VisiTrend/Plot™

BUSINESS GRAPHICS WITH FORECASTING & STATISTICS

VisiCorp™

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VisiTrend/Plot™

BUSINESS GRAPHICS WITH FORECASTING & STATISTICS

User's Guide for the IBM® Personal Computer

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PREFACE

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

Chapter One is an introduction to the product. It describes its purposes and teaches many of the basic concepts required of a user.

Chapter Two is a tutorial. Each subprogram of the VisiTrend/Plot program is described with examples and illustrations. You are introduced keystroke-by-keystroke to drawing graphs, managing files, editing, and analyzing data.

Chapter Three is a reference. All program functions are listed alphabetically. You can look up any menu option by name. It is a useful tool to refresh you memory about any function.

The Glossary explains the terminology associated with the product and the functions it performs.

The Appendices cover special topics such as error messages (Appendix A), printer information (Appendix B), file storing details (Appendix C), and using VisiTrend/Plot with other programs such as as VisiCalc® (Appendix D).

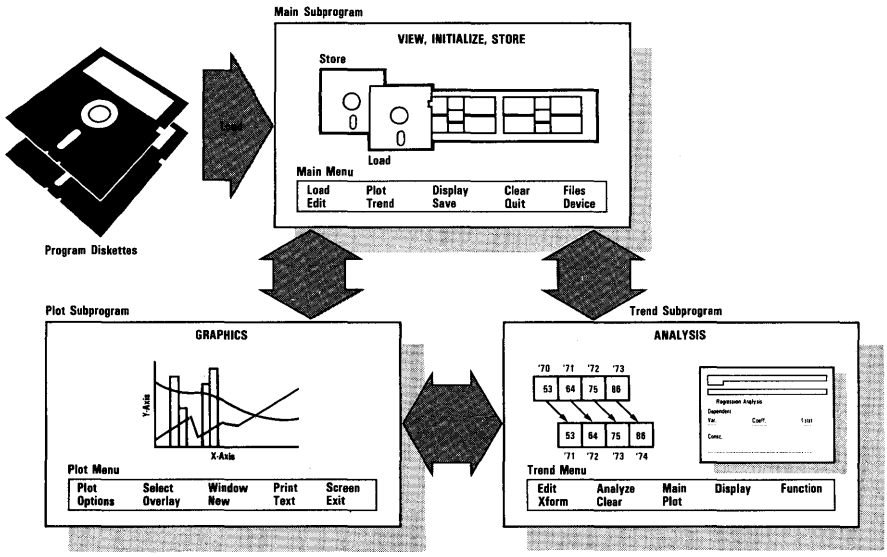
INTRODUCTION

The VisiTrend/Plot™ program turns your computer into a data analysis and chart-plotting system. With this program you enter and save business series 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 use by another program. The VisiTrend/Plot program communicates with the VisiCalc® program and other VisiCorp™ programs that support DIF™ (Data Interchange Format) files.

The VisiTrend/Plot program consists of three subprograms:

- One for file management and data editing (Main subprogram).
- One for statistical analysis, forecasting, regression, and time-series generation (Trend subprogram).
- One for creating charts of the series data managed and generated by the other subprograms and for creating text-only foils (Plot subprogram).

Figure 1-1 shows the relationship of these subprograms.



012-001

Figure 1-1. VisiTrend/Plot Program Overview

THE MAIN SUBPROGRAM

The Main subprogram:

- Loads series data from disk.
- Saves series data on disk.
- Lists the series data currently in memory.
- Controls the assignment of disk drives.
- Clears unwanted series data from memory.
- Provides the means of entering new series data and modifying the existing series data.

The Main subprogram also provides the means of loading the Plot or Trend subprograms. When you load the VisiTrend/Plot program, operation begins in the Main subprogram; you must load series data from disk or create new series data before drawing charts.

THE TREND SUBPROGRAM

The Trend subprogram:

- Develops data series used for analysis and forecasting techniques. The available methods include derivation of 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.
- Performs linear multiple regressions (using the ordinary least squares method). It calculates and displays the major statistical measures of a multiple regression including the standard errors of the coefficients and the regression, T- statistic, R-bar squared, the F-statistic, and the Durbin-Watson statistic.
- Performs trendline forecasting.
- Calculates and generates statistics such as minimum, maximum, mean, variance, standard deviation, and correlation coefficient.

THE PLOT SUBPROGRAM

The Plot subprogram communicates series data visually by generating the types of charts shown in Figures 1-2 through 1-7.

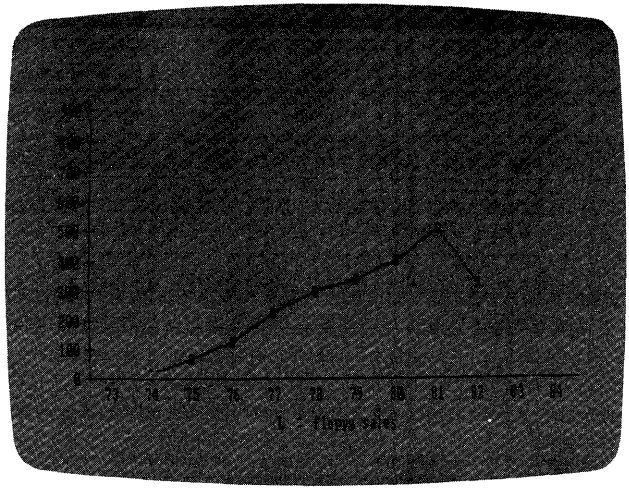


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Figure 1-2. Typical Line Chart

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.

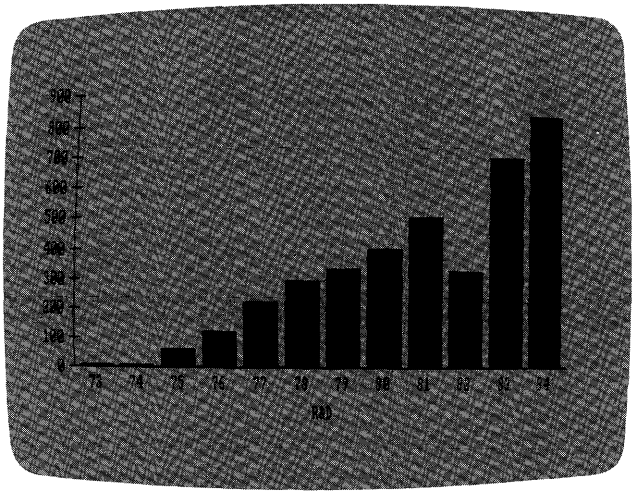

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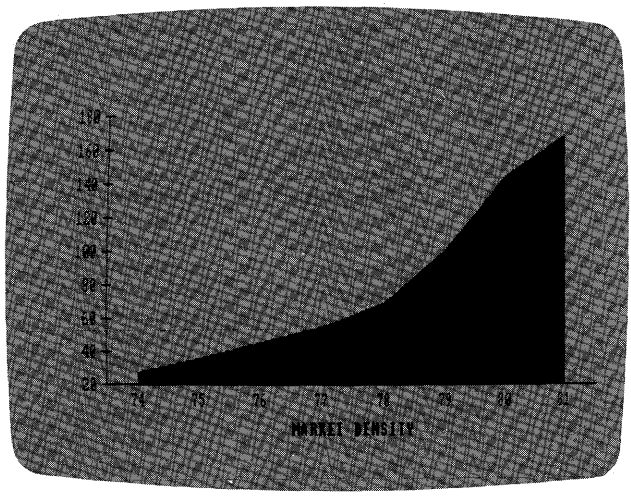
Figure 1-3. Typical Bar Chart

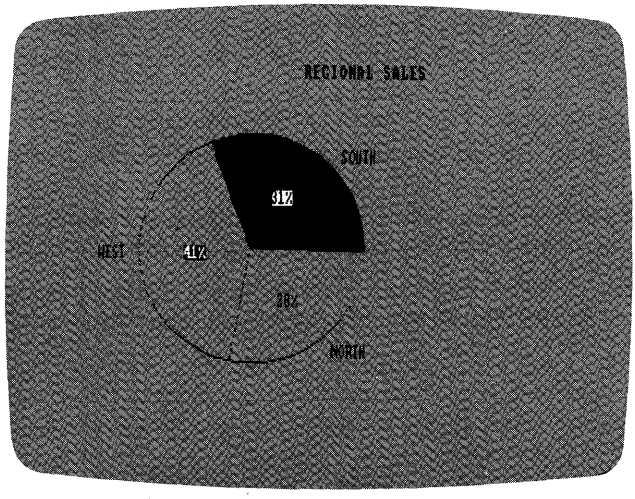
Bar charts consist of vertical bars that show value by their height.



012-003/P

Figure 1-4. Typical Area Chart

Area charts are line charts with the area between the plotting line and the base line filled in.



012-004/P

Figure 1-5. Typical Pie Chart

Pie charts show percentage of a whole or total with segments of a circle.

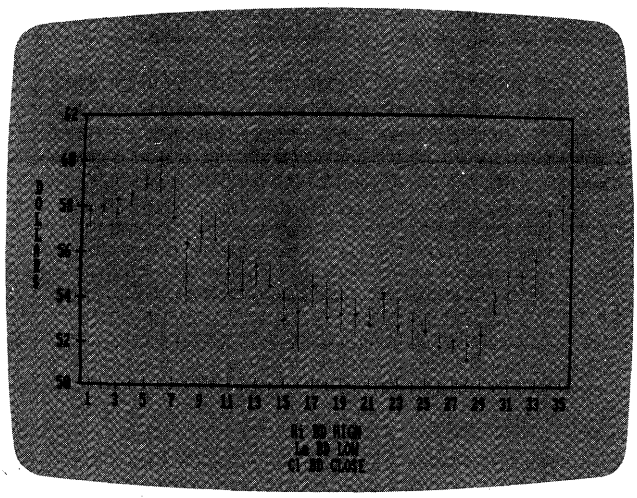


Figure 1-6. Typical High-Low-Close Chart

High-low-close charts use a vertical line at each series data point to show the high value, low value, and intermediate value for that point in time.

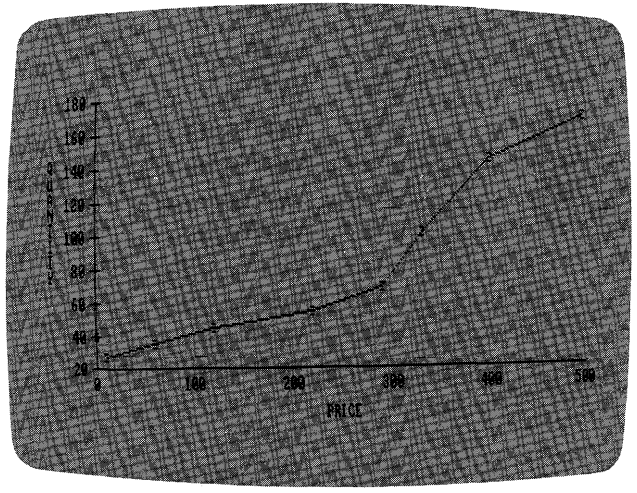
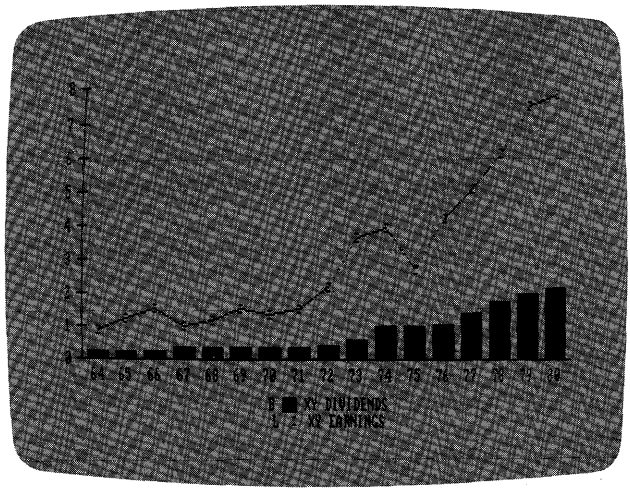


Figure 1-7. Typical XY Chart

An XY chart shows two sets of values plotted against each other.

