and third selected series when you choose the first plotting color with the COLOR menu item— after or without selecting a BACKGR color.

These multiple plotting colors only apply to multiple selected series that you plot or overlay simultaneously. The sequence is not carried over between plotting and overlaying. This means that when you do an overlay, the color sequence for the overlay(s) starts over with the first color — regardless of the number of series already plotted.

Table 3-4. Plotting Colors Generated by COLOR

Selected Color (and 4th)	Second Color (and 5th)	Third Color (and 6th)
Black1	Green	Violet
Green	Violet	White
Violet	Green	White
White1	Violet	Green
Black2	Orange	Blue
Orange	Blue	White
Blue	Orange	White
White2	Blue	Orange

CONTINUE [Main subprogram/various menus]
[Trend subprogram/various menus]

CONTINUE appears in several operations where data is displayed on the screen. If you have more data to be displayed than can fit on one screen, CONTINUE displays the next screenful. When the last screen is displayed, the status area prompts you to press any key. Press ESC to return to the Edit menu.

DEFAULT [Plot subprogram/Color and Backgr menus]
[Plot subprogram/Print menu]

DEFAULT in the Color and Backgr menus returns the background and/or plotting colors for a chart to the initial program-selected colors: Black1 and White1 (B1.W1). If you had not previously changed these colors, DEFAULT has no effect. When used with the BACKGR menu item, DEFAULT changes both the background and the plotting colors. With the COLOR menu item, DEFAULT changes only the plotting color, to White1 (W1).

DEFAULT in the Print menu allows you to change the currently selected printer driver and the printer slot. The change is made by selecting a different driver and slot from the displayed list. You can also specify

automatic line feeds. The new selections remain in effect throughout the current VisiTrend/Plot program session and all subsequent VisiTrend/Plot program sessions. The driver/slot default can be changed at any time by selecting DEFAULT again, or by selecting DRIVER (which changes the driver/slot for the current session only).

DELETE [Main subprogram/Edit menu]
[Trend subprogram/Edit menu]
[Main subprogram/Files menu]

In the Edit menus of both the Main and Trend subprograms, DELETE removes selected data points from the current series. The range of the deletion begins at the entry highlighted by the cursor when DELETE is selected, and ends at the entry to which you move the cursor. The range is displayed in the status area, and changes as you move the cursor. You can move the cursor up or down in the series. Pressing RETURN deletes all the points in the range, inclusively. If you move the cursor beyond the end of the series, the DELETE operation is cancelled. DELETE is also cancelled if you press ESC.

In the Files menu, DELETE erases a selected file from the data diskette. You select the file from the displayed list. Before a file is erased, the program prompts you to press Y TO CONFIRM the permanent deletion. Pressing either N or ESC cancels the deletion. An error message is displayed if the data diskette has a write-protect tab on it.

DEVICE [Main subprogram/Main menu]
[Plot subprogram/Screen menu]

DEVICE is only meaningful when you have more than two disk drives connected to the computer. DEVICE changes the drive and slot identifiers assigned to the disk drive where you have inserted the data diskette. The identifier of the currently assigned data disk drive (with related slot number) is displayed in the status area. The remainder of the screen contains a list of available drive/slot numbers. You change the current assignment by moving the cursor to the desired entry in the list, and pressing RETURN. A change of drive remains in effect throughout the current session only. The data disk drive identifier reverts to 2 the next time the program is loaded.

If a Corvus Hard Disk is also connected to your computer, and you specify the Corvus Hard Disk identifier, the VisiTrend/Plot program prompts you to specify a volume number from 1 through 67. Type the number of the volume you want to use. This prompt always indicates 67 volumes available; however, the actual number of volumes available varies according to the model of the Corvus Hard Disk. (Sixty-seven volumes is the capacity of a 10-megabyte model.)

Make sure your disk drives are connected to the computer as shown in Figures 3-7 or 3-8, whichever is appropriate.
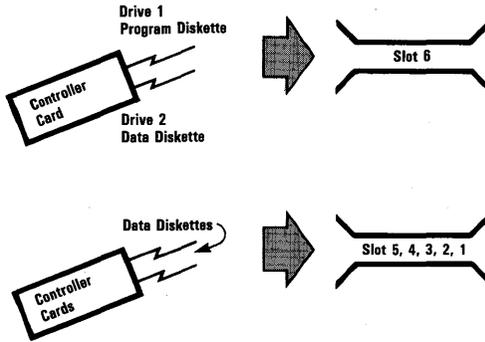
018-004

Figure 3-7. Connecting Floppy Disk Drives Only
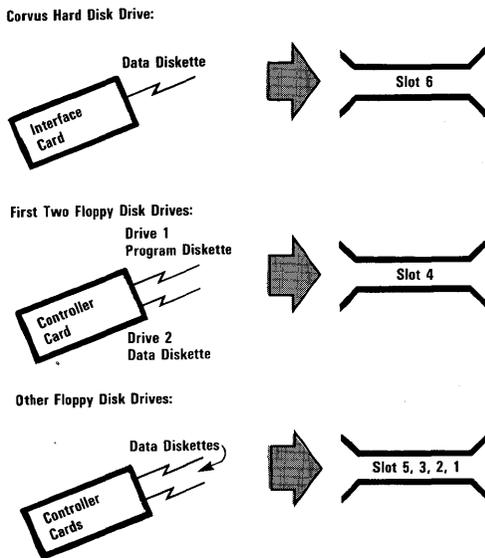
018-005

Figure 3-8. Connecting Floppy Disk Drives and Corvus Hard Disk Drive

DIF [Main subprogram/Save menu]

DIF (data interchange format) specifies that the series you are saving will be stored in a DIF file. Data in this format can be used with other VisiCorp products, such as the VisiCalc program. The alternative to DIF is the NORMAL format, which is usable only by the VisiTrend/Plot program.

Refer to Appendix D for more information on DIF files.

DIFF [Trend subprogram/Function menu]

The DIFF (Difference) function computes the difference between adjacent data points in the source series. When DIFF is selected, a list of all series currently in memory is displayed. From that list you select one series at a time for a DIFF operation. Once the difference between adjacent data points in the selected series is computed, the program creates a new series containing these computed differences. The new series has the same name as the source series, plus the extension .D that serves as an identifier.

DISPLAY [Main subprogram/Main menu]
[Trend subprogram/Trend menu]

DISPLAY lists the data series that are currently in memory. The display includes the series name, period, start date, end date, and number of data points in each series. After the display appears on the screen, the status area prompts you with RETURN and PRINT. Selecting RETURN returns to the Main or Trend menu, as appropriate. Selecting PRINT prints the entire list of series in the same format that is displayed on the screen, and then returns to the menu. The program also automatically displays the same display list after each LOAD and CLEAR operation.

DRIVER [Plot subprogram/Print menu]

DRIVER allows you to change the currently selected printer driver and slot number for the current VisiTrend/Plot session only. The change is made by selecting a different driver and slot from the displayed list. You can also specify automatic line feeds. The new selections remain in effect during the current session, until you select DRIVER again, or select DEFAULT.

EDIT [Main subprogram/Main menu]
[Trend subprogram/Trend menu]

EDIT invokes the Edit operation of the VisiTrend/Plot program. You are prompted to select a series from those currently in memory or to create a new series. When creating a new series, you are prompted for the name, period, starting date, and first data point. See the following Edit commands:

DELETE	JUMP
FILL	PRINT
FORMAT	SPECS
INSERT	UNDO

EXIT [Main, Trend, and Plot subprograms/
various menus]

EXIT leaves the current menu without performing an operation. EXIT either returns to a preceding menu, or loads another subprogram.

FILES [Main subprogram/Main menu]

FILES offers you two file management operations: to FORMAT a diskette so that it is prepared to accept data, or to DELETE a data file or .PIX file permanently from the data diskette. A file to be deleted is selected from the displayed list(s) of files currently in memory. Either operation can be cancelled by pressing ESC.

FILL [Main subprogram/Edit menu]
[Trend subprogram/Edit menu]

FILL lets you insert values into the middle of a series, or direct the program to interpolate missing values between two known values. Values can be inserted in either an arithmetic or geometric progression. You are prompted for the number of values and a factor by which to increase or decrease the series values. See ARITH, GEOMET, INSERT, and INTERP for more information.

You can also select another entire series from a displayed list, and insert that series into the series being edited. See SERIES for more information.

In all cases, the new data is inserted following the item currently highlighted by the cursor.

FIRST [Plot subprogram/Title menu]

FIRST, like SECOND and THIRD, specifies a title line to be entered at the bottom of a chart. FIRST specifies the first of the three possible bottom titles. Up to 37 characters are allowed on any bottom title line. The title is centered across the bottom of the chart. If the @ symbol is typed as the last character in the title, the title is left-justified. You can choose bold, normal, or inverse video typeface for any title. Bottom titles write over any legend occupying the same line.

FIX [Plot subprogram/Moveable title Typeface menu]

FIX appears in the Typeface menu for Moveable titles. It is used to turn a Moveable title into a fixed title, in its current position on the chart. If you select FIX without first choosing a typeface, the title is fixed in NORMAL typeface, by default.

FORMAT [Main subprogram/Edit menu]
[Trend subprogram/Edit menu]
[Trend subprogram/Analyze menu]

FORMAT in the Edit and Analyze menus lets you specify how data is to be displayed on the screen. By default, the VisiTrend/Plot program displays data in the floating decimal-point format. You can specify fixed format display by typing a number from 0 to 6 for the precision (number of digits to the right of the decimal point). You can also select a number from 6 to 15 for the column width (the total number of characters used to display the number).

Resulting numbers that are displayed as a series of "greater than" symbols (>) are either too large for the column width, or are numbers in exponential notation with a chosen fixed format. Exponential numbers can only be displayed in floating-decimal format.

You cannot enter values in exponential notation (Such as 1E + .09). The program converts numbers less than or equal to 0.001, and numbers greater than 9 digits to the left of the decimal point, to exponential notation.

FORMAT [Main subprogram/Files menu]

FORMAT in the Files menu allows you to format (initialize) a diskette so that it is prepared to accept data. You are prompted to insert the data diskette in the disk drive. You can cancel the Format operation even after a diskette has been inserted, by pressing ESC. If the diskette is already initialized (and is not blank), a message appears in the status area. At that point, you can press Y to continue, or press ESC to cancel FORMAT. Be advised that the Format operation destroys all the data previously on the data diskette.

FORMAT [Plot subprogram/Options menu]

FORMAT in the Options menu lets you specify how a Line, Bar, or XY chart will be displayed. This item is not available for Area, Pie, and High-Low-Close charts. If FORMAT is chosen for an unsupported chart type, the message CAN'T! NO OPTION HERE is displayed.

The formatting choices displayed with a Bar chart are different that the ones displayed with a Line or XY chart. For a Line or XY chart, the options are: symbols only, lines only, points only, or both symbols and lines. For a Bar chart, the options are: solid, shaded, or outlined bars.

A chart format is retained until you do one of the following: select FORMAT again, plot a different type of chart, or choose the NEW menu item.

FUNCTION [Trend subprogram/Trend menu]

FUNCTION computes one of seven functions on a specified series. These calculations produce the following results from series data: the moving average, exponential smoothing, the percent of change in series values, differences between adjacent data points, new series with a specified lead or lag from an existing series, and a new series with cumulative totals. For further information on these specific functions, see MOVE AVG, SMOOTH, PERCENT, DIFF, LAG, LEAD, and TOTAL.

GEOMET [Main subprogram/Fill menu]
[Trend subprogram/Fill menu]

GEOMET lets you insert new data into the current series in a geometric progression. You are prompted for the number of data points to be generated. The number can be any value that will not cause the total series to exceed the maximum of 150 points, or 645 points in memory. Next, you are prompted for the factor by which each preceding point is to be multiplied. The data points are inserted immediately following the data point currently indicated by the cursor.

GRID [Plot subprogram/Options menu]

GRID draws grid lines for all major (labeled) tick marks on the currently displayed chart. The operation is valid for all charts except Pie charts. GRID offers the choice of vertical, horizontal, or both vertical and horizontal grid lines. You can erase grid lines by selecting them a second time. For example, if you select horizontal grid lines while horizontal grid lines are displayed, you erase those lines. You can erase horizontal, vertical, or both. You cannot invoke this option until a chart is displayed.

HI-LO-CL [Plot subprogram/Select menu]

HI-LO-CL lets you draw a High-Low-Close chart. You are prompted to select the high series, the low series, and the close series from displayed lists of the series in memory. When prompted for the close series, you can select NONE. You can specify the high and low series in either order; the program automatically uses the series with the highest values to plot. High-Low-Close charts are displayed as a series of vertical lines connecting the high and low values. The vertical lines are not connected from time period to time period.

A High-Low-Close chart can only be generated with one high, one low, and one close series; however, you can overlay charts to display multiple series. A High-Low-Close chart that is overlaid with a Line chart, effectively emphasizes the high, low, or close values; since the Line chart is plotted with both symbols and lines.

HORIZ [Plot subprogram/Grid, Unlabel, and Window menus]

HORIZ performs differently in each menu where it appears.

In the Grid menu, HORIZ draws horizontal grid lines on the displayed chart. If horizontal grid lines already exist, this item is used to erase them.

In the Unlabel menu, HORIZ erases the range labels (X-axis).

In the Window menu, HORIZ divides the screen into top and bottom windows, rather than vertical left and right windows.

INSERT [Main subprogram/Edit menu]
[Trend subprogram/Edit menu]

INSERT lets you insert one or more new data points anywhere within the selected series. The first new point is inserted immediately preceding the data point at the current cursor location. Existing points later in the series are pushed ahead to the next year and/or period. The last point in the series is given a new end date one period beyond the old end date. Up to 149 values can be inserted in a series. You can perform multiple insertions by pressing → after a value; the cursor automatically moves to the following point and creates a space for the next value. You press RETURN to complete the insertion of new data points.

INTERP [Main subprogram/Fill menu]
[Trend subprogram/Fill menu]

INTERP performs a linear interpolation of series values, beginning at the first zero value and continuing to the first nonzero value. The cursor must be highlighting the first zero value before you invoke this operation.

If the value at the cursor is not zero, or if there is no nonzero value later in the series, a beep cancels the operation. The INTERP operation gets the starting point from the preceding period, and the ending point from the next nonzero value. All points in between are then linearly interpolated.

INVERSE [Plot subprogram/Title Typeface menus]

INVERSE appears in the Typeface menus for both fixed and Moveable titles. The item is used to display a chart title in inverse video. Other choices in the same menu are NORMAL and BOLD typefaces.

JUMP [Main subprogram/Edit menu]
[Trend subprogram/Edit menu]

JUMP lets you move the cursor to any entry in the displayed series. You can either move to a specific date/period by typing that entry when prompted; or you can move the cursor to the beginning or end of the series with the arrow keys. The → key jumps the cursor to the end of the series and the ← key jumps the cursor to the beginning.

LAG [Trend subprogram/Function menu]

The LAG function creates a new series that lags the source series by a specified number of periods. The lagging series has the same values as the source series, but they are shifted to the future a specified number of periods. In effect, lagging a series by one period adds one to each date.

The program gives the lagging series the same name as the source series, plus an extension in the form ".−n" that serves as an identifier. n is the number of periods of lag specified. For example, a series that lags the series PE RATIO by 2 periods is given the name PE RATIO. −2. Figure 3-9 shows the effect of the LAG function. You are prompted for the source series and for the number of periods to be lagged. The number of periods must not be more than exist in the source series.

Jan	Feb	Mar	Apr	May
100	200	300	400	500	Source Series

| 100 | 200 | 300 | 400 | 500 | Lag Series

| Feb | Mar | Apr | May | Jun |
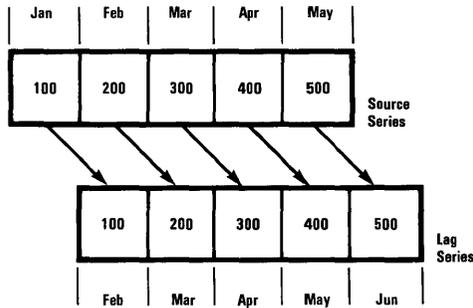
012-006

Figure 3-9. Lag Function

LEAD [Trend subprogram/Function menu]

The LEAD function creates a new series that leads the source series by a specified number of periods. The leading series has the same values as the source series, but they are shifted to the past a specified number of periods. In effect, leading a series by one period subtracts one from each date.

The program gives the leading series the same name as the source series, plus an extension in the form ". + n" that serves as an identifier. n is the number of periods of lead specified. For example, a series that leads the series PE RATIO by 2 periods is given the name PE RATIO. + 2. Figure 3-10 shows the effect of the LEAD function. You are prompted for the source series and for the number of periods to be led. The number of periods must not be more than exist in the source series.
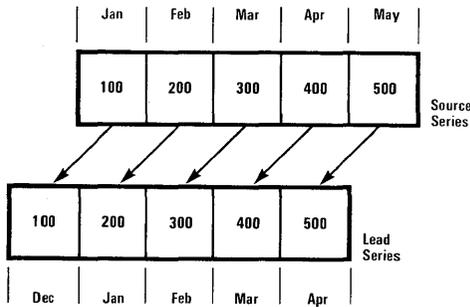
Figure 3-10. Lead Function

LEFT [Plot subprogram/Bar menu]

LEFT specifies that half-width bars are to be drawn on a Bar chart, and placed to the left of the tick marks. LEFT, along with RIGHT, is normally used for comparative Bar charts.

LEGEND [Plot subprogram/Title menu]

LEGEND redisplays the chart legend after it has been erased by any bottom titles. With a Pie chart, this item works differently: LEGEND erases the Pie chart legend and the pie segment labels. Once a Pie chart legend is erased, that legend cannot be redisplayed without replotting the Pie chart.

Every legend line (except for a Pie chart) contains a chart type code, plotting symbol for the corresponding series, and the name of the corresponding series. The chart type codes are as follows:

A — Area chart

B — Full Bar chart

BL — Bar left chart

BR — Bar right chart

CL — Close data on a High-Low-Chart

HI — High data on a High-Low-Close chart

L — Line chart

LO — Low data on a High-Low-Close chart

X — X-axis on an XY chart

Y — Y-axis on an XY chart

LINE [Plot subprogram/Select menu]

LINE specifies that a Line chart is to be drawn. You choose one or more series from a displayed list of the series in memory. When selecting multiple series, all series must have the same period. The program draws each selected series with a different symbol. If more than six series are selected, the first six symbols are reused. A maximum of the first six selected series are listed in the legend. The legend lists the names of the first six plotted series, and the symbol used for each.

LINES [Plot subprogram/Format menu]

LINES specifies that a Line or XY chart is to be drawn with connecting lines and without symbols. This option is only valid for Line and XY charts.

LOAD [Main subprogram/Main menu]

LOAD in the Main menu places a copy of a file (with all the series it contains) from the data diskette into the computer memory. You are prompted to select a file name from the directory of the current data diskette. The DEVICE item is used to change the drive/slot for the data diskette.

When the out-of-room condition is about to occur, a partial load is performed, if possible. The program loads as many series from the file as can fit in memory. The partial load only occurs with files stored in the normal VisiTrend/Plot format. Partial loads are not done with files stored in the DIF format.

LOAD [Plot subprogram/Screen menu]

LOAD in the Screen menu displays a list of all screen image (.PIX) files saved on the data diskette. When you select a .PIX file, the image saved in the file is drawn on the screen. A .PIX file cannot be altered with the normal Options menu items; however, all the features of the Text operation are available with .PIX files. See TEXT later in this chapter for details.

MAIN [Plot subprogram/Exit menu]
[Main subprogram/Files menu]
[Trend subprogram/Trend menu]

MAIN exits the Plot subprogram, Trend subprogram, or Files menu, and displays the Main menu. Series in memory are not lost in transit.

MOVEABLE [Plot subprogram/Title menu]

MOVEABLE is used to place a title anywhere on a chart. A Moveable title can contain up to 37 characters, and is initially displayed at the left center of the chart. There is no limit to the number of Moveable titles you can put on a chart.

As the name implies, the title can be moved to any location on the screen. Movement is controlled by the I, M, ←, and → keys. The relative position of these keys on the keyboard suggests the directions in which they move the title.

Each time you press a direction key, the title moves in the specified direction, until the title runs into the edge of the chart. When the edge is reached, a beep sounds until the key is released or the direction is reversed.

The number keys, 1 through 9, change the distance of each movement. The higher the number, the farther the title will move when a direction key is pressed. Initial movement is approximately at the 5 rate.

When RETURN is pressed after positioning the title, a Moveable title Typeface menu appears. This menu is identical to the fixed title Typeface menu, with the addition of two items, CANCEL and FIX.

CANCEL erases the Moveable title from the chart, and returns you to the Title menu. **Note:** if a Moveable title is covering any bars, lines or characters when you select CANCEL, a permanent black rectangle remains on the screen. To avoid this, move the title into an open black area of the screen before you display the Typeface menu to select CANCEL.

Selecting FIX fixes the title in its current location, then returns you to the Title menu. If FIX is selected without first selecting a typeface, the title is displayed in NORMAL typeface by default.

After a title is fixed in place, it can be erased by a mask created with the MOVEABLE title operation, or with the TEXT operation in the Plot menu. A mask consists of blank spaces bounded by periods. When a mask is positioned over any existing characters, and fixed in place, that portion of the chart is erased.

MOVE AVG [Trend subprogram/Function menu]

The MOVE AVG function calculates the moving average of a specified number of points within a selected series. The function prompts you to select the source series from a displayed list, and to specify the number of periods over which the moving average is to be computed. The number of periods must be between 1 and the number of data points in the source series.

The program creates a new series to contain the moving average, and gives the new series the same name as the source series, plus and extension in the form ".Mn". n is the number of periods over which the average is calculated. For example, if you specify a moving average over three periods for the DIVIDENDS series, the new series is named DIVIDENDS.M3.

The VisiTrend/Plot program uses the N + 1 method of calculating moving average. Series can be converted to the N or to the Centered Moving Average methods by following the steps described in the following paragraphs. Figures 3-11 through 3-13 show a source series and a moving average series over three periods, with each method of calculating moving average.
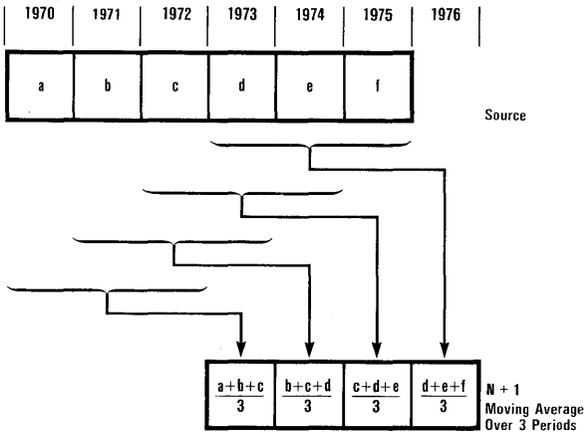
Figure 3-11. N + 1 Moving Average Method

Converting to an N Moving Average

The N moving average method locates the first point of the moving average series at the last point of the periods being averaged. To convert the VisiTrend/Plot N + 1 moving average to an N moving average, follow these steps:

1. Perform the N + 1 moving average for the desired number of periods. (Review the section "Computing Moving Average" in Lesson Four, if necessary).

2. Move the Mn moving average series back one period, with the EDIT operation. Select the moving average series from the displayed list.

3. Select SPECS from the Edit menu; then select START. When prompted for the new start date, specify a date one period earlier than the current start date. For example, if the start date is 1967, change it to 1966; if the start date is 1966 period 4, change it to 1966 period 3.

The N + 1 moving average series has now been converted to the N moving average series, and is displayed on the screen.

You can also shift the N + 1 moving average series with the LEAD function.
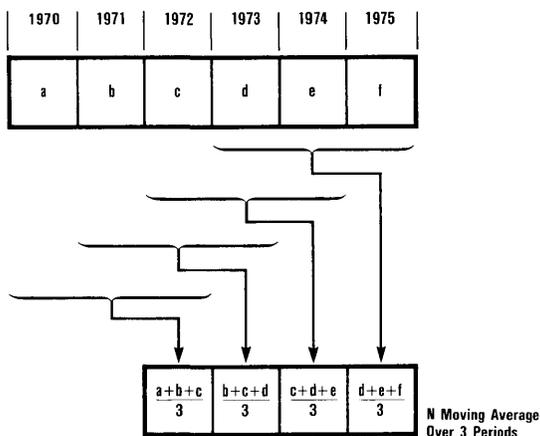
Figure 3-12. N Moving Average Method

Converting to a Centered Moving Average

The Centered Moving Average method locates the first point of the moving average series at the center of the periods being averaged. To convert the VisiTrend/Plot N + 1 moving average to a centered moving average, follow the procedure below that applies to the number of periods in the series (odd or even).

- Odd Number of Periods

  If the N + 1 moving average is over an odd number of periods (p), the generated series must be moved back, with the LEAD function, to the middle of the number of periods being averaged. In other words, the N + 1 moving average series must be moved backward (p + 1)/2 periods, where p is the number of periods averaged.

  You can select ANALYZE, then TABLE, to display the averaged series after the conversion.

- Even Number of Periods

  When the number of periods being averaged (p) is even, the conversion to a centered moving average is more complex. Follow these steps:

  1. Perform a p period N + 1 moving average. (Review the section "Computing Moving Average" in Lesson Four, if necessary).
  2. Perform a 2 period N + 1 moving average on the series resulting from step 1.

3. With the LEAD function, move the series resulting from step 2 backward in time by (p/2) + 2 periods, where p is the number of periods averaged in step 1.

4. You can select ANALYZE, then TABLE, to display the averaged series after the conversion.
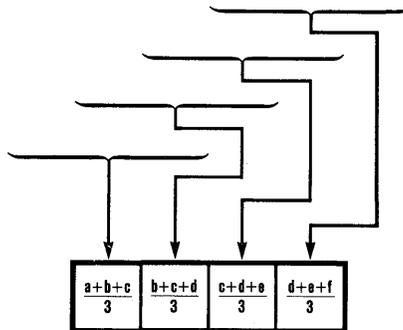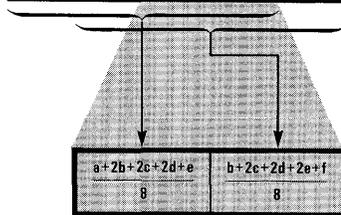
Figure 3-13. Centered Moving Average Method

NAME [Main subprogram/Specs menu]
[Trend subprogram/Specs menu]

NAME is used to change the name of the series being edited. You are prompted for the new name, and the change appears immediately at the top of the displayed series.

NEW [Plot subprogram/Plot menu]

NEW clears the screen and resets all options to the program defaults, including the plotting and background colors. NEW returns the program to the Plot menu, and cancels the [SAME] entry in the series list. If two windows are set, this item returns to single window operation.

NONE [Plot subprogram/various menus]

NONE lets you exit a menu without making a selection. NONE usually returns to the menu from which you called the current menu.

NORMAL [Plot subprogram/Typeface menus]
[Plot subprogram/Bar menu]
[Main subprogram/Save menu]

In the Typeface menus for both fixed and Moveable titles, NORMAL is used to display the subject title in normal typeface, instead of bold or inverse. If FIX is chosen without a typeface for a Moveable title, NORMAL is in effect by default.

In the Bar menu, NORMAL specifies that a Bar chart is to be drawn with full-width bars centered on the tick marks.

In the Save menu, NORMAL stores a series in the normal VisiTrend/Plot program data format, instead of the DIF format. In the normal format, the data can only be used with the VisiTrend/Plot program. This NORMAL internal data format is described in Appendix C.

OPTIONS [Plot subprogram/Plot menu]

OPTIONS displays the Options menu from which you can change certain plotting and formatting values such as range, scale, color, background, and format; or add titles to a chart. For more information see TITLE, RANGE, FORMAT, GRID, UNLABEL, RESCALE, COLOR, and BACKGR.