Additionally, with the use of the VisiTrend/Plot overlay and window capabilities, combinations of all the formats, except pie, are possible. (A pie chart is a unique form that is always handled separately.) The charts in Figures 1-8, 1-9, and 1-10 are examples of some combinations.



012-007/P

Figure 1-8. Combined Line and Bar Chart

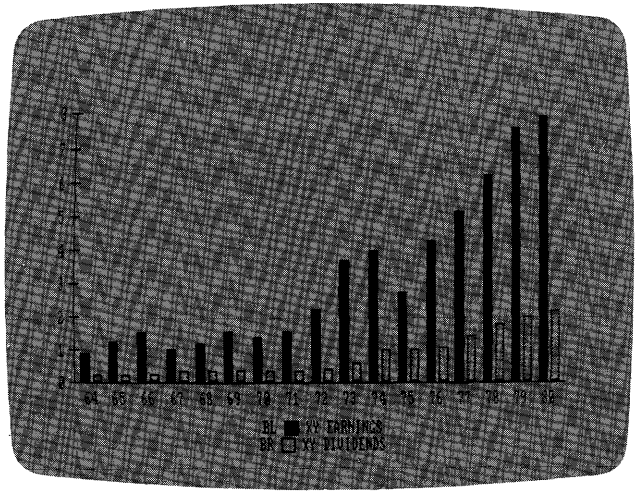


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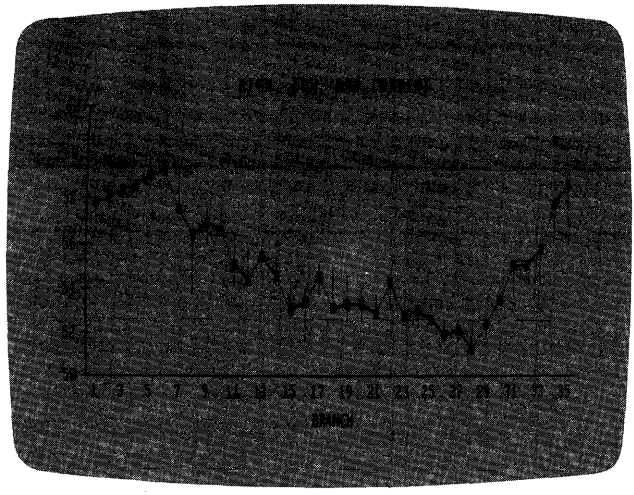
Figure 1-9. Comparative Bar Chart



012-009/P

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

COMPUTER REQUIREMENTS

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

- 128K or more of memory. (Having more than 128K of memory does not increase capabilities.)
- A video monitor. You can use any video monitor, that can be connected to your IBM Personal Computer, except the IBM Monochrome Display (Model 5151). A black and white or color monitor can be used even though the program displays do not appear in color.
- An IBM Color/Graphics Monitor Adapter (1504910) must be installed in your computer. The adapter is required even though the VisiTrend/Plot program displays do not appear in color.
- One or more floppy disk drives. Two drives are recommended.
- The three VisiTrend/Plot product disks that come with this manual. These disks are in the plastic sleeve in the binder containing this manual.
- You should have at least one blank disk to begin.

One Disk Drive System Differences

The VisiTrend/Plot program operates with one or two disk drives. Two disk drives are recommended. This manual assumes that you have two disk drives. If you have only one drive, the only difference in program operation is that you are told when to remove the program disk and insert the data disk and vice versa.

In the few instances when you are told to enter IBM DOS commands, the command for a one drive system is also shown if it is different.

TAKING CARE OF DISKETTES

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

Never touch the exposed magnetic surface with your fingers or any implement. Protect disks 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 disks. Never fold, bend, or staple a disk. And don't write on the square plastic cover with a hard pen or pencil (use only the soft felt tip pens). Store disks in a special disk binder or disk case.

How To Make Backup Copies of Your Data Disks

Always keep a backup copy of data disks that contain information that is not available elsewhere or that you cannot afford the time to recreate. Use the IBM DOS DISKCOPY command to copy whole disks or the COPY command to copy individual files. See your IBM Personal Computer *Disk Operating System* manual for information on the use of these commands.

Your program disks are protected; you cannot make operational copies of them.

GETTING STARTED

The Keyboard

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

Certain keys that you use frequently have key cap symbols that are represented differently in the manual. They are shown in the manual as follows:

Key	Function	Manual Representation
←	Backspace	[BKSP]
→|	Tab	[TAB]

The use of these keys is explained in the lessons. For now it is important that you know their names and locations on the keyboard.

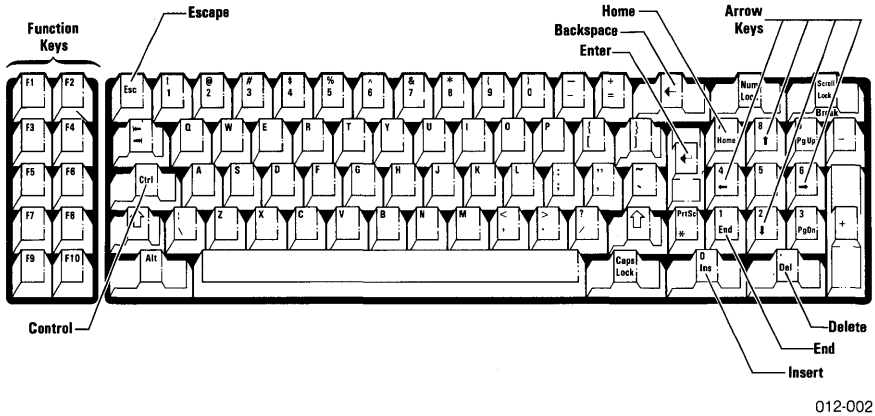


Figure 1-11. The Keyboard

PREPARING THE PROGRAM DISKETTE

The VisiTrend/Plot program disk does not include the disk operating system (DOS). Before loading the program, you must place DOS on the VisiTrend/Plot Program Disk #1. You only have to put DOS on the disk once.

1. Load the IBM DOS disk (Version 1.00 or 1.10) according to the instructions in the *Disk Operating System* manual.
2. Put the VisiTrend/Plot Program Diskette #1 in drive B.
3. Type **sys b:** (also **sys b:** for a single drive system) and press ↵.

4. Type **copy command.com b:** (**copy command.com a:** for a single drive system) and press ↵.
5. Remove the IBM DOS disk, insert the VisiTrend/Plot Program Diskette #1 in Drive A, and proceed to the next section.

LOADING THE PROGRAM

1. With Program Diskette #1 in Drive A and the Example Diskette in Drive B, video monitor and printer (if applicable) turned on, turn on the computer. If the computer is already operating, press the Ctrl key and hold it down while you press the Alt and Del keys together.

NOTE: If you turn on the printer after loading the program, the program will not know that a printer is connected to the computer and you will not be able to print.

2. When the program tells you, remove Program Diskette #1 and insert Program Diskette #2 into Drive A and press the ↵ key.
3. When the VisiTrend/Plot startup display, shown in Figure 1-12, appears, the program is loaded.

THE STARTUP DISPLAY

Figure 1-12 shows the startup display after loading the VisiTrend/Plot program.

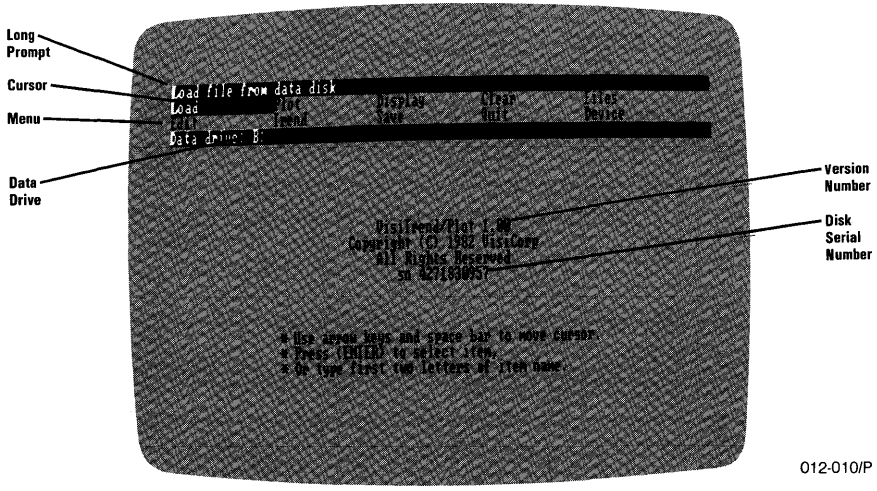


Figure 1-12. Startup Screen Display

The dark and light lines at the top of the screen are called the status area. Status areas provide operating information and contain command menus.

A command menu is a list of the commands available to you at this point in the program. You select a command from a menu with a visual pointer called a cursor. The cursor is described in the next section.

The inverse video lines (dark characters on a light background) supply information or give direction. The normal video lines (light on dark) display menus, messages from the program, or space for data entry.

Below the status area are the program version number, the copyright notice, and the serial number of your program disk. Write the version number and serial numbers down for future reference in case you call or write to VisiCorp with a question about the program. The copyright notice shows that the program is protected by the United States copyright laws. Be sure to read the VisiCorp Customer License Agreement in the *User Support Plan* about the copyright protection of this program and manual.

Near the bottom of the screen are some lines of directions on how to select an item from the menu.

THE CURSOR

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

Press the → key on the keyboard. The inverse video area (cursor) moves to the word Plot. Press the ← key and the cursor moves back to Load.

As you move the cursor, the top line of the status area (called the long prompt) changes. With the cursor pointing to Load, the top line indicates you can load a file from the data disk. With the cursor pointing to Plot, the top line indicates you can go to the Plot subprogram. The long prompt gives a longer description of the menu item to which the cursor is pointing.

You can move the cursor left or right with the ← and → keys; you can move it up or down one line in the menu with the ↑ and ↓ keys or the space bar. Experiment with the arrow keys and the space bar to put the cursor on various menu items until you feel at ease moving the cursor.

SELECTING A MENU ITEM

Just moving the cursor to a menu item does not command the program to do anything. To make the program respond, you must select a menu item.

You can select a menu item in two ways:

- You can move the cursor to the item, then press the ↵ key.
- Type the first two letters of the desired item name—there is no need to press the ↵ key.

Move the cursor to Display, and press the ↵ key. A message about no active series replaces the menu in the status area and a beep sounds from the computer. The program cannot display series information because nothing has been loaded into memory.