OVERLAY [Plot subprogram/Plot menu]

OVERLAY is used to plot charts on top of existing charts. Overlaying is different from PLOT which erases any existing charts before plotting new ones. Thus, if you follow an Overlay operation with a Plot operation, only the series selected with the last PLOT is/are drawn.

OVERLAY does not compute range or scale values; the existing values of the displayed chart are used. If the chart to be overlaid does not fit in the existing range and scale, the program offers you the choice of overlaying on the existing scale (PROCEED) or overlaying on a new scale (REDRAW).

You must PLOT at least one series before you can use OVERLAY for a second and subsequent series. Any overlaid chart must have the same period as the existing chart(s). You cannot change the RANGE or BACKGR between a PLOT and an OVERLAY.

You can overlay all chart types except Pie charts. You can also mix chart types in overlay operations, with the exception of Pie and XY charts.

Note that although a maximum of 16 series can be drawn on the same chart, you must use PLOT for up to the first six series, then use OVERLAY for up to the remaining number of series (in groups of no more than six series at a time). After the first six series have been plotted, the legend area is full. Subsequent Overlay operations draw the chart lines, but produce the warning message CAN'T! LEGEND FULL. This message is simply a notice that the program can display no more legend lines. The overlay just specified, and subsequent overlays, are drawn without legend lines.

PER [Main subprogram/Specs menu]
[Trend subprogram/Specs menu]

PER is used to change the periodicity of the chart being edited. The current period is displayed, and you are prompted for a new period. Valid periods are 1 through 99. When a periodicity other than 1 is specified, you are also prompted for the first period of the starting year. A series can begin at any period in its starting year. When you specify a new periodicity, the currently displayed series is erased and redisplayed with the new periodicity. The current beginning date is retained.

The most common periods are 1 (yearly), 2 (semi-annually), 4 (quarterly), 12 (monthly), and 52 (weekly). Note that when a series with a period of 12 is plotted, the first X-axis tick mark is labeled with the year (or reference point), then the remaining 11 tick marks are labeled for those months of the year with F M A M J J A S O N D.

PERCENT [Trend subprogram/Function menu]

The PERCENT function calculates the percent of change between suc-
cessive points in a selected series, and creates a new series containing the
percent-change data. The program gives the new series the same name as
the source series, plus an extension in the form ".%" that serves as an
identifier. For example, if you execute the PERCENT function on the series
named EARNINGS, the program generates the series EARNINGS.% for
the new data.

The new series has the same period as the source series, and a start date
one period later than the source series. If the source series has the range
1971 through 1980 and a period of 1, the percent-change series has the
range 1972 through 1980.

PIE [Plot subprogram/Select menu]

PIE specifies that a Pie chart is to be drawn. A Pie chart is a circle that is
divided into segments. The size of each segment is determined by the ratio
of the segment value to the sum of all the data values.

An individual Pie chart effectively compares the values of from two to
eight series at a specified date or reference number. It does not compare
the different values in a single series. If you plot a Pie chart for a single
series, the resulting chart is an undivided circle, and the single series
represents 100% of the chart.

In a Pie chart, the segments are drawn in a clockwise direction begin-
ning at the 3 o'clock position. You are prompted to select all the series
from a displayed list. Each selected series must have a value for the
specified year or reference point, and all selected series must have the
same period.

Segment labels around the chart correspond to lines in the legend.
The legend is boxed to the right of the chart, and contains each label,
series name, and relative percent of the total. The date/reference point
and periodicity of the data is displayed at the bottom of the legend.
Because of rounding, the percentages listed in the legend may not add
up to 100%. Series that have very small relative values may produce
overlapping segment labels around the chart. If this occurs, you can
change the order in which you select the series, so that small segments
are not side-by-side on the chart.

Once the Pie chart has been drawn, you press RETURN to display the
shading prompt. You may shade any individual segment(s) or none at all.
The program displays the same menu as generated by the COLOR item
in the Options menu.

NOTE: Because of the manner in which the Apple II handles color display, segment divisions may be distorted if you select certain colors for adjacent segments. Refer to the colors listed in Table 3-4, earlier in this chapter, for compatible color sequences in a Pie chart. For example, three adjacent segments can have the colors violet, green, and white.

After you confirm that all desired shading is completed, the Pie chart Options menu is displayed. The items in this menu let you add text to the chart, save the chart on a diskette file (or load another chart), print the chart on the printer, and add titles to the chart.

If you select TITLES, all the normal fixed and moveable titling capabilities apply, with the exception of the LEGEND item. For Pie charts only, this item is used to erase the legend. When you have completed all titling, you EXIT back to the Pie Chart Options menu.

PLOT [Main subprogram/Main menu]
            [Trend subprogram/Trend menu]
            [Plot subprogram/Plot menu]

PLOT in the Main and Trend menus exits the current program and loads the Plot subprogram. Series in memory are not lost in transit.

PLOT in the Plot menu allows you to draw a chart of the currently-selected data series, according to the current options. PLOT erases an existing chart before it draws another one. After the chart is drawn, pressing ESC returns the Plot menu to the screen.

Note that although a maximum of 16 series can be drawn on the same chart, you must use PLOT for up to the first six series, then use OVERLAY for up to the remaining number of series (in groups of no more than six series at a time). After the first six series have been plotted, the legend area is full. Subsequent Overlay operations draw the chart lines, but produce the warning message CAN'T! LEGEND FULL. This message is simply a notice that the program can display no more legend lines. The overlay just specified, and subsequent overlays, are drawn without legend lines.

POINTS [Plot subprogram/Format menu]

POINTS allows you to plot the data points in a series using dots only.

PRINT [Plot subprogram/Plot menu]
            [Plot subprogram/Pie chart Options menu]
            [Main subprogram/various menus]
            [Trend subprogram/various menus]

PRINT in any VisiTrend/Plot menu lets you print the current screen image on a supported printer. In most cases, you are allowed to change the printer driver and/or printer slot before printing. CTRL-C can be used to interrupt the printing, and return to the menu from which PRINT was selected. Refer to Appendix B for information on supported graphics printers.

PROCEED [Plot subprogram/data-off-scale condition]

The PROCEED option appears when an overlay or rescale operation will cause points in the series to be outside the current chart scale. If you select PROCEED, the program draws an off-scale, partial plot. Each time an off-scale value is encountered, a beep sounds. The program continues to warn you that data is off-scale, and you are prompted to PRESS ANY KEY TO CONTINUE. Pressing ESC, for example, returns you to the Plot menu.

QUIT [Main subprogram/Main menu]

QUIT leaves the VisiTrend/Plot program, and returns you to DOS. The DOS prompt (]) is displayed. To reboot the VisiTrend/Plot program, switch the computer power off, wait a couple of seconds, then switch it back on; or type PR#n where n is the slot number of the drive containing the program diskette. All series are cleared from memory when you select QUIT.

RANGE [Plot subprogram/Options menu]

RANGE is used to change the plotting range of the selected series. RANGE displays the current series range, and the Range menu in the status area. The Range menu lets you SET a new range, or CLEAR a range you have previously SET. If you have not previously changed the range with SET, the CLEAR item has no effect.

When SET is chosen, you are prompted for new starting and ending dates, and a period if other than 1. The chart is redrawn when PLOT is selected. You can also choose to EXIT the Range operation without clearing or setting the range.

Refer to the description of Range at the beginning of this chapter for more information on range and scale operations in the VisiTrend/Plot program.

REDRAW [Plot subprogram/data-off-scale condition]

The REDRAW option appears when an Overlay operation will cause points in the series to be outside the current chart scale. Your other two options are PROCEED and CANCEL. If you select REDRAW, the chart is rescaled, then redrawn. However, all previously overlaid series, all legends, and any titles are erased in the process. Only the originally plotted series, and the series produced by REDRAW remain.

REGRESS [Trend subprogram/Analyze menu]

REGRESS calculates an ordinary least-squares multiple regression, such that:

$$y(i) = B + m_1 x_1(i) + m_2 x_2(i) + \ldots + m_5 x_5(i)$$

You are prompted to select the dependent variable, then from one to five independent variables, from lists of the series currently in memory. Next, you are prompted to either keep or change the current range for the selections.

In a regression, the current range is the logical intersection of the ranges of the dependent and independent variables. This range must have at least two more data points than there are independent variables, regardless of whether or not a constant is used. Next, you are prompted to choose whether the regression is to be computed with a constant, or through the origin (no constant).

Two new series are generated by the Regression operation. The first is a fitted series developed from the generated constant and coefficients. The second is a series containing the differences (residuals) between the actual dependent series values and the fitted values. The new series have the same name as the dependent series, plus an extension that serves as an identifier. These identifiers are in the form ".Fn" for the fitted series, and ".Rn" for the residual series. n is a program-generated number, and is the same for both series that result from a single regression.

The Regression operation can also be used to generate a forecast series. This option is chosen by selecting [TREND] as the only independent variable. You are then asked to specify the number of periods to be forecast. The program develops a straight-line series based on the dependent variable. The series is then extended by the specified number of periods.

The REGRESS calculations typically take from 15 to 60 seconds to be completed. The results are displayed on the screen. These include the name of the dependent variable, the range, and the number of data points (# OBS:). For each independent variable (and the constant, if used), the program displays the coefficient, standard error, and T-statistic.

At the bottom of the screen, the regression statistics are displayed. These are the R-bar squared statistic, the corrected R-bar squared

statistic, the standard error of regression, the sum of the squared residuals, the F-test value of the regression, and the Durbin-Watson statistic. When you perform a regression on one independent variable with no constant, the F-statistic and the corrected R-bar squared are meaningless and, therefore, not computed.

The Durbin-Watson statistic (DW) is the last item calculated. If there is not enough room for the fitted and residual series, they are not created, and the Durbin-Watson statistic is not calculated. A message that there is no room in memory appears in the status area. You should return to the Main menu, CLEAR at least two series from memory, then perform the regression again.

After the results of the computations are displayed, you can print the analyses on the printer. If you do not print the screen display, it is discarded.

Whether or not you choose to print the display, the program next asks if you want to save the two generated series in memory. You then return to the Trend menu.

The formulas used by the VisiTrend/Plot program in computing regressions are summarized here for your convenience. For additional information on these and related formulas, refer to current textbooks dealing with econometrics and statistics.

The values in formulas are defined as follows:

Let

$x_j(i)$ = i^{th} data point from j^{th} independent series.
$m(i)$ = i^{th} regression coefficient.
$y(i)$ = i^{th} data point from dependent series.
n = number of series data points.
k = number of regression coefficients to be estimated.

and let

$$
X = \begin{bmatrix} x_0(0) & x_1(0) & \cdots & x_{k-1}(0) \\ x_0(1) & x_1(1) & & \cdot \\ \cdot & \cdot & & \cdot \\ \cdot & \cdot & & \cdot \\ x_0(n-1) & x_1(n-1) & \cdots & x_{k-1}(n-1) \end{bmatrix} = \begin{bmatrix} \text{index} & | & \text{index} & | & | & \text{index} \\ \text{series} & | & \text{series} & | & \cdots & | & \text{series} \\ \#0 & | & \#1 & | & | & k-1 \end{bmatrix} \quad Y = \begin{bmatrix} y(0) \\ y(1) \\ \cdot \\ \cdot \\ y(n-1) \end{bmatrix} \quad M = \begin{bmatrix} m(0) \\ m(1) \\ \cdot \\ \cdot \\ m(k-1) \end{bmatrix}
$$

For the least squares regression coefficient: if you want a constant computed in the regression, then independent series 0 is an artificial series with all data values equal to 1. In this case, all the values in column 0 of X are 1. If $n > k$ and $(X'X)$ is invertible, then the least squares regression coefficient estimates $m(0)$, ..., $m(k-1)$ are given by

$$M = (X'X)^{-1} X'Y$$

Coefficients for a Trend subprogram forecast are also computed in exactly the same manner. In this case, column 0 of X is an artificial series whose values are all 1, and column 1 of X is an artificial series whose values are 1, 2, 3, ..., n.

Regression statistics:

1. The standard errors of coefficients are given by

$$s(i) = \sqrt{\text{diag}_i \left(SER^2 (X'X)^{-1} \right)}$$

where diag denotes the ith diagonal element of a matrix.

2. The T statistic is given by

$$t(i) = m(i)/s(i), \ s(i) \neq 0$$

3. If $\hat{y}(i)$ denotes the fitted value for the ith dependent data value, i.e.

$$\hat{y}(i) = \sum_{J=0}^{k-1} m(j)x_j(i)$$

then the ith residual is defined to be

$$e(i) = y(i) - \hat{y}(i)$$

The Sum of Squared Residuals (SSR) is then

$$SSR = \sum_{i=0}^{n-1} e^2(i)$$

4. The Standard Error of Regression (SER) is given by

$$SER = \sqrt{\frac{1}{n-k}} \ SSR$$

5. The Coefficient of Determination R^2 is

$$R^2 = 1 - \frac{SSR}{SST} \quad (SST \neq 0)$$

where $SST = \sum_{i=0}^{n-1} (y(i) - \bar{y})^2$

where $\bar{y} = \frac{1}{n} \sum_{i=0}^{n-1} y(i)$ (mean of $y(i)$)

6. The Corrected Coefficient of Determination R^2 is given by

$$\bar{R}^2 = R^2 - \frac{k-1}{n-k} \left(1 - R^2\right)$$

7. The F Statistic is

$$F(k-1, n-k) = \frac{n-k}{k-1} \left(\frac{R^2}{1-R^2}\right) \quad \text{if } R^2 \neq 1 \text{ and } k \neq 1$$

8. The Durbin-Watson Statistic is computed as

$$DW = \frac{\sum_{i=1}^{n-1} (e(i) - e(i-1))^2}{SSR} \quad \text{if } SSR \neq 0$$

RESCALE [Plot subprogram/Options menu]

RESCALE is used to change the chart scale that was determined by the program. You are prompted for new minimum and maximum scale values, and the number of intervals into which the axis is to be divided (tick marks). For an XY chart, both axes represent scale values, and you are prompted once for each axis. For all other chart types (except Pie charts), the scale is represented on the Y-axis.

If you specify a minimum value that is greater than the maximum, the program reverses the values. If you specify the same value for the minimum and maximum, the program uses the specified value as the minimum and sets a maximum that is approximately 20 percent higher.

Refer to the discussion of Scale at the beginning of this chapter for more information on range and scale operations in the VisiTrend/Plot program.

RETURN [Main subprogram/various menus]
[Trend subprogram/various menus]

After the completion of certain operations (LOAD, for example), the program offers you the choice of PRINT or RETURN. When RETURN is selected, the program returns to the Main or Trend menu, without first printing the screen contents.

During the selection process from a displayed list of series in memory, the status area normally contains directions that include <RETURN>. When you press the RETURN key, the item currently highlighted by the cursor is selected.

RIGHT [Plot subprogram/Bar menu]

RIGHT specifies that a Bar chart is to be drawn with half-width bars located to the right of the tick marks. RIGHT along with LEFT, is normally used for comparative Bar charts.

SAVE [Main subprogram/Main menu]

SAVE in the Main subprogram is used to write one or more series on a diskette file for permanent storage. You must choose whether the data is to be saved in the normal VisiTrend/Plot format or the DIF format. You then select the series to be saved from a displayed list of the series currently in memory.

You can save a specific series, [ALL] series, or [NONE] by moving the cursor to that entry, and pressing RETURN. You can also use the space bar to indicate any number of individual series to be saved. An asterisk (*) marks a series when you press the space bar, but the marked series is not saved until you press RETURN to complete the Save operation. To erase an asterisk, press the space bar a second time.

When you press RETURN, you save all the series marked with an asterisk **and** the series which the cursor is highlighting (whether or not the latter has an asterisk). Selecting either [ALL] or [NONE] disregards any asterisks that may be in the list.

Next, the program displays a list of the files currently on the data diskette. You can choose to store the selected series in an existing file, or to create a new file. If you select an existing file, **all** the data that is currently in that file is erased and replaced by the series being saved. If you choose to store the series in a [NEW FILE], you are prompted to name the file. If you specified the file to be saved as a DIF file, the program automatically appends the extension .DIF to the file name.

The SAVE request is cancelled if you do not specify a file name, if you press ESC when prompted for a file name, or if you select [NONE] from the series list.

SAVE [Plot subprogram/Screen menu]

SAVE in the Plot subprogram is used to store the screen image of a chart on a diskette file. The saved screen image can subsequently be loaded back onto the screen from the data diskette.

The program displays a list of all screen image files currently stored on the data diskette. You can choose to store the screen image in an existing file, or to create a new file. If you select an existing file, the screen image that is currently in that file is erased, and replaced by the one being saved. If you choose to store the image in a [NEW FILE], you are prompted to name the file. To identify the file as a screen image, the program automatically adds the extension .PIX to your specified file name when the file is saved.

SCREEN [Plot subprogram/Plot menu]
[Plot subprogram/Pie chart Options menu]

SCREEN is used to load a chart screen image (.PIX file) from the data diskette to the screen, save a chart screen image on a diskette file, and specify a disk drive/slot for the data diskette. For more information see LOAD, SAVE, **and** DEVICE.

SECOND [Plot subprogram/Title menu]

SECOND, like FIRST and THIRD, specifies a title line to be entered at the bottom of a chart. SECOND specifies the second of the three possible bottom titles. Up to 37 characters are allowed on any bottom title line. The title is centered across the bottom of the chart. If the @ symbol is typed as the last character in the title, the title is left-justified. You can choose bold, normal, or inverse video typeface for any title. Bottom titles write over any legend occupying the same line.

SELECT [Plot subprogram/Plot menu]

SELECT is used to select the type of chart to be plotted. SELECT does not clear the current active series from the screen until you PLOT a new chart, nor does SELECT change the current options. To clear the current series and options selections, use the NEW item first.

The selected series name is displayed in the bottom line of the status area. If you select multiple series, the name of the first one selected is displayed, followed by three dots.

SERIES [Main subprogram/Fill menu]
[Trend subprogram/Fill menu]

SERIES lets you insert the values of an entire series into the middle of the series being edited. You select the other series from a displayed list of the series currently in memory. If you choose to insert the current series into itself, the program inserts the series values before any editing changes occurred.

The new data is inserted following the value currently highlighted by the cursor, and given the next sequential dates as indicated by the period of the series. The values that follow the insertion are pushed ahead and given new dates and/or periods, as appropriate.

Up to 149 values can be inserted in a series.

SET [Plot subprogram/Range menu]

SET is used to set a new plotting range for the current series. You are prompted to enter new start and end dates, and periods for both dates if the period is other than 1. The range you set can be removed with the CLEAR item; then you can PLOT the chart again using the range stored with the series.

SIDE [Plot subprogram/Title menu]

SIDE specifies a title line to be entered at the left of a chart. The side title is written vertically from top to bottom, and centered outside the Y-axis. Up to 14 characters are allowed in a side title.

The UNLABEL item in the Options menu can be used to erase this vertical Side title, along with the Y-axis labels.

SLOT [Plot subprogram/Print menu]

SLOT is used to change only the currently assigned slot number for a printer. Up to seven slots are available; however, slot 1 is normally used. Once changed, the slot number remains in effect throughout the current session — until it is changed again using the SLOT item, or as part of DRIVER. The DEFAULT item can also be used to change the slot number, but this change is retained between sessions.

When SLOT is selected, the currently-assigned slot number is displayed in the bottom line of the status area. The status area below the Main menu also displays the current slot number.

SMOOTH [Trend subprogram/Function menu]

The SMOOTH function performs a single exponential smoothing on the source series. The forecast generated by this technique is based on the most current data point and current forecast, and lags the source series by one period.

You are prompted for a smoothing factor (λ) which must be greater than 0 and less than 1. The smoothed series (Y) is generated from the source series (X) according to the following formulas.

For the value i = 1:

$$Y_i = X_i$$

For the remaining i values:

$$Y_i = \lambda \ X_{i-1} + (1 - \lambda) Y_{i-1}$$

where:

i is an integer ranging from 1 through the number of series data points.

A high smoothing factor (a value greater than 0.5) gives greater weight to the more current point, and a low smoothing factor gives greater weight to the earlier point.

The generated smoothed series is saved with the same name as the source series, plus an extension in the form ".S" that serves as an identifier. The generated series lags the source series by one period. This lag is a one-period forecast for the data in the source series.

SPECS [Main subprogram/Edit menu]
[Trend subprogram/Edit menu]

SPECS is used to change the specifications of the current series. The specifications that can be changed are: the name of the series, the period, and the start date. For further information see NAME, PER, and START.

START [Main subprogram/Specs menu]
[Trend subprogram/Specs menu]

START is used to change the starting date of the series being edited. You are also prompted for the starting period of the specified date, if the current series periodicity is other than 1. The series dates are changed immediately, and shown in the screen display. If you press RETURN without first entering a new start date, the date 0 is used by the program.

STATS [Trend subprogram/Analyze menu]

STATS computes statistics on one or more series currently in memory. When multiple series are selected, STATS also computes and displays the correlation coefficients of the selected series. If you do not explicitly set a data format, the statistics are displayed in floating-decimal point format, and the correlation coefficients are displayed to three decimal places.

The following formulas are used in the computations:

For a series $x(i)$, $i = 0, 1, ..., n-1$

$$\text{The mean } \bar{x} = \frac{\displaystyle\sum_{i=0}^{n-1} x(i)}{n}$$

The population variance $\sigma^2 = \dfrac{ss}{n}$ where $ss = \sum\limits_{i\,=\,0}^{n\,-\,1} (x(i) - \bar{x})^2$

The population standard deviation $\sigma = \sqrt{\dfrac{ss}{n}}$

The number of series that can be displayed in a STATS operation depends on the column width specified for the series. Therefore, when multiple series are selected, only those series that fit within the display width appear — beginning with the first series selected.

The program first prompts you to select one or more series from a displayed list. The status area next displays a range that represents the intersection of the ranges in the selected series. You have the choice of keeping this range or changing it. If you select CHANGE, you are prompted for a starting and ending date (and period for each, if periodicity is other than 1). Lastly, you have the option of printing the statistics display(s) on the printer.

SWITCH [Plot subprogram/Window menu]

SWITCH makes the other window active when the program is in two-window mode. This switching does not affect the chart displayed in the previously active window. The current window designation, which is displayed in the lower-right corner of the status area, is changed to show the window that is in use.

When you switch between windows, the series and options for the window you are leaving are no longer active. If you return to a window and want to change an option, you must start over, and PLOT the chart again. You should, therefore, try to complete all refinements to one chart before switching windows to plot and refine the other chart.

SYMBOLS [Plot subprogram/Format menu]

SYMBOLS specifies that a chart is to be drawn using plotting symbols only (no interconnecting lines). This item appears in the Format menu for Line and XY charts.

Up to six different symbols are used for multiple series charts. When more than six series are drawn on the same chart, the symbols are repeated in sequence. That is, the first-series symbol is repeated for the seventh series, the second-series symbol is repeated for the eighth series, and so on. The symbols used by the VisiTrend/Plot program are shown here, in the sequence they appear on a chart:

☐ First series (hollow square)
+ Second series (plus sign)
o Third series (hollow circle)
x Fourth series
◇ Fifth series (hollow diamond)
X Sixth series (x over dot)

TABLE [Trend subprogram/Analyze menu]

TABLE produces a table of one or more series. If you do not explicitly set a data format, the series are displayed in floating-decimal point format, with a column width of 10.

The number of series that can be displayed in a TABLE operation depends on the current column width. Therefore, when multiple series are selected, only those series that fit within the display width appear — beginning with the first series selected.

The program first prompts you to select one or more series from a displayed list. The status area next displays a range that represents the union of the ranges in the selected series. You have the choice of keeping this range or changing it. If you select CHANGE, you are prompted for a starting and ending date (and period for each, if periodicity is other than 1).

The table is displayed 18 lines at a time. After each 18 lines, you are prompted to continue to the next 18 lines, print the current screen display and continue, or exit to the Trend menu.

TEXT [Plot subprogram/Plot menu]
[Plot subprogram/Pie chart Options menu]

TEXT allows you to place customized titles, labels, legends, and notes on a displayed chart. You can also use TEXT to create text-only pages. When the Text operation is in effect, your computer and its associated printer operate much like an electronic typewriter. Text-only screens can be printed out as annotations or other supporting material for charts, and you can place more information on the charts themselves. TEXT can be selected for a new chart display, or for a .PIX file that has been loaded from a data diskette. Table 3-5 lists the special keyboard keys that can be used in the Text operation.

Table 3-5. Summary of Text Operations

Operation	Key(s)
Erase a character	Space Bar
Change cursor to small-increment dot	CTRL-Z
Move cursor up one line	CTRL-O
Move cursor down one line	CTRL-L
Move cursor left	←
Move cursor right	→
Move cursor to beginning of next line	RETURN
When in lower case, change only the next character to upper case	CTRL-A
When in lower case, change all subsequent characters to upper case	CTRL-A twice
When in upper case, change all subsequent characters to lower case	CTRL-A
Tab five spaces to the right	CTRL-I
Turn on/off bold face (upper case only)	CTRL-B
Turn on/off inverse video	CTRL-R
Clear entire screen	CTRL-@
Terminate Text operation	ESC

THIRD [Plot subprogram/Title menu]

THIRD, like FIRST and SECOND, specifies a title line to be entered at the bottom of a chart. THIRD specifies the third of the three possible bottom titles. Up to 37 characters are allowed on any bottom title line. The title is centered across the bottom of the chart. If the @ symbol is typed as the last character in the title, the title is left-justified. You can choose bold, normal, or inverse video typeface for any title. Bottom titles write over any legend occupying the same line.

TITLE [Plot subprogram/Options menu]
[Plot subprogram/Pie chart Options menu]

TITLE is used to add top, bottom, side; and moveable titles to the currently displayed chart; and to remove or redisplay legend line(s). For more information, see TOP, FIRST, SECOND, THIRD, SIDE, LEGEND, and MOVEABLE.

TOP [Plot subprogram/Title menu]

TOP specifies a title line to be entered at the top of a chart. Up to 37 characters are allowed on a top title line. The title is centered across the top of the chart. If the @ symbol is typed as the last character in the title, the title is left-justified. You can choose bold, normal, or inverse video typeface for any title.

TOTAL [Trend subprogram/Function menu]

The TOTAL function generates a new series that contains the cumulative total of the data points in the source series. The generated total series is saved with the same name as the source series, plus an extension in the form ".T" that serves as an identifier.

The first data point in the generated series is equal to the first point in the source series. The second point in the new series is equal to the sum of the first and second points in the source series, and so forth. Thus, any point in the total series is equal to the sum of all preceding points in the source series.

TREND [Plot subprogram/Exit menu]
[Main subprogram/Main menu]

TREND exits the Plot subprogram or the Main subprogram, and displays the Trend menu. Series in memory are not lost in transit.

UNDO [Main subprogram/Edit menu]
[Trend subprogram/Edit menu]

UNDO discards all changes made to a series during the current editing session. The series is restored to its previous state — as it appeared when selected for the current Edit operation. If you select UNDO with a newly-created series, the series is deleted.

UNLABEL [Plot subprogram/Options menu]

UNLABEL is used to erase the X-axis and/or Y-axis labels from a chart. The Unlabel menu is displayed which offers the choice of erasing horizontal (X-axis) labels, vertical (Y-axis) labels, or both. When vertical labels are erased, any side title on the chart will also be erased. If NONE is selected, the program returns to the Plot menu.

VERT [Plot subprogram/Grid, Unlabel, and
Window menus]

VERT performs differently in each menu where it appears.

In the Grid menu, VERT specifies that vertical grid lines are to be drawn. If vertical grid lines already exist, this item is used to erase them.