SUMMARY

This completes your introduction to the VisiTrend/Plot program. Already, you know how to set up your computer for the VisiTrend/Plot program. You've learned how to load the program, how to move the cursor around a menu, how to select an item from the menu, and how to use certain keys to get the menu display back on the screen.

Now you are ready to go on to the VisiTrend/Plot lessons. Lesson One is about drawing charts on the screen. Lesson Two covers the Main subprogram except for the Edit functions. The Edit functions are covered in Lesson Three. Lesson Four describes how to use the statistical analysis functions in the Trend subprogram. In Lesson Five, you will plot a number of charts to gain experience with more complex data series.

LESSON ONE

THE PLOT SUBPROGRAM

This lesson assumes you have read the Introduction and know:

- How to load the VisiTrend/Plot program from diskette.
- How to move the cursor in a menu.
- How to select an item from a menu.

Refer back to the Introduction if you are not sure how to do these operations.

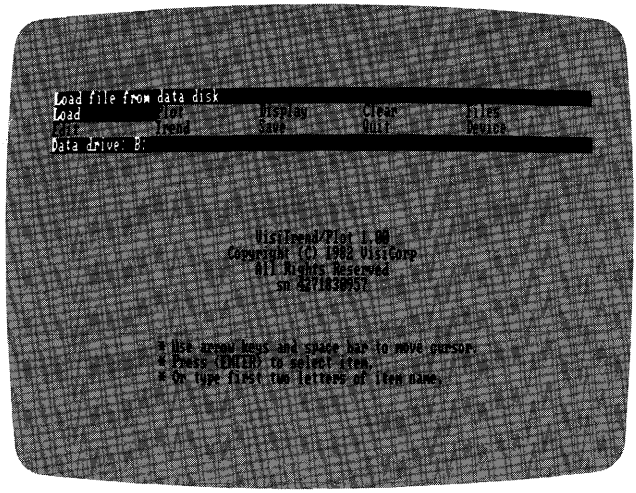
This lesson deals with plotting existing data series. You will learn how to load plotting data and use the Plot subprogram. By the end of this lesson, you will know how to:

- Display a chart.
- Add titles and other enhancements to a chart.
- Change the scale and range of a chart.
- Print a chart.
- Save the screen image of a chart.

LOADING THE PROGRAM

Load the VisiTrend/Plot program according to the directions under "Loading the VisiTrend/Plot Program" in the Introduction.

When the program is loaded, the display should look like Figure 2-1. If the display does not look like this, reload the program carefully according to the preceding instructions.



012-010/P

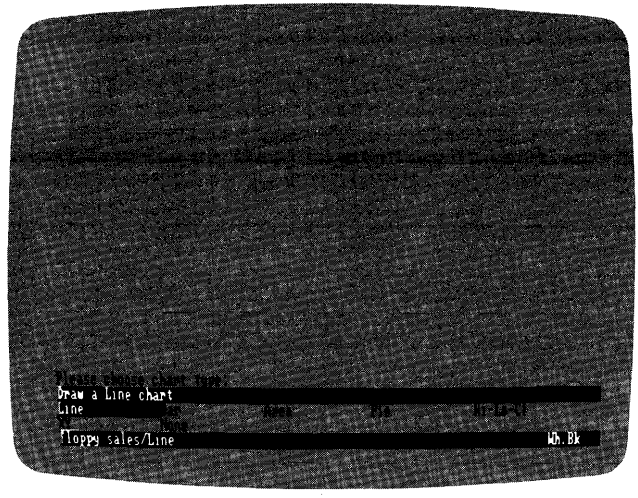
Figure 2-1. Startup Screen Display

The bottom line of the status area should specify the drive with the data disk.

The startup screen displays the Main subprogram menu. From this menu you can get to the other subprograms. You must load data from the Main subprogram before going to the Plot subprogram to draw a chart. Do the following:

1. Put the cursor on Load, and press ↵. The program displays a list of the data files on the example disk.
2. Put the cursor on x:SAMPLE1.SER, and press ↵. (x: identifies the data drive.) A list of the data series in SAMPLE1.SER is displayed.
3. With the cursor on Return, press ↵ again. The list disappears and the menu returns. The series in the SAMPLE1.SER file have been loaded into memory, and you can now use them to draw (plot) charts.
4. Move the cursor to Plot, and press ↵.

You are now in the Plot subprogram. The Select menu, shown in Figure 2-2, appears in the status area at the bottom of the screen. A prompt asking you to choose a chart type appears above the status area.



012-011/P

Figure 2-2. Select Menu

SELECTING A CHART TYPE

From the Select menu you select the type of chart you want to draw and the data series for the chart. The menu items indicate the six kinds of VisiTrend/Plot charts: Line, Bar, Area, Pie, High-Low-Close, and XY. The last item on the menu, None, exits from this menu without choosing a chart type. This exit path comes in handy at times, especially if you get to this menu by mistake, which can happen before you become familiar with the program.

With the cursor on Line, press ↵. You elected to draw a line chart.

The menu is replaced by the prompt Cursor movement, <SPACE>, or <ENTER> telling you which keys to use to select from the list. The list of names you saw after loading SAMPLE1.SER appears at the top of the screen.

The list includes some information about each series. Going across the header line, the informational items are:

Name — The name of the data series.

Per — The period of the series. The series in the list have a period of 1. The period is the number of subdivisions within the basic time unit. The period can be any value from 1 to 99. Typical values are 1 (annual), 4 (quarterly), 12 (monthly), and 30 (daily).

Start — The start date for the series. Both series in the list start in 1973. If the period is other than 1 (annual), the start date is the year and the period of the first data point. For example, a start value of "1980 9" (with a period of 12) means the 9th period of 1980 or September, 1980.

End — The end date for the series. Everything mentioned in the description of Start applies to End.

— The number of data points in the series. A series can contain 250 data points.

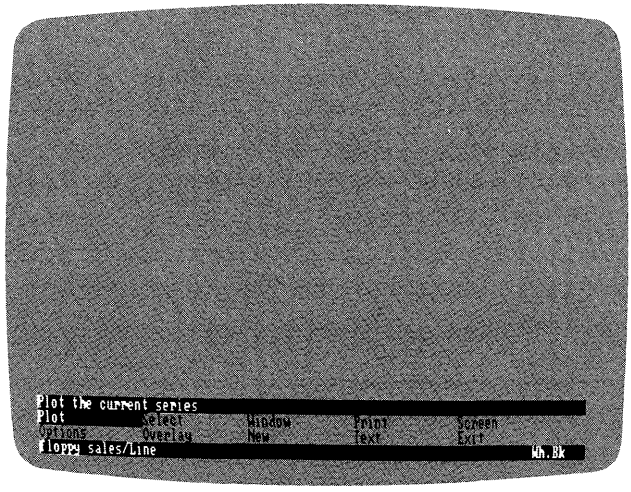
You must select a series from this list. You cannot go further in the Plot subprogram unless you have selected a series to plot. Selecting an item from a list is not much different than selecting from a menu. Move the cursor to the item and press the ↵.

To move the cursor up and down in this list, use the ↑ key and the ↓ key. The cursor wraps around from bottom to top and vice versa. For example, if you try to go beyond the bottom line of the list, the cursor jumps to the top line.

Move the cursor to the series named Floppy Sales and press ↵.

PLOTTING A CHART

When you select a series, the list disappears and the Plot menu, shown in Figure 2-3, appears in the status area. Most of your work with the Plot subprogram is done from this menu.



012-012/P

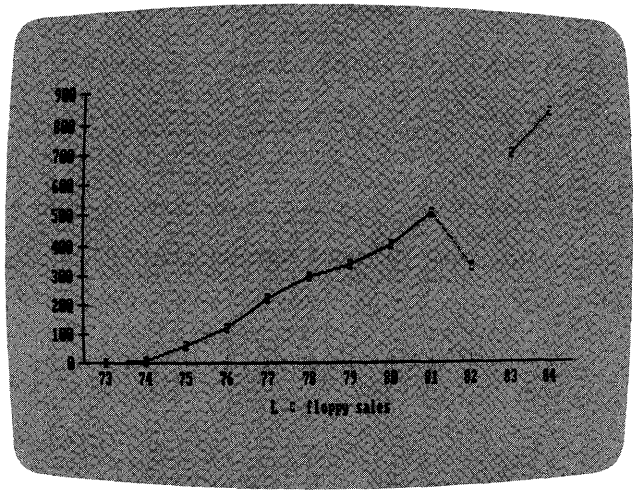
Figure 2-3. Plot Menu

The left side of the bottom line contains Floppy Sales/Line and the right side, Wh.Bk. The left side indicates you selected a Line chart and the series named Floppy Sales. The right side indicates the data will be displayed in white (Wh.) and the background in black (Bk).

The cursor is pointing to the word Plot, and the top line of the status area indicates this item plots the current series. The current series is the last series or group of series you selected. You can select more than one series, then they all become the current series. Selecting multiple series is described in Lesson Five.

DRAWING THE CHART

With the cursor on Plot, press ↵. The screen should now look like Figure 2-4.



012-013/P

Figure 2-4. Line Chart With Floppy Sales Data

Examine the chart. The numbers along the vertical or Y-axis are the scale of the chart. The numbers along the horizontal or X-axis are the range. Remember that the series listing said this series covered the years 1973 through 1984. The numbers along the X-axis are 73, 74, and so forth. When the range is given in years and there are many plotting points, the Plot subprogram abbreviates the range numbers to fit on the axis.

The legend at the bottom contains: the chart-type code (L for Line), the plotting symbol used for the series (a square with a dot in the center), and the name of the series (Floppy Sales). A square with a dot is always used when a single series is plotted. Later, when you draw charts with multiple series, you will see the other symbols: triangle with a dot in it (Δ), number sign (#), asterisk (*), plus sign (+), and x.

To get the menu back, press the Esc key. The status area reappears and covers the legend. The full chart is still visible above the status area. The status area still contains the Plot menu.

If you want to see the chart again without the status area, press the Esc key again. You can switch back and forth as often as you want.

DRAWING A BAR CHART

If the status area is not on the screen, display it by pressing Esc. You can use the other functions in the Plot menu to change the chart. You can put titles on it, change the range and scale, put grid lines on it, and much more. You are going to start over and repeat what you did to draw the line chart. The difference is that you are going to draw a bar chart.

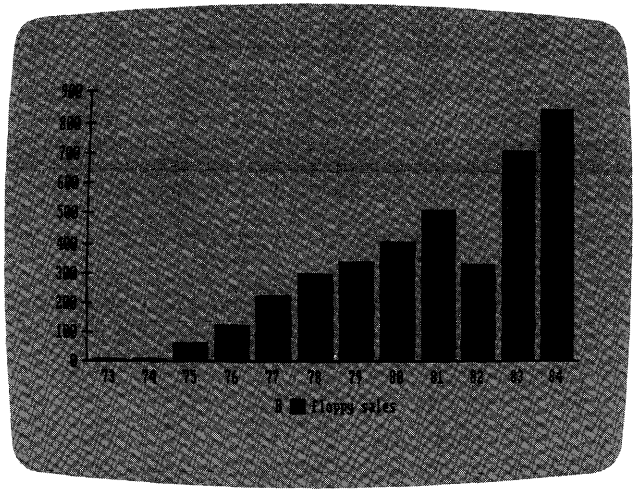
Move the cursor to Select. The long prompt is Select a chart type. Press ↵.

The Plot menu is replaced by the Select menu and the chart is erased.