In the Unlabel menu, VERT specifies that the scale labels (Y-axis) are to be erased. If a side title exists on the chart, it is erased along with the labels.

In the Window menu, VERT specifies that the screen is to be divided into left and right windows, rather than horizontal top and bottom windows.

WINDOW [Plot subprogram/Plot menu]

WINDOW divides the screen into two windows, switches between windows, and changes back to one full-screen window. A screen can be divided into either horizontal top and bottom windows, or vertical left and right windows.

The chart legends are not displayed in the window mode.

When window mode is in effect, the extreme right corner of the status area displays an appropriate code for the active window: WT, WB, WL, or WR — for top, bottom, left, or right window.

Window mode is cancelled when you select NONE from the Window menu, or either NEW or PIE from the Plot menu.

XFORM [Trend subprogram/Trend menu]

XFORM allows you to do series transformations. This can include the conversion of exponential values to first order values for inclusion in a linear multiple regression.

In addition, XFORM lets you write your own transformation formula. Formulas are limited to two lines (80 characters). You have the use of the following mathematical, logical, and comparative operators in writing your transformation formula:

Arithmetic operators:

+   Addition
−   Subtraction
*   Multiplication
/   Division
∧   Exponentiation

Logical operators:

        AND
        OR
        NOT

Comparative operators:

<   Less than
< =   Less than or equal to
=   Equal to
>   Greater than
> =   Greater than or equal to

Functions:

SGN   Sign
INT   Integer part of
SQR   Square root
LOG   Natural logarithm
EXP   e to the power of
RND   Random number between 0 and 1
ABS   Absolute value of

Trigonometric functions:

SIN   Sine

COS   Cosine

TAN   Tangent

ATN   Arctangent

    You can use parentheses to control the execution order of the formula. All operations in parentheses are performed before the operations outside the parentheses. All parentheses must be closed or an error will occur.

    Functions are used as they are in a BASIC program. The only difference here is that you can use a series as the variable on which the function operates. In this case the function is performed on each data point in the series. For example, SQR(XY EARNINGS) generates a series with the same beginning and ending dates and period. Each data point in the new series is the square root of the corresponding data point in XY EARNINGS.

    When you select XFORM, you are first prompted to enter a name for the series to receive the transformed values. If you press RETURN without entering a series name, the program generates a name in the form SERIESn, where n is a digit representing the next series in memory. For example, if there are five series currently in memory, the new series is named SERIES6.

    After naming the new series, you are prompted to enter the transformation expression by typing it at the keyboard. You can include series names in any formula. The XFORM operation displays the list of series currently in memory for this purpose. However, you do not type the name of a series.

    To enter a series name into the transform expression, press → to move the cursor into the series list. The name highlighted by the cursor appears in the transform expression. Pressing the arrow keys moves the cursor up and down the list in the normal manner. As the cursor moves, the currently highlighted series name replaces the previous name in the transform expression. To select a series, press RETURN, or enter the next character in the transform expression.

    You can erase entries in the formula by pressing ESC. ESC erases series names as well as characters entered from the keyboard. A series name is erased as a whole, not a character at a time. When ESC is first pressed, series names are bracketed with back slashes (\\) so they are more easily identified.

When the expression is complete, press **RETURN** to perform the transformation and create the new series.

XY [Plot subprogram/Select menu]

XY specifies that an **XY** chart is to be drawn. Lists of the series in memory are displayed from which you select first the series to be plotted along the X-axis, and then the one to be plotted along the Y-axis. The X-axis is scaled to the minimum and maximum for the X-axis series, and the Y-axis is scaled correspondingly for the Y-axis series. The range of a XY chart is the intersection of the two series, and is not explicitly shown in the chart. You can change the range of an XY chart.

When you RESCALE an **XY** chart, you are asked for new scale values for both the X-axis and the Y-axis.

An **XY** chart can be drawn with symbols only, lines only, points only, or both symbols and lines by selecting the FORMAT item in the Options menu. If you do not specify a format, plotting symbols are used.

ERROR MESSAGES

This appendix lists the error messages issued by the VisiTrend/Plot program. The messages are in alphabetical order by the first word of the message. The error descriptions include suggestions on further action whenever possible. If an error message with a number appears, see **The DOS Manual**, Apple product number #A2L0036.

(loud beep)

A beep is sounded whenever inappropriate data is entered, or an illegal operation is attempted. When inappropriate data is entered, no message accompanies the beep. When you encounter this, try your entry again. You probably pressed the wrong key by mistake, such as pressing a letter key when the program was looking for numeric data.

CAN'T! BAD FILE

You attempted to load a data file that is not in the VisiTrend/Plot data format or the DIF format. Only files in these formats can be loaded by the VisiTrend/Plot program.

CAN'T! BAD PERIODICITY

You selected series that have different periods. All series used in a chart, whether a multiple series chart or an overlay of two or more charts, must have the same period.

CAN'T! BAD RANGE

If this message occurs as the result of an attempted PLOT, it means that a series being used does not have at least two data points, or that the series has more than 150 data points. Use the EDIT operation to check the series, and make sure it contains at least two, but not more than 150, data points.

Other conditions that can cause this message are:

• There is no data in the range you specified with the RANGE item.

• You attempted to draw a Pie chart with series that have no data at the date specified for the Pie chart.

If any pair of independent variables have very different scales (one in the range around .01 and the other in the range around 1,000,000, for example) a regression cannot be performed. Use the XFORM operation to multiply or divide one series by a power of 10 to eliminate the different scale problem. You must adjust the coefficient of the scaled variable. For example, if you divided a variable by 100 to run the regression, multiply the resulting coefficient of that variable by 100 to obtain the correct value. This technique affects the fitted and residual values; however, the descriptive statistics of the regression will be correct as shown.

CAN'T! BAD TRANSFORM: BAD EXPRESSION
You entered an XFORM expression that contains an illegal operator or unbalanced parentheses. There are several other ways you can make an error in creating a transform. You can specify an invalid operation such as division with zero. It's also possible to mismatch parentheses (or make a similar syntactical mistake) or type a series name instead of using the arrow keys to select it from the list. When an error is encountered, carefully enter the expression again.

CAN'T! BAD TRANSFORM: DIVISION BY ZERO
You specified a division by zero in an XFORM expression. Re-enter the correct formula.

CAN'T! DISK FULL
The data storage capacity on the diskette currently in use has been reached. The operation that was in process when this message appears has been lost. Replace the current diskette with another data diskette, and retry the operation.

CAN'T! DISK ERROR or DISK I/O
This error can be caused by trying to save data on a diskette that is not initialized.
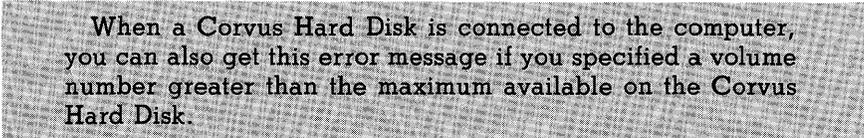
When a Corvus Hard Disk is connected to the computer, you can also get this error message if you specified a volume number greater than the maximum available on the Corvus Hard Disk.

Initialize the diskette with the FORMAT item in the Files menu of the Main subprogram. If you still get the error message, try placing the data diskette in a different drive (if you have multiple drives). You might also try a different data diskette. Make sure you use a data diskette for which you have a backup. It is always a good idea to have a backup of your diskettes, and a necessity when you are having problems.

If you continue to get the error, see the troubleshooting guide that came with your computer and disk drives.

CAN'T! FILE EXISTS
   A file already exists with the name you typed. Choose another name, and try the operation again.

CAN'T! FILE LOCKED
   You attempted to DELETE a file that has been locked, probably via a DOS command. Unlock the file as explained in **The DOS Manual** then retry the Delete operation.

CAN'T! INSERT PROGRAM DISKETTE
   You tried to change programs when the VisiTrend/Plot program diskette was not in drive 1 connected to slot 6. Insert the program diskette in this drive, and press ESC to continue.

CAN'T! LEGEND FULL
   You have done nothing wrong. "CAN'T!" in this instance only means that your chart has reached its maximum of six legends, and the program can't display any more legend lines. The overlay you just specified, and subsequent overlays, are drawn — but without corresponding legend lines.

CAN'T! NO ACTIVE SERIES
   You attempted to invoke an operation that cannot be invoked until a series is selected through the Select menu, or until a series is loaded into memory.

CAN'T! NO FILES HERE
   You selected the LOAD item from the Screen menu, or you selected the DELETE item from the Main menu, but there are no files to be loaded or deleted. Files must be loaded into memory before they can be loaded on the screen or deleted. Use LOAD from the Main menu.

   It is also possible that the disk drive door is open, there is no data diskette in the specified disk drive, or the diskette is wrong side up in the drive. Make sure that you have the correct data disk drive specified, and that you have a data diskette in the specified drive. Also make sure the diskette is inserted properly, and the disk drive door is closed.

CAN'T! NO OPTION HERE
   Certain options are not applicable in all instances. When you see this error message, you tried to apply an option that is not valid in the current circumstances. Another cause of this message is selecting GRID when no chart is displayed on the screen.

CAN'T! NO OVERLAY HERE

You attempted to use OVERLAY when there was no chart displayed; or you specified COLOR or BACKGR and then immediately tried to overlay. Another possible cause of this message is trying to overlay an XY chart.

CAN'T! NO OVERLAY OF XY WITH OTHER TYPE

You tried to overlay an XY chart with another chart type during an overlay. XY charts cannot be used in an overlay operation. Choose an allowed set of chart types, or use other options to achieve the desired effect.

CAN'T! NO ROOM

You tried to LOAD a file when there was not enough room in memory to hold all the series in the file. Another cause is that you tried to put more than 150 data points in a series. You must CLEAR enough series out of memory to make room for the series in the file.

CAN'T! PLEASE SELECT FIRST

You selected the PLOT or OPTIONS items without first selecting a series. You may also have switched windows without selecting a series for the new window. You must use the SELECT item in the Plot menu to select a series after switching windows, even if you want to plot the same series. Select a series, and then return to the PLOT or OPTIONS item.

CAN'T! PRESS ANY KEY

You are drawing a chart that has an off-scale data point. This message occurs when the first off-scale point is encountered. This message also appears in the Trend subprogram when the last screenful of statistics or values is displayed. In this case, there is no error; just press ESC to return to the Edit menu.

CAN'T! PRINTER DRIVER HAS BAD FORMAT

You selected a printer driver with a format that is incompatible with the version of the program you have loaded in your computer. You might have erroneously transferred a version 1 driver onto a version 2 program diskette, for example. Check the list of available printer drivers again with the DRIVER or DEFAULT operations, and make sure that you are selecting the correct driver.

It is possible to get this error message if a non-VisiTrend/Plot file is mistaken for a VisiTrend/Plot file, because of format similarities, and is loaded.

CAN'T! SINGULAR MATRIX

You selected independent variables for a multiple regression that either exhibit a high degree of collinearity or have very different scales.

When the independent variables are highly correlated, it is mathematically impossible to perform a regression. If two variables are simple multiples of each other, they are perfectly correlated. You should be careful in creating regression variables using the XFORM function.

CAN'T! WRITE PROTECTED

You attempted to save some series in a file on a write-protected diskette. Either replace the data diskette with one that is not write-protected or remove the protection tab from the diskette. Before removing the tab, you should determine why the diskette was write-protected.

DATA OFF SCALE, CHOOSE ACTION

You rescaled the chart and, in the new scale, some data points fall outside the specified scale. CANCEL cancels the entire plot operation. PROCEED causes a partial plot to be drawn. Each time an off-scale value is encountered, the beep sounds. If the chart is a Bar chart, the plot is cancelled when the first off-scale data point in encountered.

When overlays are involved, REDRAW is a third choice of action. REDRAW causes the chart to be redrawn using a new Y-axis. However, interim overlays and all titles and legends are lost from the redrawn chart.

DISKETTE ALREADY INITIALIZED

You selected the FORMAT item, and the diskette in the data disk drive is already initialized. If you continue, the data currently on the diskette will be erased. Press the ESC key to cancel; press Y to continue the Format operation.

SUPPORTED GRAPHICS PRINTERS

OVERVIEW

The VisiTrend/Plot program works with a variety of graphics printers. This appendix contains a list of the printers supported by the program, and describes any required printer options and switch settings. If your printer is currently operating properly with other programs, you probably will not need to change printer switch settings and options. You may only need to select the appropriate driver for your printer from those included on the program diskette. If you are installing a new printer, you should expect to receive assistance from your dealer.

The following graphics printers are supported by the VisiTrend/Plot program:

- Apple Silentype™
- Apple Daisy Wheel™
- Apple Dot Matrix™
- Centronics 739®
- Epson MX-80™ with GRAFTRAX 80™ option or GRAFTRAX-PLUS™ option installed
- Epson MX-100™
- IDS Paper Tiger™ models 440G and 445G
- IDS Paper Tiger™ models 460G and 560G with Dot Plot™ option installed
- IDS Prism™ models 80 and 132
- NEC PC-8023A-C Dot Matrix™
- NEC Spinwriter™ models 3530, 5510, 5520, 5530, 7710, 7720, and 7730
- Qume Sprint® models 5/45, 9/45, and 11/40 PLUS
- Trendcom 200G®

Your printer requires a specific software routine, called a driver, to correctly print your textual or graphic screen images. Drivers are located on the VisiTrend/Plot program diskette, and permit the various listed printers to operate with the VisiTrend/Plot program. The names of the drivers that support each printer are listed in Table B-1.

Your VisiTrend/Plot program diskette is already set up to print on the Apple Silentype™ printer. You do not need to make any printer changes, or select a driver if your printer is an Apple Silentype.

If you have one of the other listed graphics printers connected to your computer, you'll need to change drivers before you can print. See "Changing the Printer Driver" following Table B-1.

INTERFACE CARDS AND DRIVERS

The VisiTrend/Plot program operates correctly in serial mode with the Apple II Serial Interface card, the Apple II Communications Interface card, and the Apple II Super Serial Interface card. Operating the program with any other serial or communications interface card may produce incorrect results or cause the program to stop processing altogether.

The Silentype and Trendcom 200G printers work only with their own special interface cards provided with the printer.

One important point should be noted about parallel driver programs: with two exceptions, the parallel drivers operate only with the Apple II Parallel Interface card. The exceptions are the Epson MX-80 and MX-100 printers, which operate only with the Epson MX Apple II Interface card.

The Epson MX-80 and MX-100 drivers support high-density graphics. In high-density mode, twice as many dots are printed per inch as in normal density.

Table B-1 lists the drivers for the various configurations of listed graphics printers.

Table B-1. Drivers for the Supported Printers

Printer	Description of Driver
Apple Silentype	Silentype Interface; single width
	Silentype Interface; double width
Apple Daisy Wheel	Apple II Serial Interface *; double width
	Apple II Super Serial Interface; double width
Apple Dot Matrix	Apple II Parallel Interface; double width
Centronics 739	Apple II Parallel Interface; double width
Epson MX-80	Epson Parallel Interface; double width
Epson MX-100	Epson Parallel Interface; double width
IDS Paper Tiger 440G and 445G	Apple II Serial Interface *; single width
	Apple II Parallel Interface; single width
	Apple II Super Serial Interface; single width
IDS Paper Tiger 460G and 560G and IDS Prism 80 and 132	Apple II Parallel Interface; double width
	Apple II Serial Interface*; double width
	Apple II Super Serial Interface; double width
NEC PC-8023A-C Dot Matrix	Apple II Parallel Interface: double width
NEC Spinwriter 5510, 5520 7710, and 7720	Apple II Serial Inteface*; double width
	Apple II Super Serial Interface; double width
NEC Spinwriter 3530, 5530, and 7730	Apple II Parallel Interface; double width
Qume Sprint 5/45, 9/45, and 11/40 PLUS	Apple II Serial Interface *; double width
	Apple II Super Serial Interface; double width
Trendcom 200G	Trendcom Interface; double width
Other printers	Apple II Serial Interface *
	Apple II Parallel Interface
	Apple II Super Serial Interface

*If you are using an Apple II Communications Interface card with your printer, you may use the Apple II Serial Interface drivers.

CHANGING THE PRINTER DRIVER

The Print Menu in the Plot subprogram contains two items that allow you to change both the printer driver and the printer slot: DEFAULT and DRIVER. With either item, the change is made by selecting a different driver and slot from a displayed list.

Automatic line feeds are software functions, not hardware options; you need no extra equipment to use them. If the line-spacing is wrong on your printouts, you can change the line feed specification. Both the DEFAULT and the DRIVER items allow you to do this.

If you use DEFAULT, your new selections remain in effect throughout the current VisiTrend/Plot program session and all subsequent VisiTrend/Plot program sessions. If you use DRIVER, your new selections remain in effect during the current session only. You can change selections at any time by using DEFAULT or DRIVER again.

Follow the steps below:

1. Display the Plot menu, and select PRINT.
2. When the Print menu appears, select either DEFAULT or DRIVER. The program next displays a list of printers with their specifications.
3. The status area displays the current printer driver and interface card slot number, and notes whether automatic line feeds are in effect. You are prompted to move the cursor, or press RETURN.
4. Use the arrow keys to position the cursor on the name of the correct printer driver, then press RETURN.
5. If the driver you want is not displayed, move the cursor to [MORE], and press RETURN. An additional list of drivers appears. Use Table B-1 to match a driver with your printer.
6. The list of drivers disappears, and you are prompted to choose whether or not you want automatic line feeds. If your printing has been double-spaced and you want single spacing, select NO. If lines have been printed on top of one another, or if you want your output to be double-spaced, select YES.
7. Finally, you are prompted for the slot number in which the printer interface card currently resides. Type the correct number, and press RETURN. The program returns to the Print menu. You can then position the printer paper, and select PRINT to continue a printing operation.

    Always position the paper before you request the printing of listings or charts. No automatic form feeds or top of form are built into the VisiTrend/Plot program.

PRINTER SETUP AND SWITCH SETTINGS

The following sections describe the preparation of the listed graphics printers and interface cards. These sections are intended only as an aid in preparing the printers and interface cards for use with the VisiTrend/Plot program. They are not complete directions on setting up the printers. For that information, see the documentation that the manufacturer ships with the printer and/or interface card, or contact your dealer.

You must turn your printer off before setting switches.

Only those switch settings that are necessary to print graphics are listed. Other switches may be dependent upon your configuration, or are meaningless in this application. Therefore, no switch position is suggested.

Note that there may be as many as three different sets of switches involved with a specific printer/interface card setup. The printer may have internal and/or external switches, and there may be switches on the interface card in your computer. Make sure you are setting the correct switches.

APPLE SILENTYPE

No setup is required. No change of driver is necessary.

APPLE DAISY WHEEL

The Apple Daisy Wheel printer operates with the Apple II Serial Interface card, The Apple II Communications card, or the Apple II Super Serial Interface card. Set up the switches for your printer and interface card according to the directions on the *Apple Computer Daisy Wheel Printer Reference Card* that accompanied your printer.

APPLE DOT MATRIX

The Apple Dot Matrix printer operates only with the Apple II Parallel Interface card. Set up the switches for your printer and interface card according to the directions on the *Apple Computer Dot Matrix Printer Reference Card* that accompanied your printer.

CENTRONICS 739

The Centronics 739 only operates with the Apple Parallel Interface card. There are only two switches on the printer and their settings are shown in Table B-2.

Table B-2. External Switch Settings for the Centronics 739 Printer

Switch	Setting
On-line/Off-line	On-line
Power	On

EPSON MX-80 WITH GRAFTRAX 80 or GRAFTRAX-PLUS OPTION

The Epson MX-80 operates only with the Epson MX Apple II parallel interface card.

The printer contains internal DIP switches which must be set correctly for it to print graphics. The DIP switches are located near the back of the main circuit board. See your *MX-80 User's Manual* and the GRAFTRAX-80 or GRAFTRAX-PLUS supplement for complete details. Table B-3 lists the switch settings that must be checked and set, if necessary. Switches that are not listed can be set as your system or configuration requires. The Epson parallel interface card has no switches. The printer must be on-line. There are no other external switches to set.

Table B-3. Epson MX-80 Printer Internal DIP Switch Settings

Dip	Switch	Setting
DIPS1	SW2	On (CR = print)
	SW3	On (Buffer full = print)

EPSON MX-100

The Epson MX-100 operates only with the Epson MX Apple II parallel interface card.

The printer must be on-line, otherwise there are no internal or external switches to set.

IDS PAPER TIGER 440G, 445G, 460G, 560G and IDS Prism 80 and 132

The IDS Paper Tiger printers operate with either a serial or parallel interface. You must have the Dot Plot graphics option on the model 440 and 445 to print charts. The Dot Plot graphics option is denoted by a G in the model number, i.e. 460G. Without the Dot Plot graphics option, you can print only listings, not charts.

Note that even though the IDS Prism printers are color printers, the printer drivers listed support only black-and-white output.

Under some circumstances, IDS printers may begin to print continuously when the power is turned on. To avoid this, you must load the DOS System Master diskette, and enter the commands:

PR#1

PR#0

before turning on the printer. Then turn on the printer, insert the VisiTrend/Plot program diskette, and type the command RUN HELLO.

Serial Operation

The baud rate limit is 1200 with the Apple II Serial Interface card, and 9600 with the Apple II Super Serial Interface card.

With an unmodified Apple II Communications Interface card, the baud rate is 300. During printing, the data may also appear on the screen. When printing is completed, the screen image returns to normal.

Table B-4 lists the DIP switch settings that should be used with the Paper Tiger models 440G and 445G. Table B-5 lists the switch settings for the Paper Tiger models 460G and 560G, and the Prism models 80 and 132.

**Table B-4. Paper Tiger Models 440G and 445G Printer Internal
Switch Settings Used With Apple II Serial Interface Card**

Dip	Switch	Option	Switch Setting
DIPS3	SW6	Graphics Print Capability Enable	On (Switch is meaningless for printers without the graphics option)
DIPS4	SW5	Auto-linefeed	Off
	SW6	Remote Printer Control Deselect	Off

**Table B-5. Paper Tiger Models 480G and 560G, and
Prism Models 80 and 132 Printer Internal Switch
Settings Used With Apple II Serial Interface Card**

Dip	Switch	Option	Switch Setting
DIPS4	SW4	Automatic Boundary	User Choice (CAUTION: If On, make sure there are enough lines on the current page for the graph before printing, otherwise the 1-inch skip will occur within the chart.)
	SW5	Auto-linefeed	Off
	SW7	Expanded Function	Must be On

The switches on the Apple II Serial Interface card should be set as shown in Table B-6.

Table B-6. Apple II Serial Interface Card Switch Settings

Switch	Option	Switch Setting
SW5,6	Paper Size	User Choice (If set to On/On, printing occurs simultaneously on the screen and printer)

With the Apple II Super Serial card, the printer and interface card should be set up as suggested in the *Apple II Super Serial Card Installation and Operating Manual* for printer mode. Be sure that the baud rates on the printer and interface cards are the same, and that the jumper block is pointing toward TERMINAL. Table B-7 lists the switch settings for the Apple II Super Serial Interface card.

Table B-7. Apple II Super Serial Interface Card Switch Settings

Dip	Switch	Option	Switch Setting
DIPS1	SW5,6	Mode	Off/on for printer mode
DIPS2	SW3,4	Line width and video	Off/off for 132 char/line and video off

Parallel Operation

With the Apple II Parallel Interface card, use the printer DIP switch settings shown in Table B-8 for the Paper Tiger models 440G and 445G, and the switch settings in Table B-9 for the Paper Tiger models 460G, 560G, and Prism 80 and 132.

Table B-8. Paper Tiger Model 440G and 445G Printer Internal Switch Settings Used With an Apple II Parallel Interface Card

Dip	Switch	Option	Switch Setting
DIPS3	SW6	Graphics Print Capability Enable	On (Switch is meaningless for printers without the graphics option)
DIPS4	SW5	Auto-linefeed	Off
	SW6	Remote Printer Control Deselect	Off

**Table B-9. Paper Tiger Models 460G, 560G and
Prism models 80 and 132 Printers Internal Switch Settings Used
with Apple II Parallel Interface Card**

Dip	Switch	Option	Switch Setting
DIPS4	SW4	Automatic Boundary	User Choice (CAUTION: If On, make sure there are enough lines on the current page for the graph before printing, otherwise the 1-inch skip will occur within the chart.)
	SW5	Auto-linefeed	Off
	SW7	Expanded Function	Must be On

NEC PC-8023A-C DOT MATRIX

The NEC PC-8023A-C Dot Matrix printer operates only with the Apple II Parallel Interface card. Set up the switches for your printer and interface card according to the directions in the *PC-8023A-C Dot Matrix Printer User's Manual for Apple Users* that accompanied your printer.

NEC SPINWRITER 5510, 5520, 7710, and 7720

The VisiTrend/Plot program supports the serial interface NEC Spinwriters with the NEC-compatible graphics option. Models 5510, 5520, 7710, and 7720 operate with the Apple II Serial Interface card, the Apple II Communications card, or the Apple II Super Serial Interface card.

If your Apple II Serial Interface card has the P8 PROM, the serial operation speed cannot exceed 300 baud. If the P8A PROM is installed, the speed cannot exceed 1200 baud.

For operation with the Apple II Communications Interface card, the baud rate is 300 for an unmodified card. During printing, the data may also appear on the screen. When printing is completed, the screen image returns to normal.

For operation with the Apple II Super Serial Interface card, the baud rate limit is 1200.

The Spinwriter may beep and not start printing when you first attempt to print after the Apple II is powered on. To clear this, press the RETURN key on the keyboard.

The switches on your Spinwriter should be set as shown in Table B-10.

Table B-10. NEC Spinwriter 5510, 5520, 7710, and 7720 Printer External Switch Settings

Model	Dip	Switch	Setting
5510 and 5520	N/A	Local LF	Off
		LF	6
		SP	10
		Remote/Local	Remote (if switch is present)
7710 and 7720	DIPS1	SW6 and SW7	Off – buffer length 163 characters
	DIPS2	SW6	Off – normal operation
	DIPS3	SW1	Off – normal operation
		SW2	Off – constant spacing
		SW3	Off – 6 lines per inch
		SW4	Off – single line spacing

The switches on the Apple II Serial Interface card should be set as shown in Table B-11.

Table B-11. Apple II Serial Interface Card Settings

Switch	Option	Switch Setting
SW5,6	Paper Size	User Choice (Must not be set to On/On)

With the Apple II Super Serial card, the printer and interface card should be set up as suggested in the *Apple II Super Serial Card Installation and Operating Manual* for printer mode. Be sure that the baud rates on the printer and interface cards are the same, and that the jumper block is pointing toward TERMINAL. Table B-12 lists the switch settings for the Apple II Super Serial Interface card.

Table B-12. Apple II Super Serial Interface Card Switch Settings

Dip	Switch	Option	Switch Setting
DIPS1	SW5,6	Mode	Off/on for printer mode
DIPS2	SW3,4	Line width and video	Off/off for 132 char/line and video off

NEC SPINWRITER 3530, 5530, and 7730

The program supports the parallel interface NEC Spinwriters. All models operate only with the Apple II Parallel Interface card.

To prepare any model, you must check, and if necessary set, DIP switches located on the circuit boards inside the printer. If you need help taking the printer apart contact the NEC Information Systems Regional Office or your local field service representative. See the NEC documentation for the address and phone number.

The DIP switches and their use are described in Appendix A of the *Spinwriter Model 5530 Product Description* which comes with the printer. Table B-13 lists the necessary switch settings for the G9BNA board (furthest back) and Table B-14 lists the settings for the G9BNB board (next to the G9BNA board).

Refer to the appropriate appendixes in the Product Description document for other models.