Move the cursor to Bar and press ↵.

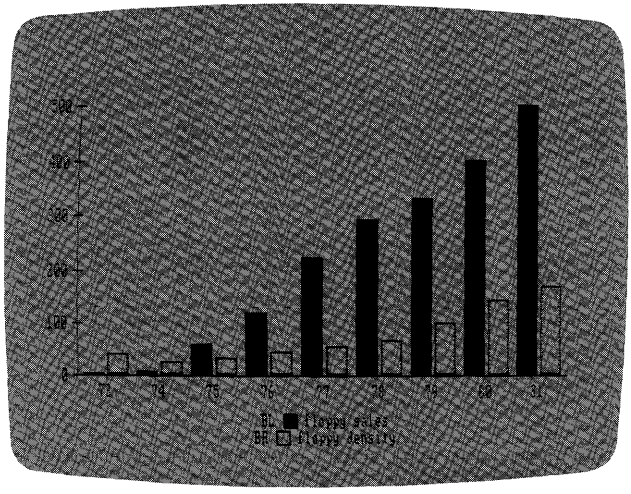
The Select menu is replaced with the Bar menu. From this menu you select the type of bar. Your options are:

- Full, shown in Figure 2-5, produces full-width bars that are centered on the X-axis tick marks.
- Both, shown in Figure 2-6, produces half-width bars that are positioned on either side of the X-axis tick marks. When you choose this option you must select two data series; the first is positioned on the left of the tick marks and the second on the right.
- Left or Right, shown in Figure 2-7, produce half-width bars that are positioned to the left or the right of the tick marks.



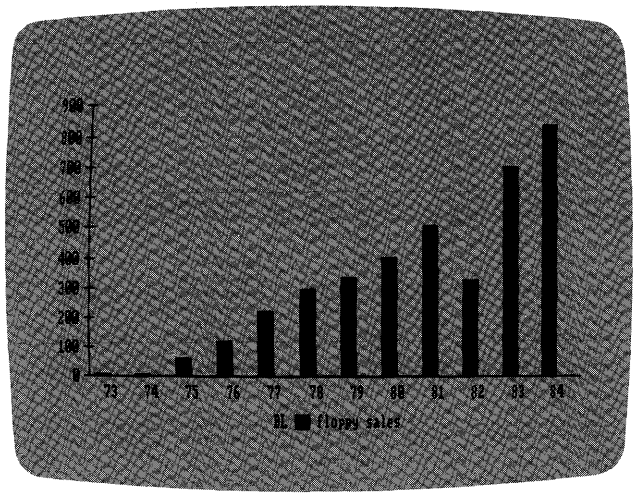
012-014/P

Figure 2-5. Full-width Bars



012-015/P

Figure 2-6. Both Bars



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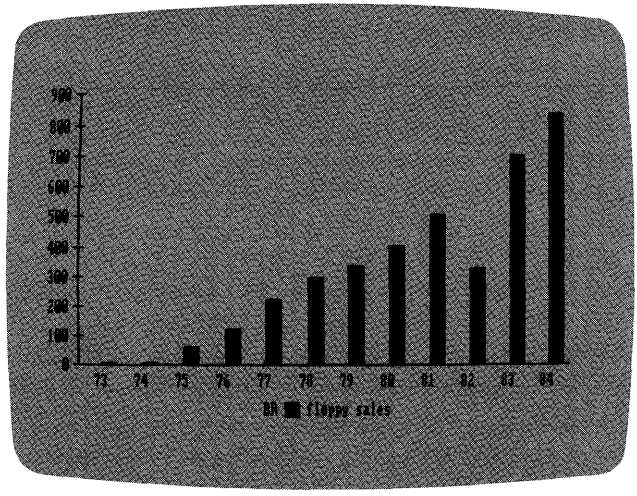


012-017/P

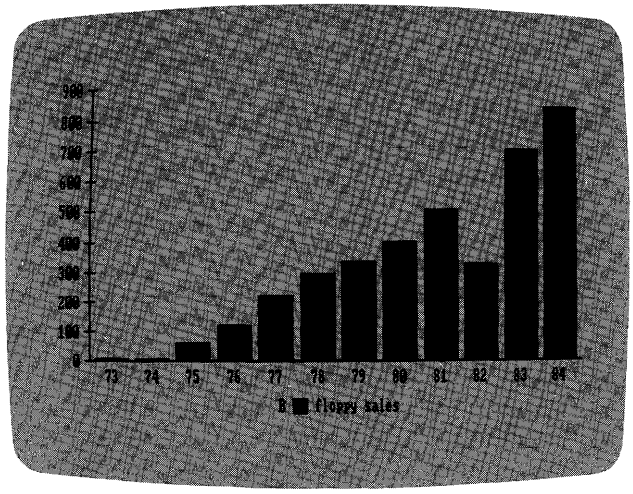
Figure 2-7. Left and Right Bars

With the cursor on Full, press ↵. The list of data series is displayed. Select Floppy Sales.

As before, the list disappears and the Plot menu reappears. You can see the Floppy Sales line chart again. The old chart remains until you Plot the new chart. The bottom line of the status area now reads Floppy Sales/Bar.

With the cursor on Plot, press ↵.

The line chart is replaced with a bar chart; the beep indicates the chart is completed. Your screen should now look like Figure 2-8.



012-014/P

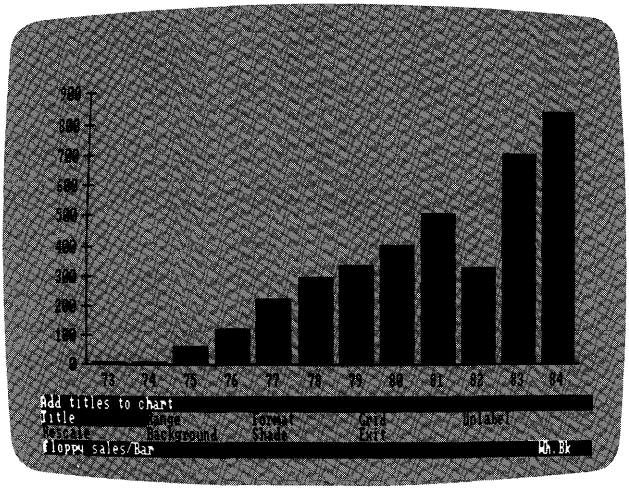
Figure 2-8. Bar Chart With Floppy Sales Data

Adding Detail To a Chart

The chart on the screen is sparse. Sometimes you have to include more detail in a chart. You might want to expand the legend, to highlight some detail, or explain unusual data.

Press Esc to display the status area.

Options lets you add detail. Move the cursor to Options, and press ↵. The Plot menu is replaced by the Options menu, shown in Figure 2-9. You are going to use all of these options in this lesson.

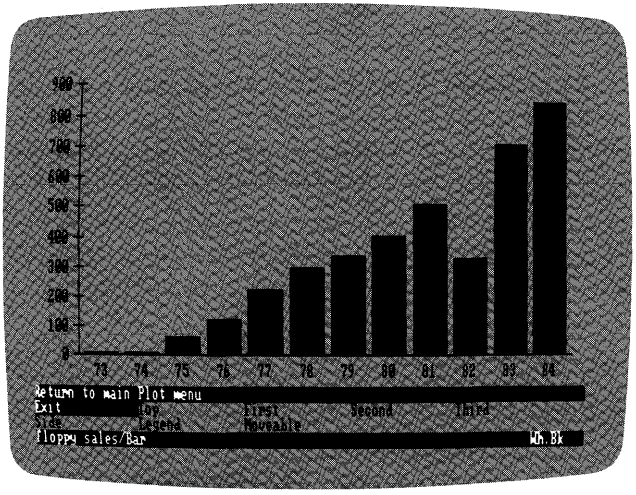


012-018/P

Figure 2-9. The Options Menu

Putting Titles On a Chart

With the cursor on Title, press ↵. The Title menu, shown in Figure 2-10, is displayed.



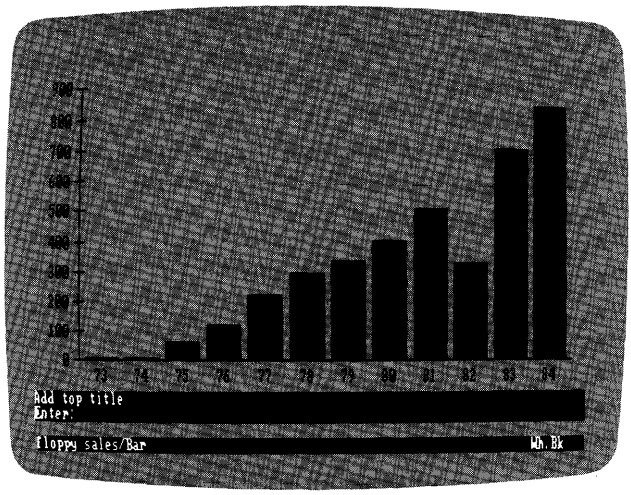
012-019/P

Figure 2-10. Title Menu

The first item is Exit which lets you return to the Plot menu. The other items perform their functions, then return to the Title menu.

Move the cursor to Top, and press ↵.

The menu is replaced by an entry area, as shown in Figure 2-11. The third line of the status area is the title-entry line. It displays what you type at the keyboard.

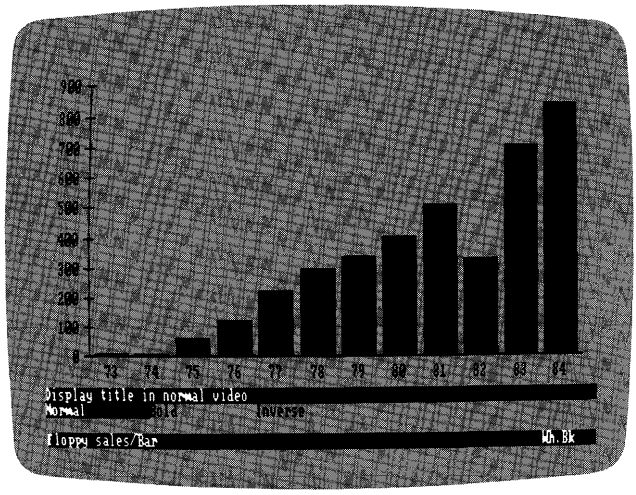


012-020/P

Figure 2-11. Entry Area

Type **My First Chart**. The [BKSP] key lets you erase the last character. You can use it to make corrections. If you press [BKSP] past the beginning of data, you'll hear beeps from the computer. (The ← key cannot be used to erase; the computer beeps if you try to use it to do so.)

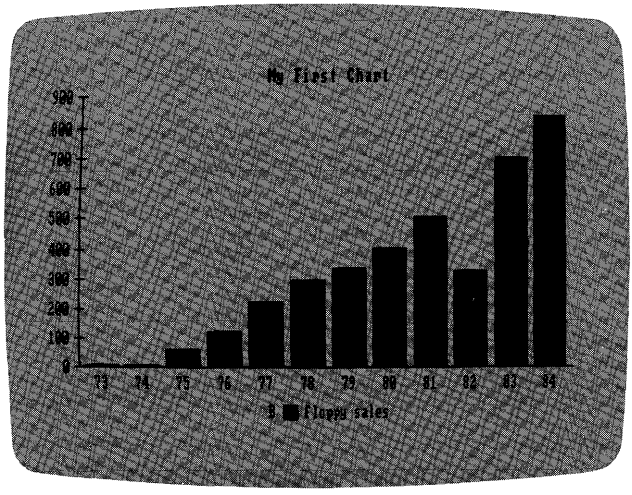
When the title is correct, press ↵. The Typeface menu, shown in Figure 2-12, appears. You can display your title in normal, bold, or inverse video. Everything you have seen on the screen so far has been in the normal typeface. Move the cursor to Bold, and press ↵.



012-021/P

Figure 2-12. Typeface Menu

The title is centered at the top of the chart. Notice that the characters are in bold typeface; the other characters on the screen are in normal typeface. The title you just created should look like the one in Figure 2-13.



012-022/P

Figure 2-13. Top Title in Boldface

The title is centered above the chart. You can put the title at the left side by ending the title with an at sign (@). If your left adjusted title requires an at sign at the end, enter two (@@), one for the title text and one for left justification.

The length of the title depends on the location (left or centered) and the typeface. Table 2-1 lists the maximum title lengths.

Table 2-1. Maximum Title Lengths

Location		Typeface		Maximum Length
Left	Centered	Bold	Normal or Inverse	
X			X	73
X		X		58
	X		X	77
	X	X		64

If you change your mind and want a different title, enter a new one. The new title replaces the old one.

The Title menu lets you enter one, two, or three bottom titles. The bottom titles occupy the first, second, and third lines in the legend area. A bottom title line erases the legend if there is a legend on the same line.

Move the cursor to First, and press ↵. The entry area appears again. Bottom titles have the same maximum lengths as the top title. Enter the title **Disk Drive Sales**. Press the ↵ key and the Typeface menu appears. This time select the Normal typeface. Press the Esc key to see the bottom title. Press Esc again when you are ready to continue. Second and Third functions operate the same as First. They put titles on the second and third legend lines.

Ending the bottom titles with the at sign (@) locates them to the left, the same as it did with the top title.

Next you are going to put a vertical title to the left of the Y-axis labels. Move the cursor to Side and press ↵. The Side title can have a maximum length of 19 characters. Enter **Units Per Outlet**. Press ↵. This time, select Inverse and press ↵.

The last item in the Title menu is Moveable. The Moveable function lets you enter a title and move it to any location in the chart. You can put as many titles as you want on the chart.

Move the cursor to Moveable and press ↵.

Enter **Plant Fire**, and press ↵.

The title appears near the middle of the screen. You can move it to any location on the screen.

Moving a Title

The movement of a title is controlled with the ←, →, ↑, and ↓ keys. These keys move the title in the obvious direction:

up
↑
left ← → right
↓
down

Press the ← key several times. You'll see the title move to the left; the title moves each time you press the key. Press the ↓ key to move the title down over the chart bars. Notice that it is white when over a black background and black when over a white background.

Keep pressing the ↓ key to move the title all the way to the bottom of the screen. When it reaches the bottom, the computer clicks each time you press the key.

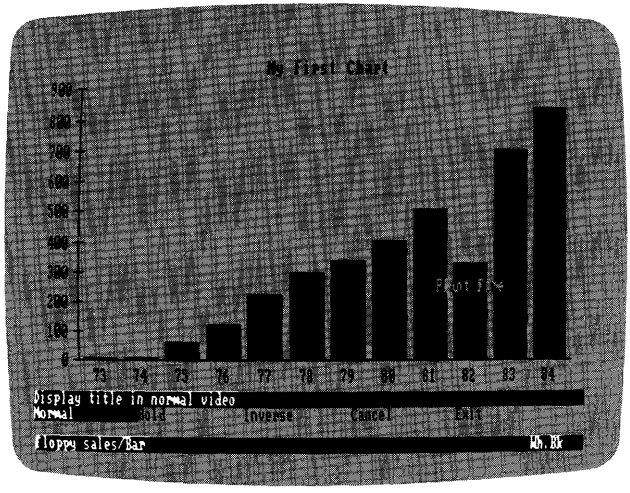
With the number keys (1 through 9) you can change the distance the title moves each time you press an arrow key. The higher the number, the farther the title moves. If you do not increase the distance-per-move, it moves at the 2 rate.

Press the 9, in the top row of keys, and then press an arrow key. You can move the title from border to border with fewer presses of the arrow key.

NOTE: The program configures the keyboard so that the number pad at the right is used for cursor movement, not number entry. To enter a number from this pad, you must first press the Num Lock key. You will have to press it a second time to regain use of the arrow keys.

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

Move the Plant Fire title to the short bar for the year 1982. Center it across the bar about a quarter of an inch below the top. When it is in place, press ↵. The Typeface menu appears as shown in Figure 2-14.



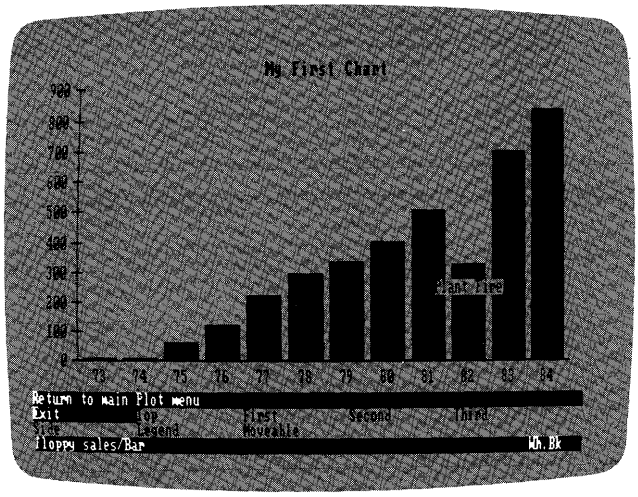
012-023/P

Figure 2-14. Typeface Menu

The Typeface menu offers several choices. Bold displays the title in boldface; Inverse displays it in black letters on a white background; and Normal displays it in white letters against a black background. Cancel erases the title and returns you to the Title menu. Exit fixes the title in place, then returns you to the Title menu.

Before canceling or fixing the title in place, you can switch between typefaces to see which is best. If the title extends over a light area and you select Bold and then return to a normal size type, the broadening of the title will leave a hole in the light area. There is no problem if the title is over a dark area of the screen. Once you select Exit, the title appears in the typeface specified, it will be fixed in place, and the Title menu reappears.

Select Normal and then Exit. The title is fixed in place. It is now a permanent part of the chart, and the Title menu returns to the screen. The display should look like Figure 2-15.



012-024/P

Figure 2-15. Example of Moveable Title in Place

In this section you learned:

- The ←, →, ↑, and ↓ keys move a moveable title in the direction indicated by the arrow.
- The number keys, 1 through 9, select the distance a title jumps each time the ←, →, ↑, and ↓ keys are pressed.
- After placing a moveable title on the chart, press ↵ to display a Typeface menu.
- The Exit option in the Typeface menu fixes a moveable title in place.

Erasing Moveable Titles

A moveable title can be erased before it's fixed in place.

Select Moveable and enter **Test1**. Put the title anywhere and press ↵. Select Cancel from the Typeface menu. The title vanishes, and the Title menu reappears.

After a title becomes fixed, it can still be erased, but by a different method.

If the title is in or extends into any light area and you select Normal, Bold, or Inverse before selecting Cancel, a hole the size of the title remains in the light area. If this occurs you will have to start over to remove the hole. This situation does not occur if the title is in a dark area of the screen.

Erasing Fixed Titles

You can use the Text option from the Plot menu to erase fixed titles. The Text option is described in Lesson Five.

Bringing Back the Legend

The only other item in the Title menu is Legend. This option erases bottom title lines that cover legend lines and restores the original legend lines. Like bottom titles, there can be three legend lines. You covered the one-line legend with the First title; now, put the cursor on Legend and press ↵.

This option only erases those bottom title lines that covered legend lines. A bottom title line that did not cover a legend line is not erased by the Legend option.

Press the Esc key to erase the status area. Your bottom title is gone, and the original legend is on the screen.

The Legend function works differently with pie charts. When you have a pie chart on the screen, the Legend function erases the pie chart legend. After you erase a pie chart legend, you must redraw the pie chart to restore the legend.

Select Exit to return to the Plot menu.

Moving and Changing Fixed Titles

To be precise, fixed titles can't be moved or changed. They can, however, be erased, modified, and re-entered in the same location or in other locations. For example, to change My First Chart to DISK DRIVE SALES, enter the new title with the Top option. The new title replaces the old title.

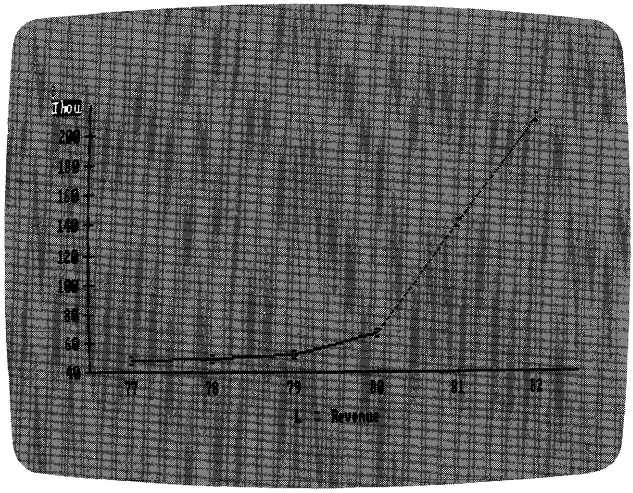
You can erase top, bottom, and side titles by replacing them with a blank title. When the program asks you to enter the title, press the space bar and the ↵ key.

The Range and the Scale

The range of a chart is the time interval between the start date and the end date. It is plotted on the X-axis except for an XY or pie chart. The scale is the spread of values plotted along the Y-axis. The program determines the scale each time a series is plotted. It determines a reasonable scale that covers the values in the series. It also decides the number of divisions (tick marks) to display.

In determining a scale, the program attempts to avoid divisions that result in fractional or non-round numbers. When possible, it chooses round numbers. For example, with a series of 0 through 700, the program tick-marks the Y-axis seven times and numbers them 0, 100, 200, ... 700. It wouldn't choose eleven tick marks because that results in scale numbers of 0, 64, 127, 191, 255, and so on.

When the Y-axis values are too large to be displayed, the VisiTrend/Plot program indicates the scaling factor at the top of the Y-axis as Thou (thousand) or Mill (million) in inverse video and truncates the labels. For example, with a scale of 0 through 30,000, the program generates numbers of 0, 10, 20, 30 and displays Thou as the factor. This tells you the numbers represent 0, 10,000 (10 x 1000), 20,000 (20 x 1000), and 30,000 (30 x 1000) respectively. Figure 2-16 shows a chart with a scale factor of thousands.



012-025/P

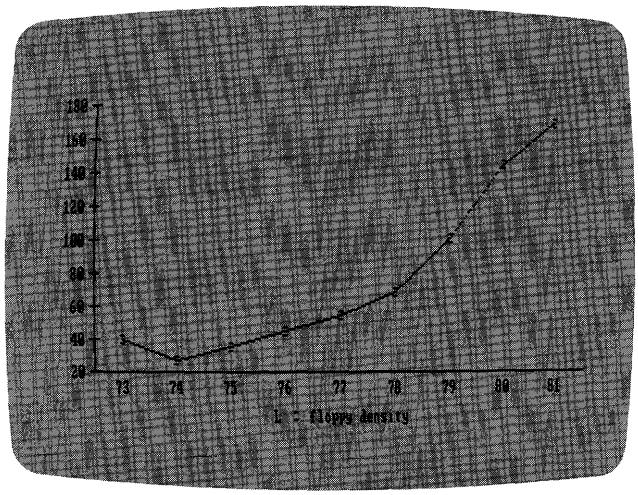
Figure 2-16. Example of Chart With Scale Factor

You can change both the range and the scale when you draw a chart. You might want to show only a subset of the range. You might want small variations to show up more or to show up less. The scale and range have significant impact on how a person perceives the information in a chart.