Table B-13. NEC Spinwriter Model 5530 Board G9BNA Internal DIP Switch Settings

Switch	Option	Setting
SW5	Auto Return Invalid	On

Table B-14. NEC Spinwriter Model 5530 Board G9BNB Internal DIP Switch Settings

Dip	Switch	Option	Setting
DIPS1	SW5	Test Printing	Off
	SW6	Local/Remote	On (remote) This switch must be Off if the 5530 has a front panel
	SW7	Line Feed Pitch	Off (6 lines per inch)
	SW8	Line Spacing	Off (single spacing)
DIPS3	SW2	Local Line Feed	Off
	SW5	Auto Return	Off (auto return off)
	SW6	Spacing Pitch	Off (10 characters per inch)

Table B-15 lists the front panel switch settings for the Models 3530, 5530, and 7730.

Table B-15. Spinwriter Models 3530, 5530, and 7730 Front Panel Switch Settings

Model	Dip	Switch	Setting
3530	DIPS2	SW1	Off – 6 lines per inch
		SW2 and SW3	Off – 10 char. per inch
		SW4	Off – constant spacing
	DIPS3	SW2	Off – single line feed
		SW3	Off – normal operation
5530	N/A	Test	Off
		LPI (lines per inch)	Must be 6
		Single/Double	Must be Single
		Remote/Local	Must be Remote
7730	DIPS1	SW6 and SW7	Off – buffer length 163 characters
	DIPS2	SW6	Off – normal operation
	DIPS3	SW1	Off – normal operation
		SW2	Off – constant spacing
		SW3	Off – 6 lines per inch
		SW4	Off – single line spacing

QUME SPRINT 5/45, 9/45, and 11/40 PLUS

The VisiTrend/Plot program supports the Qume Sprint models 5/45, 9/45, and 11/40 PLUS with the Apple II Serial Interface card, the Apple II Communications Interface card, and the Apple II Super Serial Interface card.

If your serial interface card has the P8 PROM, the maximum baud rate is 300. With the P8A PROM the maximum baud rate is 1200.

For operation with an unmodified Apple II Communications Interface card, the maximum baud rate is 300. During printing the data may also appear on the screen. When printing is completed, the screen image returns to normal.

For operation with the Apple II Super Serial Interface card, the maximum baud rate is 9600 for models that support that baud rate, and 1200 baud for models that do not support 9600 baud.

Table B-16 lists the printer switch settings for the model 5/45. Refer to your printer manual for the settings for models 9/45 and 11/40 PLUS. Table B-17 lists the Apple II Serial Interface card switch settings for all three models.

Table B-16. Qume Sprint Model 5/45 Printer External Switch Settings

Switch	Setting
Auto LF	Off
Char. Spacing	Must be 10

Table B-17. Apple II Serial Interface Card Switch Settings When Used With the Qume Sprint 5/45, 9/45, and 11/40 PLUS Printer

Switch	Option	Switch Setting
SW5,6	Paper Size	User choice (Must not be set to On/On)

With the Apple II Super Serial card, the printer and interface card should be set up as suggested in the *Apple II Super Serial Card Installation and Operating Manual* for printer mode. Be sure that the baud rates on the printer and interface cards are the same, and that the jumper block is pointing toward TERMINAL. Table B-18 lists the switch settings for the Apple II Super Serial Interface card.

Table B-18. Apple II Super Serial Interface Card Switch Settings

Dip	Switch	Option	Switch Setting
DIPS1	SW5,6	Mode	Off/on for printer mode
DIPS2	SW3,4	Line width and video	Off/off for 132 char/line and video off

TRENDCOM 200G

No setup is required. Use the printer driver that matches your configuration.

THE VISITREND/PLOT™ INTERNAL DATA FORMAT

VisiTrend/Plot data series can be stored in either of two formats: the VisiTrend/Plot data format and the DIF format. Data is stored in the VisiTrend/Plot data format when you select NORMAL from the SAVE format menu. It is stored in the DIF format when you select DIF. Data in the DIF format can be used by other VisiCorp programs.

The VisiTrend/Plot data format is described in this appendix. The DIF format is described in Appendix D.

A VisiTrend/Plot data file is a sequential text file which is described in **The DOS Manual**, Apple number A2L0036. The fields are variable length and each field is terminated with a RETURN. The following list contains a description of the contents and, in parentheses, the limitations on and expected contents of the fields.

The fields of a data file are:

Number of series (1-16)

Series name (string — up to 14 characters)

Number of data points (1-150)

Periodicity (1-99)

Start year (0-2500)

Start period (1-periodicity)

End year (1-2649)   (must be consistent with

End period (1-periodicity)   the start year and period,

Data point 1   the periodicity, and number

Data point 2   of points)

.

.

.

Data point n

The following is the listing of a sample file containing two series, named FIRST and SECOND. FIRST has a period of 1 and contains five data points beginning at date 1. The values of the data points are 100, 200, 300, 400, and 500. SECOND has a period 1 and contains three data points beginning at date 1980. The values of the data points are 1111, 2222, and 3333.

2	Number of series in file
FIRST	Series name
5	Number of data points
1	Periodicity
1	Start year
1	Start period
5	End year
1	End period first series
100	
200	
300	Data points
400	
500	
SECOND	
3	
1	
1980	
1	Second series
1982	
1	
1111	
2222	
3333	

EXCHANGING FILES

> **NOTE:** the technical information in this appendix is for
> VisiTrend/Plot users who are programmers and who wish to in-
> clude or manipulate DIF-formatted data in their own programs.
>
> Non-programmers who need to exchange DIF files between the
> VisiTrend/Plot program and other products such as the
> VisiCalc program, normally do not require the level of detail
> presented in this appendix. The end of Lesson Two demon-
> strates two examples of how to transfer a DIF file between the
> VisiCalc and VisiTrend/Plot programs.

The DIF™ format is a standard file format that allows unrelated programs
to share data. A file saved in the DIF format is a text file that can be read
by other DIF-supporting programs. Thus, a data series created by the
VisiTrend/Plot program can be saved in the DIF format and read by other
programs that support DIF.

This appendix describes the file format and lists three sample programs
in Applesoft BASIC that retrieve and save DIF files.

THE DIF FORMAT

The DIF format stores data in a form accessible to programs other than
the VisiTrend/Plot program. To accommodate a wide range of languages
in which such a program might be written, several simplifying techniques
have been used:

- Information about the size of the file is provided at the beginning.
- Records are kept as short as possible.
- The data type (string or number) of each value is explicitly defined.
- Strings are stored one per line.
- Strings that contain special characters are enclosed in quotation
  marks.
- The file ends with an explicit End-Of-Data record.

Figure D-1 shows a sample data series created in the VisiTrend/Plot program. Before this data series could be used by another program, such as VisiCalc, it would have to be saved in a DIF file in the VisiTrend/Plot program.

Date	XYZ Fund	
1980 1	227.16	
2	272.73	
3	317.71	
4	329.13	
5	378.24	
6	345.06	
1981 1	428.38	
2	496.02	
3	443.15	
4	485.82	
5	489.03	
6	503.32	012-014

Figure D-1. Sample VisiTrend/Plot Data Series

The DIF format stores the data in a series of slices; it can be sliced either horizontally (by rows) or vertically (by columns). Each of these slices is called a tuple; each slice along the other axis is called a vector. In the sample data series in Figure D-1, the row formed by 80, 1, and 277.16 is a tuple; the column beginning with 1 is a vector; and the row of values beginning with 277.16 is another vector.

A DIF file consists of a series of header records that describe the file, followed by one set of data records for each tuple, and ends with a pair of End-Of-Data records. When the data series shown in Figure D-1 is saved in the DIF format, it would be laid out as shown in the following three diagrams.

HEADER

The header consists of four sets of three records that give information about the entire file:

TABLE
0, 1
TUPLE.DIF
VECTORS
0, 1
" "
TUPLES
0, 12
" "
LABEL
1, 1
TUPLE
PERIODICITY
1, 6
6
MAJORSTART
1, 1980
1980
MINORSTART
1, 1
1
TRUELENGTH
1, 12
12
DATA
0, 0
" "

DATA RECORDS

The data records consist of a pair of header records that identify the beginning of a tuple, and a pair of records for each value in the tuple:

−1, 0
BOT
0, 277.16
V
−1, 0
BOT
0, 317.71
V
1, 0
BOT
0, 329.13
V
1, 0
BOT
0,503.32
V

END-OF-DATA RECORDS

The End-Of-Data records mark the end of the file:

```
| -1,0 |
|------|
| EOD  |
```

WORKING WITH DIF FILES

The following three programs demonstrate how BASIC programs might be written and used with the DIF format. They perform the following functions:

• Dump a DIF file just as it is stored, record by record.

• Print a DIF file that contains a data series.

• Create a DIF file by prompting for the file entries.

DUMPING A DIF FILE

This program prints the DIF file just as it is stored, record by record. It asks for the name of the file, and whether to print it. If not instructed to print the file, the program displays the file on the screen:

```
100 ' ************************
110 ' *    INITIALIZATION    *
120 ' ************************
130 NUL$ = CHR$(34) + CHR$(34)
140 FALSE = 0
150 TRUE = -1
440 '
450 '
460 ' ************************
470 ' *     MAIN ROUTINE     *
480 ' ************************
490 '
500 GOSUB 1000'                          * PROMPT FOR ORDERS
510 GOSUB 1200                           * PRINT HEADER
520 GOSUB 1400'                          * PRINT DATA RECORDS
530 GOSUB 1600'                          * END-OF-PROGRAM CLEANUP
540 END
940 '
950 '
960 ' ************************
970 ' * PROMPT FOR ORDERS    *
980 ' ************************
990 '
1000 CLS
1010 INPUT "File name: ",FILENAME$
1020 IF RIGHT$(FILENAME$,4) <> ".DIF" THEN FILENAME$ = FILENAME$ + ".DIF"
1030 INPUT "Print the file (Y or N): ",REPLY$
1040 IF REPLY$ = "Y" OR REPLY$ = "y" THEN HARDCOPY = TRUE
1050 OPEN FILENAME$ FOR INPUT AS #1
1060 IF NOT HARDCOPY THEN CLS
1070 IF HARDCOPY THEN LPRINT FILENAME$: LPRINT " ":LPRINT ELSE PRINT FILENAME$:P
RINT:PRINT
```

```
1080 RETURN
1140 '
1150 '
1160 ' **********************
1170 ' *     PRINT HEADER    *
1180 ' **********************
1190 '
1200 INPUT #1, TITLE$
1210 INPUT #1, TYPE, NUMBER
1220 INPUT #1, STRNG$
1230 IF HARDCOPY THEN LPRINT TITLE$:LPRINT TYPE; ","; NUMBER ELSE PRINT TITLE$:P
RINT TYPE; ","; NUMBER
1240 IF STRNG$ = "" THEN IF HARDCOPY THEN LPRINT NUL$ ELSE PRINT NUL$ ELSE IF HA
RDCOPY THEN LPRINT STRNG$ ELSE PRINT STRNG$
1250 IF TITLE$ <> "DATA" THEN 1200
1260 IF NOT HARDCOPY THEN GOSUB 2000
1270 RETURN
1340 '
1350 '
1360 ' **********************
1370 ' * PRINT DATA RECORDS *
1380 ' **********************
1390 '
1400 INPUT #1, TYPE, NUMBER
1410 INPUT #1, STRNG$
1420 IF CSRLIN > 20 AND NOT HARDCOPY THEN GOSUB 2000
1430 IF HARDCOPY THEN LPRINT TYPE; ","; NUMBER: LPRINT STRNG$ ELSE PRINT TYPE; "
,"; NUMBER: PRINT STRNG$
1440 IF STRNG$ <> "EOD" THEN 1400
1450 RETURN
1530 '
1540 '
1550 ' **********************
1560 ' *    END-OF-PROGRAM   *
1570 ' *    CLEANUP          *
1580 ' **********************
1590 '
1600 CLOSE 1
1610 RETURN
1920 '
1930 '
1940 ' **********************
1950 ' *          PRINT      *
1960 ' * "RETURN FOR MORE"   *
1970 ' * MESSAGE AT BOTTOM   *
1980 ' **********************
1990 '
2000 LOCATE 24,1
2010 PRINT "RETURN for more";
2020 REPLY$ = INPUT$(1)'              * WAIT UNTIL ANY KEY IS PRESSED
2030 CLS
2040 RETURN
```