How to Change the Scale

This portion of the lesson uses a different chart. Go to the Select menu, specify a line chart, and select the series named Floppy Density.

If you forgot, Select takes you back to the Select menu. Line specifies a line chart. Floppy Density is one of the series on the list. When the Plot menu returns, select Plot to display the line chart. Your screen should look like Figure 2-17.



012-026/P

Figure 2-17. Line Chart Before Changing the Scale

Press Esc to bring back the status area after the chart is drawn. Select Options.

Move the cursor to Rescale, and press ↵.

The prompts request limits for the plot scale. First you are asked for a Y-axis minimum. The current minimum is 20; change it to −200. Enter −200, and press ↵. Next you are asked for the Y-axis maximum. The maximum is currently 180; change it to 100. Enter **100**, and press ↵. Finally, you are prompted for the number of axis divisions. You can specify divisions (tick marks) from 2 to 12.

To determine the correct number of divisions, subtract the minimum scale value from the maximum value. A good number of divisions is any number in the range 2 through 12 that evenly divides into the difference. In the preceding example, 100 minus −200 equals 300. 2, 3, 6, and 12 give divisions of 150, 100, 50, and 25. Others, such as 4 and 5, will work but result in divisions of 75 and 60 which are not as common as chart units as 25, 50, and 100.

The scale, −200 to 100, divides nicely into 6 divisions. Enter **6**, and press ↵.

The Plot menu returns, but nothing else happens. The scale did not change.

You didn't do anything wrong. You must select Plot again to redraw the chart with the new scale. Press ↵ with the cursor on Plot. A message appears in the status area telling you the data is off-scale and prompts you to choose one of two actions. This message means data points in the series are outside the scale you specified. This is a warning that the chart will not contain all the data points in the series. You have two choices: Proceed or Cancel. Proceed tells the program to continue and draws the chart with the off-scale data points. Cancel cancels the entire Plot request, leaves the current chart displayed, and redisplays the Plot menu.

Select Proceed and press ↵. For each data point that the program cannot put on the chart, it beeps. Two beeps sound while the program draws this chart. The last two points in the series do not fit within the scale.

The off-scale data points are signaled this way for line, area, XY, and high-low-close charts. However, when you draw a bar chart that goes off the scale, the program draws a bar chart until it encounters the first data point that is off-scale, then it stops plotting. If you think about it, an off-scale bar chart gives incorrect information. A person reading the chart does not know that certain bars continue beyond the top of the scale. Nor do they know that a missing bar is off-scale rather than 0. It is better to rescale and try again than to show incorrect information.

Press Esc to display the Plot menu. Move the cursor to Options and press ↵. When the Options menu appears, select Rescale and press ↵. For Y-axis minimum, enter 0 and press ↵. For Y-axis maximum, enter 750 and press ↵. For the # axis divisions?, enter 10 and press ↵.

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

AUTOMATIC CORRECTING BY THE VISITREND/PLOT PROGRAM

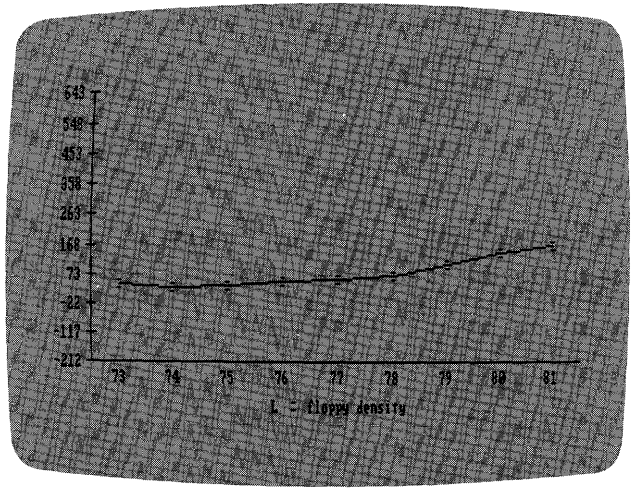
If you mistakenly enter a minimum scale value that is greater than the maximum value, the program makes an assumption and continues. The program assumes that you reversed the values and switches them back. If you give the same value for the minimum and the maximum, the program uses 0 as the minimum and sets the maximum to twice this value.

If you give a number of divisions less than 2 or greater than 12, the value won't be accepted. The computer beeps, and the status area waits for you to enter a value from 2 through 12.

WELL-SCALED CHARTS

The VisiTrend/Plot program tries to generate a well-scaled chart. There are times, however, when the values it chooses are not well-scaled. When this happens, you should consider rescaling the chart.

When you select a scale, the program takes your request literally and does not try to change it. You will, at times, come up with odd-looking scales. This is especially true if you select Y-axis divisions that are not even divisors of the difference between the minimum and maximum scale values. For example, if you set a scale from −200 to 800 with 10 divisions, the labels read −200, −100, 0, 100 and so on. But if you pick a scale from −212.39 to 643.22 with 9 divisions, the chart, while correct, is hard to read as you can see in Figure 2-18.



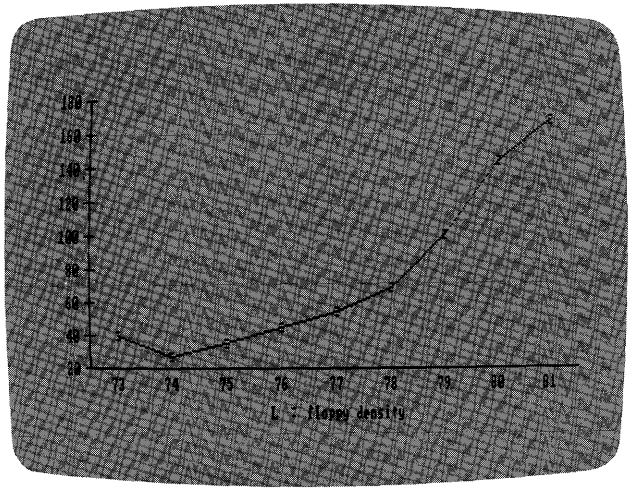
012-027/P

Figure 2-18. Example of Poorly Selected Scaling Divisions

How to Change the Range

Start with program generated scale for the Floppy Density series. Go back to the Select menu, and select Line and the Floppy Density series or change the scale back to 20 to 180 with 8 divisions. If you need help with your choice, see either 'The Select Menu" or "How to Change the Scale."

Now you should have a Floppy Density line chart on the screen that looks like Figure 2-19.



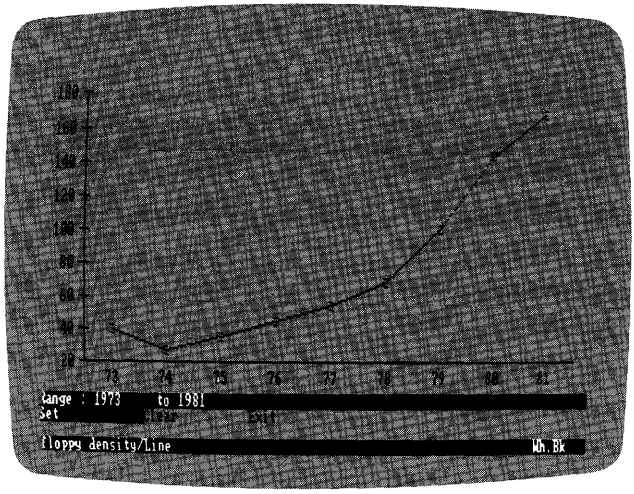
012-026/P

Figure 2-19. Example of a Well-scaled Chart

Press Esc to redisplay the Plot menu. Move the cursor to Options, and press ↵.

Move the cursor to Range, and press ↵.

The program displays the Range menu shown in Figure 2-20. The top line lists the current range, 1973 to 1981. The menu offers three choices: Set, Clear, and Exit.



012-028/P

Figure 2-20. Range Menu

Exit returns you to the Plot menu.

The Set option lets you change the range. With the cursor on Set, press ↵. The prompt asks for a start date. Enter **1974**, and press ↵. The program then prompts for an end date. Enter **1990** and press ↵. The Plot menu returns and nothing happens to the chart. As with the Rescale option, you must select Plot to see the chart with the new range. Select Plot.

You took a year off the beginning of the series but *did not* add nine years to the end. You can shorten a range but you cannot lengthen a range beyond the end of the series.

If you change the range and take out data points, you might wish to change the scale. If you specify a range that does not coincide with any of the data points, you will get a bad-range message. A new range must overlap the range of the series by at least two points. You cannot completely exclude a selected series.

When the program prompted for start and end dates, it did not ask for a period, only a year. If the period had been other than 1 (annual), the program would have prompted for the year and the period.

Press Esc to redisplay the Plot menu, then select the Options menu again. Select the Range option. This time move the cursor to Clear and press ↵. When the Plot menu returns, Plot the chart again. This time it is drawn with the original range. The Clear function returns to the original range of the series. Clear does nothing if you have not changed the range.

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. However, if you explicitly change the scale with the Rescale option, before or after changing the range, the program does not recalculate the scale.

Formatting a Chart

You can modify line, bar, and XY charts with the Format option. Display the Plot menu (press Esc if the status area is not on the screen) and select New. New erases the existing chart and clears all options you have set.

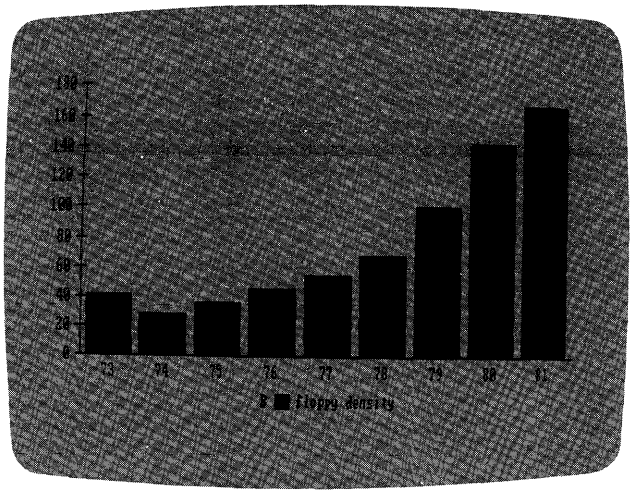
Now select Line and the Floppy Sales series. Plot it.

Display the Plot menu and select Options. Move the cursor to Format, and press ↵. The program displays the Format menu. The options are Symbols, Lines, Points, and Both. All the line charts you have drawn up to now used Both (symbols and lines).

Move the cursor to Points, and press ↵. Plot the chart again. It is redrawn without the plotting symbols — just the points to indicate the values.

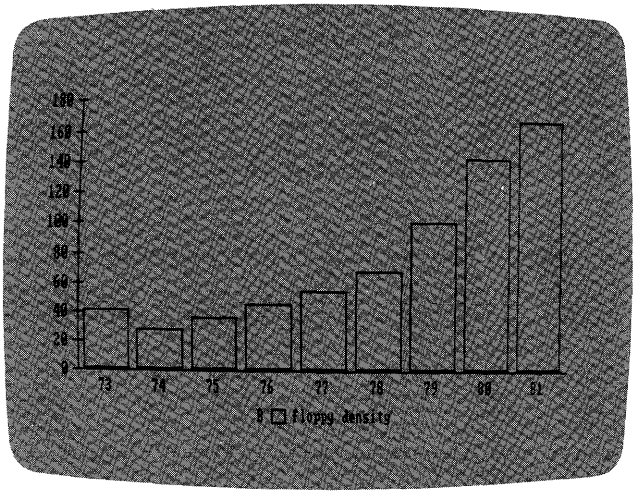
Use the other Format options by displaying the chart with Lines only and Symbols only.

The Format option is valid only for line, bar, and XY charts. Symbols only, lines only, points only, or both symbols and lines are the Format options for line and XY charts. The bar chart options are solid bars, outlined bars, or shaded bars as shown in Figures 2-21, 2-22, and 2-23.



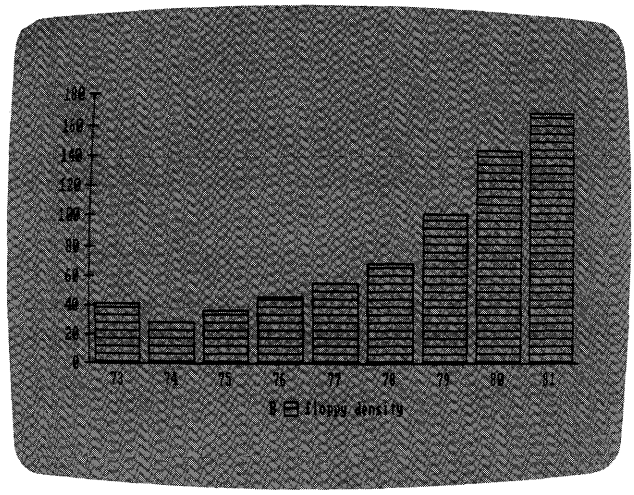
012-029/P

Figure 2-21. Solid-Bar Chart



012-030/P

Figure 2-22. Outlined-Bar Chart



012-031/P

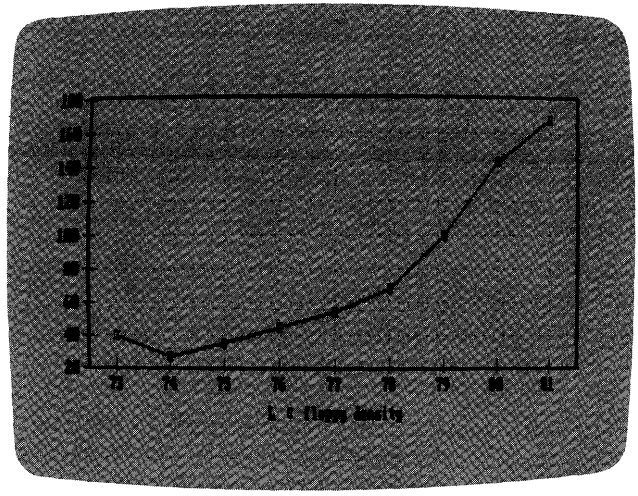
Figure 2-23. Shaded-Bar Chart

If you try to select the Format option with an area, pie, or high-low-close chart, you will get an error message.

Drawing Grid Lines

Go to the Select menu by selecting New. Select Line, the Floppy Density series, and then Plot the chart.

Press Esc and select Options. Move the cursor to Grid, and press ↵. The program displays the Grid menu. You can draw horizontal, vertical, or both horizontal and vertical grid lines. With the cursor on Both, press ↵. The program draws grid lines for every tick mark that has a label. Your screen should now look like Figure 2-24.

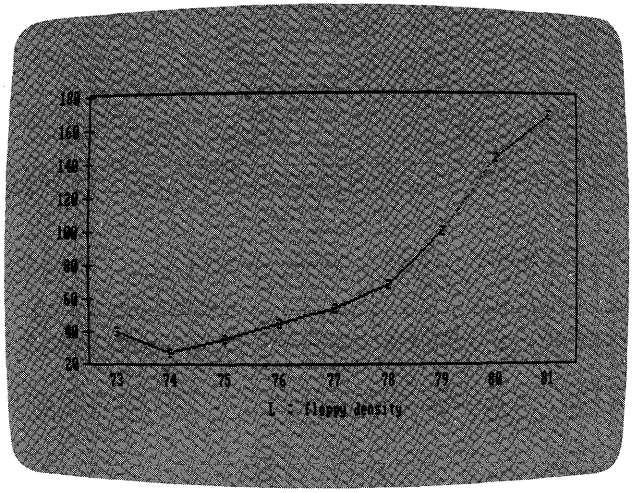


012-032/P

Figure 2-24. Chart With Grid Lines

Plot the series again. There is no need to go to the Select menu; press ↵ with the cursor on Plot. The program redraws the chart without the grid lines. Go to the Grid menu again and draw only the Horizontal grid lines.

Go back to the Grid menu once more and again select Horizontal. The program erases the existing grid lines. This grid-line erasing feature operates on the horizontal and vertical grid lines. Note in Figure 2-25 that only the grid lines are erased; the added border on the top and right are not erased.



012-033/P

Figure 2-25. Chart With Grid Lines Erased

You do not have to erase grid lines in the same manner that you drew them. You can draw both horizontal and vertical grid lines, then erase only one set. You can later redraw an erased set of grid lines.

A chart (other than a pie chart) must be displayed when choosing the Grid option. If you select the option when no chart is displayed, you get an error message.

OTHER OPTIONS

You now have enough experience to examine the remainder of the options. There are three you haven't used: Unlabel, Background, and Shade.

The Unlabel option removes the X-axis and Y-axis labels. It must be used with a displayed chart. If you remove the labels with this option, you must replot the chart to get them back.

The Background and Shade options let you change the background and plotting shades. They offer you a variety of visual enhancements. For a complete description of how you can enhance your charts with black, white, and the various shades of gray offered by the Shade option, see the Options menu explanation in Chapter Three (the Reference).

PRINTING THE CHART

You can print a copy of the chart on a printer if you have a graphic printer that the Plot subprogram supports. (See Appendix B for a list of the supported graphic printers.) If a non-graphics printer is connected to your computer, skip this exercise, since you can only print listings and tables.

The VisiTrend/Plot program is configured to print on an IBM 80-Character-Per-Second Matrix Printer. If you have one of the other supported graphics printers, see Appendix B; it is a simple process to change the configuration to one of the other supported graphic printers.

To print a copy of the chart from the screen to a printer move the cursor to Print, and press ↵. The program displays the Print menu. With the cursor on Print, press ↵. The program immediately prints the chart.

The Print menu allows you to specify the printer driver and to specify what printer is connected to the computer. The Driver option lets you change the printer driver for the current session. The Device option lets you change the selected printer for this session. The Configuration option lets you change both the printer driver and current printer for the current session and all future sessions. Exit returns you to the Plot menu.

NOTE: If you loaded the program with the printer turned off and the program cannot find the printer, select the printer with the Device option. This saves you from re-loading the program with the printer turned on.

SAVING THE CHART ON DISK

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

Move the cursor to Screen and press ↵. The Screen menu gives you the options of loading, saving, changing the data drive, or returning to the Plot menu.

At this point you can go ahead and save the chart on the current data disk.

Move the cursor to Save, and press ↵. If you have saved screens on the disk, their file names are displayed here, with [NEW FILE], and

[NONE] at the end. You are going to save the chart in a new file, so make sure the cursor is on [NEW FILE], and press ↵. The [NONE] item lets you exit the list without saving a file.

The status area asks for the file name. Enter **SCREEN1**, and press ↵. The VisiTrend/Plot program saves the displayed chart on the disk in a file named SCREEN1.PIX. The program adds the suffix PIX to the name. You never have to enter it.

When the screen image file has been saved on disk, the program displays the Plot menu.

RETRIEVING A CHART FROM A SCREEN IMAGE FILE

Select New to clear the screen. Then select None to return to the Plot menu. Finally, select Screen and then Load.

The program displays a list of the screen image files stored on the disk appears. Each file name ends with .PIX. The last entry in the list is [NONE]. When there are more file names than can fit on one screen, the last entries in the list are [NONE] and [MORE]. When the last screenful appears the last entry in the list is [NONE].

With the cursor on SCREEN1.PIX, press ↵. The program displays the chart you saved. This chart is identical to the original chart. The only way to tell that it is a screen image is with the Plot menu displayed. The Plot menu does not have a data series name or chart type in left side of the bottom status area line.

The only Plot or Options menu options that you can use with the screen image are Select, New, Print, Text, Screen, and Exit.

THE EXIT, TEXT, AND WINDOW OPTIONS

You have used all the options in the Plot menu except Exit, Text, and Window.

The Exit option lets you go to the Main subprogram, the Trend subprogram, or return to the Plot subprogram. The data series in memory are not lost when you change subprograms.

The Text option lets you create text-only screens and annotate charts. The text-only screens you create can be printed as well as displayed. The Text features for annotating charts allow you to place more information on the charts themselves. The use of the Text option is described in Lesson Five.

The Window option lets you two charts on the screen. The charts can be side by side or above and below each other. The use of the Window option is described in Lesson Five.

The next lesson describes the use of the Main subprogram. Following that, Lesson Three covers the Edit functions, and Lesson Four covers the Trend subprogram. You will be introduced to more plotting features, and experiment with area, XY, and high-low-close charts in Lesson Five.

SUMMARY

In this lesson you've learned how to use 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 titles, format options, and grid lines. You should be able to change scale and range, and store and retrieve a screen image.

FUNCTIONAL SUMMARY

To	From	Select/Enter
Load a data file	Main menu	1. Load 2. File name 3. Return/Print
Load the Plot subprogram	Main menu	1. Plot
Draw a line chart	Select menu	1. Line 2. Series name 3. Plot
Re-display or erase the Plot menu	Plot menu	1. Esc
Draw a bar chart	Select menu	1. Bar 2. Full/Left/Both/Right 3. Series name 4. Plot
Put fixed titles on a chart	Plot menu	1. Options 2. Title 3. Top/First/Second/ Third/Side 4. Title (end with @ to left-justify; correct with Esc) 5. Normal/Bold/Inverse

(Continued)

To	From	Select/Enter
Put a moveable title on a chart	Plot menu	1. Options 2. Title 3. Moveable 4. Desired title 5. 1 through 9 (change jump increment) 6. ↑, ↓, ←, → (position a moveable title) 7. Normal/Bold, Inverse 8. Exit
Erase a fixed title	Title menu	1. Moveable 2. .spaces. 3. ↑, ↓, ←, → (position a moveable title) 4. Normal/Bold/Inverse 5. Exit
Erase a legend	Title menu	1. First/Second/Third 2. Spaces
Restore original legend	Title menu	1. Legend
View the legend	Chart with status area	1. Esc
Change the scale	Options menu	1. Rescale 2. Y-axis minimum 3. Y-axis maximum 4. Number of intervals 5. Plot 6. If in scale: Plot If off-scale: Proceed/ Redraw
Set a new range and redraw the chart	Options menu	1. Range 2. Set 3. Start of range 4. End of range 5. Plot 6. Proceed
Return to the original range and redraw the chart	Options menu	1. Range 2. Clear 3. Plot
Erase all existing chart options	Plot menu	1. New

(Continued)

To	From	Select/Enter
Format a line or XY chart	Options menu	1. Format 2. Symbols/Lines/Points 3. Plot
Add grid lines	Options menu	1. Grid 2. Horizontal/Vertical/Both
Erase grid lines	Options menu	1. Grid 2. Horizontal/Vertical/Both
Change the printer	Plot menu	1. Print driver 2. Driver 3. Printer name 4. Yes/No (autolinefeed) 5. Exit
Print displayed chart	Plot menu	1. Print 2. Print
Specify printer	Plot menu	1. Print 2. Device 3. Name of default printer 4. Exit
Save displayed chart	Plot menu	1. Screen 2. Save 3. Existing/new file name
Erase axis labels	Options menu	1. Unlabel 2. Both/Horizontal/Vertical
Change background shade	Options menu	1. Background 2. Shade 3. Plot
Restore original background shade	Options menu	1. Background 2. Original 3. Plot
Change plotting shade	Options menu	1. Shade 2. Shade 3. Plot
Restore original plotting shade	Options menu	1. Shade 2. Original 3. Plot

LESSON TWO: MAINTAINING DATA

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

The Main subprogram is the first subprogram you encounter when you load the program. The Main subprogram lets you create, load, and save VisiTrend/Plot series data. It also lets you access DIF™ data from other VisiCorp products, such as the VisiCalc® program. (See Appendix D for DIF information.)