PRINTING A DATA FILE FROM A DIF FILE

The following program prints the data series exactly the way it looks in the DIF format. It asks for the name of the file in which the data series was saved in the DIF format, the width of columns to be printed, and whether the data series was saved by rows or by columns:

```
60  ' ***********************
70  ' *   INITIALIZATION   *
80  ' ***********************
90  '
100 DIM WORKSHEET(50,50)
110 FALSE = 0
120 TRUE = -1
130 BYROWS = FALSE
440 '
450 '
460 ' ***********************
470 ' *    MAIN ROUTINE    *
480 ' ***********************
490 '
500 GOSUB 1000'                    * PROMPT FOR ORDERS
510 GOSUB 1200'                    * READ HEADER
520 GOSUB 1400'                    * READ DATA RECORDS
530 IF NOT FILEBAD THEN GOSUB 1600'    * PRINT THE WORKSHEET
540 GOSUB 1800'                    * END-OF-PROGRAM CLEANUP
550 END
940 '
950 '
960 ' ***********************
970 ' * PROMPT FOR ORDERS  *
980 ' ***********************
990 '
1000 CLS
1010 INPUT "File name: ", FILENAME$
1020 IF RIGHT$(FILENAME$,4) <> ".DIF" THEN FILENAME$ = FILENAME$ + ".DIF"
1030 INPUT "Column width: ",COLUMNWIDTH
1040 INPUT "Saved by row or column (R or C): ",REPLY$
1050 IF REPLY$ = "R" OR REPLY$ = "r" THEN BYROWS = TRUE
1060 INPUT "Print the worksheet (Y or N): ",REPLY$
1070 IF REPLY$ = "Y" OR REPLY$ = "y" THEN HARDCOPY = TRUE
1080 OPEN FILENAME$ FOR INPUT AS #1
1090 RETURN
1140 '
1150 '
1160 ' ***********************
1170 ' *     READ HEADER    *
1180 ' ***********************
1190 '
1200 INPUT #1, TITLE$
1210 INPUT #1, TYPE, NUMBER
1220 INPUT #1, STRNG$
1230 IF TITLE$ = "VECTORS" THEN VECTORS = NUMBER
1240 IF TITLE$ = "TUPLES" THEN TUPLES = NUMBER
1250 IF TITLE$ = "DATA" THEN RETURN
1260 GOTO 1200
1340 '
1350 '
1360 ' ***********************
1370 ' * READ DATA RECORDS  *
1380 ' ***********************
1390 '
1400 FOR ROW = 1 TO TUPLES
1410     INPUT #1, TYPE, NUMBER
1420     INPUT #1, STRNG$
```

```
1430      IF TYPE <> -1 OR STRNG$ <> "BOT" THEN
             GOSUB 2000:
             RETURN
1440     FOR COL = 1 TO VECTORS
1450         INPUT #1, TYPE, NUMBER
1460         INPUT #1, STRNG$
1470         IF TYPE <> 0 AND TYPE <> 1 THEN
                GOSUB 2000: RETURN
1480         IF BYROWS THEN IF TYPE = 0 THEN WORKSHEET$(COL,ROW) = STR$(NUMBER)
ELSE WORKSHEET$(COL,ROW) = STRNG$ ELSE IF TYPE = 0 THEN WORKSHEET$(ROW,COL) = ST
R$(NUMBER) ELSE WORKSHEET$(ROW,COL) = STRNG$
1490        NEXT COL
1500     NEXT ROW
1510 RETURN
1540 '
1550 '
1560 ' **********************
1570 ' * PRINT THE WORKSHEET*
1580 ' **********************
1590 '
1600 IF BYROWS THEN WDTH = TUPLES: DEPTH = VECTORS ELSE WDTH = VECTORS: DEPTH =
TUPLES
1610 FOR ROW = 1 TO DEPTH
1620     FOR COL = 1 TO WDTH
1630         IF HARDCOPY THEN LPRINT WORKSHEET$(ROW,COL); TAB(COL*COLUMNWIDTH);
ELSE PRINT WORKSHEET$(ROW,COL); TAB(COL*COLUMNWIDTH);
1640        NEXT COL
1650     IF HARDCOPY THEN LPRINT " " ELSE PRINT
1660     NEXT ROW
1670 RETURN
1730 '
1740 '
1750 ' **********************
1760 ' *    END-OF-PROGRAM   *
1770 ' *     CLEANUP          *
1780 ' **********************
1790 '
1800 CLOSE 1
1810 RETURN
1940 '
1950 '
1960 ' **********************
1970 ' *    ERROR IN FILE    *
1980 ' **********************
1990 '
2000 PRINT
2010 BEEP: PRINT "ERROR IN FILE . . . "
2020 PRINT TAB(5); "TYPE ="; TYPE
2030 PRINT TAB(5); "NUMBER ="; NUMBER
2040 PRINT TAB(5); "STRING = "; STRNG$
2050 FILEBAD = TRUE
2060 RETURN
```

CREATING A DIF FILE OUTSIDE OF THE VISITREND/PLOT PROGRAM

The following program prompts for VisiCalc worksheet entries (by row-column coordinate), then writes the entries on a disk in a DIF file. Either a string or number (integer or real) can be entered. To enter a label that starts with a number, type a quotation mark (") as the first character of the label. To end a row, type ESC then press RETURN; to end the worksheet, type ESC then press RETURN.

The program assumes the coordinate of the lower-right corner of the worksheet is the row-column coordinate of the location immediately to the left of the coordinate where ESC-ESC is typed, so the last row should be at least as wide as all preceding rows. The worksheet is saved by rows:

```
60 ' ***********************
70 ' *    INITIALIZATION    *
80 ' ***********************
90 '
100 ESC$ = CHR$(27)
110 LASTINROW$ = ESC$
120 LASTONSHEET$ = ESC$ + ESC$
130 QUOTE$ = CHR$(34)
140 NUL$ = QUOTE$ + QUOTE$
150 CLSCREEN$ = CHR$(12)
160 ROW = 1
170 COL = 1
180 FALSE = 0
190 TRUE = -1
200 DIM WORKSHEET$(50,50)
440 '
450 '
460 ' ***********************
470 ' *     MAIN ROUTINE    *
480 ' ***********************
490 '
500 GOSUB 1000'                  * PROMPT FOR ORDERS
510 GOSUB 1200'                  * PROMPT FOR ENTRIES
520 GOSUB 1400'                  * WRITE FILE
530 GOSUB 2000'                  * END-OF-PROGRAM CLEANUP
540 END
940 '
950 '
960 ' ***********************
970 ' * PROMPT FOR ORDERS   *
980 ' ***********************
990 '
1000 PRINT CLSCREEN$
1010 INPUT "Write the file (Y or N): ",REPLY$
1020 IF REPLY$ = "Y" OR REPLY$ = "y" THEN DISKCOPY = TRUE
1030 IF DISKCOPY
        THEN INPUT "File name: ",FILENAME$:
             IF RIGHT$(FILENAME$,4) <> ".DIF" THEN FILENAME$ = FILENAME$ + ".DIF
"
1040 RETURN
1140 '
1150 '
1160 ' ***********************
1170 ' * PROMPT FOR ENTRIES *
1180 ' ***********************
1190 '
1200 PRINT CLSCREEN$
1210 WORKSHEET$(ROW,COL) = ""
1220 PRINT "Row"; ROW; ", Column ";CHR$(64+COL); ": ";
1230 REPLY$ = INPUT$(1)
```

```
1232 IF REPLY$ = CHR$(8) THEN IF LEN(WORKSHEET$(ROW,COL)) > O THEN PRINT CHR$(29
);" ";CHR$(29);:WORKSHEET$(ROW,COL) = LEFT$(WORKSHEET$(ROW,COL),LEN(WORKSHEET$(R
OW,COL))-1):GOTO 1230:ELSE GOTO 1230
1240 IF REPLY$ <> CHR$(13)
     THEN PRINT REPLY$;: WORKSHEET$(ROW,COL) = WORKSHEET$(ROW,COL) + REPLY$:
GOTO 1230
1250 PRINT
1260 IF WORKSHEET$(ROW,COL) = LASTONSHEET$
     THEN WDTH = COL - 1: DEPTH = ROW: RETURN
1270 IF WORKSHEET$(ROW,COL) = LASTINROW$
     THEN ROW = ROW + 1: COL = 1: PRINT:GOTO 1210
1280 COL = COL + 1
1290 GOTO 1210
1310 '
1320 '
1330 ' ***********************
1340 ' *    WRITE FILE       *
1350 ' ***********************
1360 '
1370 ' ----------------------
1380 '         HEADER
1390 ' ----------------------
1400 IF NOT DISKCOPY THEN RETURN
1404 OPEN "O", 1, FILENAME$
1410 PRINT #1, "TABLE"
1420 PRINT #1, O; ","; 1
1430 PRINT #1, NUL$
1440 PRINT #1, "VECTORS"
1450 PRINT #1, O; ","; DEPTH
1460 PRINT #1, NUL$
1470 PRINT #1, "TUPLES"
1480 PRINT #1, O; ","; WDTH
1490 PRINT #1, NUL$
1500 PRINT #1, "DATA"
1510 PRINT #1, O; ","; O
1520 PRINT #1, NUL$
1540 '
1550 ' ----------------------
1560 '      DATA RECORDS
1570 ' ----------------------
1580 FOR COL = 1 TO WDTH
1590     PRINT #1, -1; ","; O
1600     PRINT #1, "BOT"
1610     FOR ROW = 1 TO DEPTH
1620         IF VAL(WORKSHEET$(ROW,COL)) > O THEN
                 PRINT #1, O; ","; VAL(WORKSHEET$(ROW,COL)): PRINT #1, "V":GOTO 1
660
1630         IF LEFT$(WORKSHEET$(ROW,COL),1) = QUOTE$ THEN
                 WORKSHEET$(ROW,COL) = MID$(WORKSHEET$(ROW,COL),2)
1640         PRINT #1, 1; ","; O
1650         PRINT #1, QUOTE$; WORKSHEET$(ROW,COL); QUOTE$
1660         NEXT ROW
1670     NEXT COL
1680 '
1690 ' ----------------------
1700 '      END-OF-DATA
1710 ' ----------------------
1720 PRINT #1, -1; ","; O
1730 PRINT #1, "EOD"
1740 RETURN
1930 '
1940 '
1950 ' ***********************
1960 ' *   END-OF-PROGRAM    *
1970 ' *    CLEANUP          *
1980 ' ***********************
1990 '
2000 CLOSE 1
2010 RETURN
```

CONSIDERATIONS WHEN TRANSFERRING TO THE VISICALC PROGRAM

When transferring VisiTrend/Plot program data to the VisiCalc program, there are certain considerations you should observe in your VisiTrend/Plot data series.

- The VisiCalc program uses a matrix of 63 rows by 252 columns.
- A data series DIF file that exceeds 63 time units must be read into the VisiCalc program by columns.
- A file that contains more than 252 time units exceeds the VisiCalc capability.

GLOSSARY

This manual uses some terms that might be new to you or that you currently use in a different way. This glossary will help you to get acquainted with the precise meaning of these important terms.

Argument: The value(s) that a function needs to calculate its own value. In the VisiTrend/Plot program you can use series as arguments to functions.

Boot: The process of loading and starting up a computer program.

Chart: The output of the plotting program. The graphic representation of one or more data series.

Command or Option: An order given to the computer program. In the VisiTrend/Plot program, commands or options are issued by selecting a menu item.

Cursor: A white block on the screen used to point to items in menus and lists. The cursor is controlled with the two arrow keys and the space bar in menus and by just the two arrow keys in lists. When the cursor is pointing to an item, the item is displayed in dark letters against the white background.

Data Point: A numeric value that is associated with a major start date (year) or reference point, and a minor start (period). In most charts, the value is plotted against the Y-axis and the time against the X-axis. Data points, along their associated date or reference point, make up a series.

Date: A value indicating a year or point within a year. A date or reference point is associated with every data point.

Default: Responses or values that are already stored in the program. If you do not enter different values or responses, the program uses the built-in defaults when you begin a new session.

DIF™: Acronym for data interchange format, a data format that is readily transferable to other computers and different computer programs. The VisiTrend/Plot program uses DIF to exchange data with VisiCalc and other VisiSeries programs.

DOS: Disk Operating System. DOS 3.3 is an Apple II operating system that uses the capabilities of the disk drives together with the storage media from which they read and to which they write.

Exponential Smoothing: A forecasting technique to show trends in a data series by generating a new series giving preference to the current data and forecast.

File: A collection of data on a floppy diskette. A file can contain from 1 to 16 series but not more than 645 data points.

Function: The operation or processing the program does in response to a command or option.

Grid: Horizontal and vertical lines on a chart used as an aid in determining the value of a point or bars. In the VisiTrend/Plot charts, grid lines are series of small dots, light against a dark background and dark against a light background.

Intersection of the Range: The range of data points in two or more series that are common to all of the series.

Inverse Video: The display of black letters on a white background. The normal format in a display is white letters on a black background.

Least Squares: See Linear Multiple Regression.

Linear Multiple Regression: A method of developing an equation that relates a dependent variable, such as a company's sales, to one or more independent variables, such as inventory, economic indexes, competition, etc. The result is a means of explaining the dependent variable. Linear multiple regression in the VisiTrend/Plot program uses the ordinary least squares method. The method produces an equation consisting of a constant and independent coefficients that reproduce historical data with the smallest error, where error is the sum of the squares of the residuals (SSR).

List: A display that offers a collection of data items, one or more of which are selected with the cursor, the space bar, and the RETURN key.

Memory: The temporary storage area within your computer.

Menu: A display that offers two or more command choices or options. The items in a menu are selected with the cursor and the RETURN key. An item can also be selected by typing the first two letters of the item name.

Menu Item: A command choice or option that is offered in a menu. A menu item is selected with the cursor and the RETURN key, or by typing the first two characters of the item name.

GLOSSARY

Moving Average: An average taken over a specified number of points in a series. A series made up of moving averages may illustrate trends that are obscured by erratic peaks or valleys in the data.

Overlay: An option in the Plot subprogram that allows you to plot additional series on an existing chart. With overlays, you can mix chart types (except Pie and XY charts), plot multiple series on a single chart, and create comparison plots on a single chart.

Period or Periodicity: The frequency at which data points occur within a year. A period of 1 means the data is shown on a yearly basis. A period of 12 means the data is shown on a monthly basis.

Point: See Data Point.

Prompt: A message, in or just above the status area, that either describes your next action(s) in the program or explains the meaning of a command in a menu.

Range: The period of time covered by a series or the scope of the series. The range is the beginning date (and period) to the ending date (and period).

Reference Point: A value associated with a data point in a series. Either a reference point value or a date must be associated with every data point.

Scale: The scope of values normally covered by the Y-axis of a chart. A scale usually, but not always, covers the highest and lowest values in a series.

Series: A collection of data points in sequence, usually time. A series is the basic unit of data that the VisiTrend/Plot program uses in memory. A series has a name. Up to 16 series can be stored in a file on diskette. Memory can hold a maximum of 16 series or 645 data points.

Slot: A long narrow rectangular socket with the printed circuit edge connectors, intended to receive the plated "fingers" of a printed circuit board such as a printer or drive controller card. There are 8 slots in your Apple II computer, numbered from 0 to 7 on the right side.

Smoothing: A trending enhancement that performs an exponential computation on the source series. The smoothing computation is based on the most current data point and current forecast.

Time Series: See Series.

Union of the Range: The range of data points in two or mores series that begins with the earliest data point in all series and ends with the latest data point in all series.

X-Axis: The horizontal axis of a chart. VisiTrend/Plot plots the range of dates on the X-axis (except on XY charts).

Y-Axis: The vertical axis of a chart. VisiTrend/Plot plots the data point values on the Y-axis.

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