In the last lesson, you briefly used some Main subprogram functions. In this lesson, you will use it more fully.

GETTING TO THE MAIN MENU

If the VisiTrend/Plot program is not loaded, load it according to the directions in "Loading the Program" in the Introduction, and go to the following section.

If you are in the Plot subprogram from Lesson One, return to the Main subprogram. To get to the Main subprogram:

- If no menu is displayed, press Esc.
- If you are in the Plot menu, select Exit and Main.
- If you are in the Select menu, select None, Exit, and Main.
- If you are in the Options or Title menu, select Exit, Exit, and Main.

THE MAIN MENU

Each time you load the VisiTrend/Plot program, the Main menu, shown in Figure 2-26, appears at the top of the screen. (If you've gotten to the Main menu from the Plot or Trend subprogram, your screen is blank below the status area.)

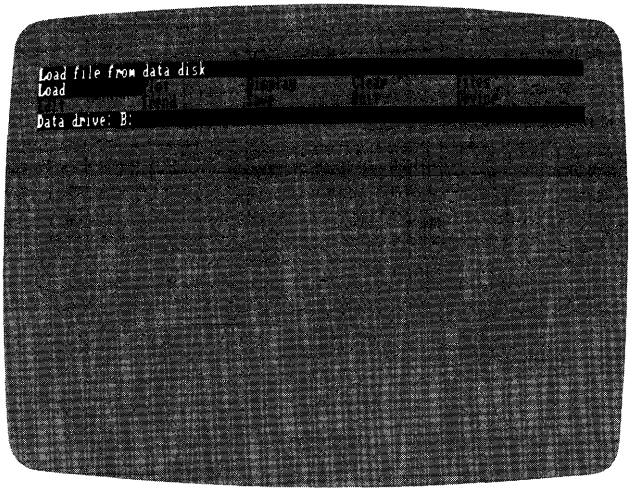


Figure 2-26. Main Menu

DISKS AND DISK DRIVES

Data disks store data, and the program disks store the VisiTrend/Plot program. The program disks are always used in Drive A. Your data disks can be used in any disk drive attached to your computer.

The bottom line of the Main menu identifies the current data disk drive, as shown in Figure 2-26. This is the drive that loads or saves data, and that has (or should have) the data disk. When both the program and data disks use Drive A, the program issues messages telling you when to change disks.

The data drive name is A:, B:, C:, or D:. The Device option lets you change the data drive.

Always check the drive name before selecting a function that uses the data disk and change it if necessary. If you try to load from a non-existent drive, empty drive, or drive with the door open, you get the error message: Can't access data diskette!.

Never store data on the program disks. The VisiTrend/Plot example disk contains all of the sample data used in these lessons. It also has space for many more. You used the SAMPLE1 file in Lesson One.

For the purposes of this lesson, make sure that the program disk is in Drive A and that the example disk is in Drive B.

Changing the Data Drive

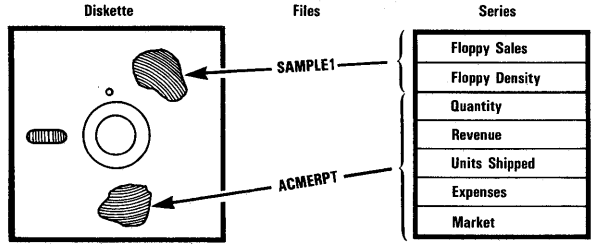
Move the cursor to Device and press ↵.

Move the cursor to drive name you want as the data drive and press ↵ again. The selected drive is the data drive until you change it again or until you exit the program. When you load the program, Drive B is always the data drive.

Files and Series

Data is stored on a data disk in files. This data can be a screen image, such as a chart, or it can be one more collections of data points. A file is nothing more than stored data that is identified by a file name.

The VisiTrend/Plot program processes data series. A series is a collection of data points. A series has a name just like a file. Series are stored in files. Figure 2-27 shows the relationship between files, series, and disks.



001-005

Figure 2-27. Relationship Between Files, Series, and Disks

A data series can be used only after the file in which it is stored is read into memory from the data disk. Reading the file does not erase it from the disk. When a file has been read into memory, the program processes the series individually. Files are used only for storage on disk.

Often series with related data are used together. Store related series in a single file in the same way you would store related documents in a single file folder.

The points to remember are:

- Both files and series have names.
- Files are units of storage on disks. The computer uses files for storing data.

- Series are units of data in files. The computer uses series for processing data.

File and Series Names

File names can be a maximum of 8 characters in length. If the name contains a period, only the portion of the name following the period is used. If the name contains a space, the space is removed. For example:

FILEA.X becomes X

FILEA X becomes FILEAX

The program appends a period and three letter suffix to file names. The suffix identifies the type of data in the file. The suffixes are:

SER Data series stored in the normal VisiTrend/Plot format.

DIF Data series stored in the DIF format.

PIX Screen image.

When the program displays the file names it also adds a prefix identifying the data drive. A data series file in the normal format on a disk that is in Drive B is displayed as:

B:FILEA.SER

Series names can be a maximum of 14 characters in length. The names can contain any characters including spaces and periods. No prefixes or suffixes are added to series names.

LOADING VISITREND/PLOT DATA

There are two ways to get series data into the computer: create it with the Edit option (described in Lesson Three) or load it from disk with the Load.

After you load the VisiTrend/Plot program and the Main menu appears, the cursor points to the Load option. The long prompt tells you that this option loads data from the data disk.

With the cursor on Load, press ↵.

A list of file names appears under the status area as shown in Figure 2-28. The cursor is no longer in the status area; it is pointing to the top name on the list.

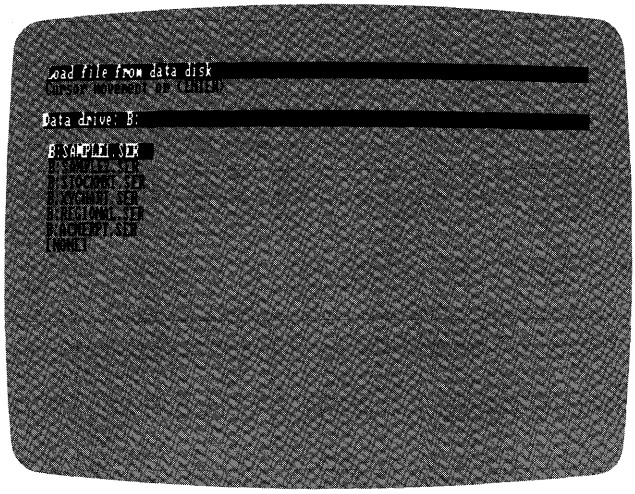


Figure 2-28. List of Files for Loading

You load a file by moving the cursor to the file name and pressing ↵. The ↑ and ↓ keys move the cursor up and down the list. Selecting [NONE] returns you to the Main menu without loading a file. If the whole list of files does not fit on the screen, the last itemd are [NONE] and [MORE]. Selecting [MORE] displays the next portion of the list. You are at the end of the list when the last item is [NONE].

Move the cursor to B:SAMPLE1.SER, and press ↵.

The program loads the **SAMPLE1.SER** file and displays a list of the series in the file, as shown in Figure 2-29.

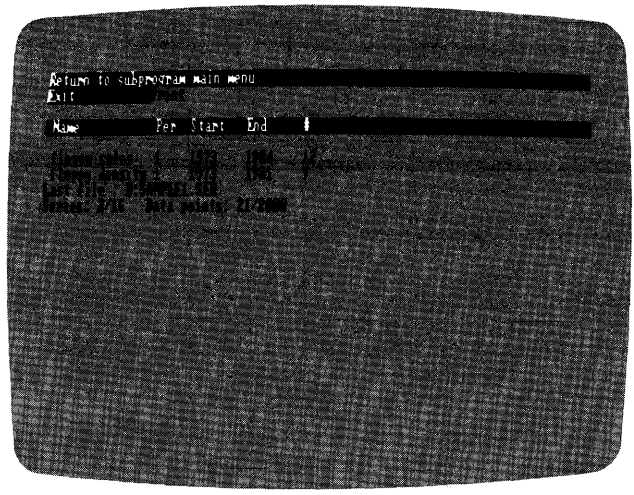


Figure 2-29. List of Series in Loaded File

You can select Exit, which returns you directly to the Main menu, or Print, which prints the list, and then returns you to the Main menu. Select Exit.

You can load more series into memory by repeating the load option.

There are two limiting factors on the number of files you can load: 16 data series or 2000 data points. You can load any number of files (up to 16) as long the total number of series does not exceed 16 and the total number of data points does not exceed 2000.

When either limit is reached, a message that there is no more room appears on the screen.

DISPLAYING THE SERIES IN MEMORY

Move the cursor to Display, and press ↵.

The list shows the names of the series, the period of the data (the frequency of data points per year), the start date, the end date, and the number of points in the series.

Following the list is the name of the last file you loaded and the total number of series and data points along with the maximums for each. With some simple arithmetic you can determine how may more series or data points you can load.

Select Exit to return to the Main menu.

FORMATTING A DATA DISK

Disks must be formatted before they can be used for data storage with the VisiTrend/Plot program. A data disk is any disk that is formatted by the VisiTrend/Plot Format function or the IBM DOS Format command. The example disk you are using is formatted.

Do not format the program or example disks. Formatting erases the data on the disk.

You should have a new, blank disk or a used disk that does not contain any useful data. Put that blank disk into the data disk drive, now.

Move the cursor to Files and press ↵. With the cursor on Format, press ↵.

The prompt reminds you that you have selected to format a data disk. Below the prompt is a message that gives you the choice of canceling the Format option by pressing the Esc key or proceeding by pressing any other key, such as ↵. Press ↵.

The Format function destroys all the data on a used disk. When the Format function is complete, you are returned to the Main menu. The disk can now be used for storing series data and screen images.

Remove the newly formatted disk from the drive and replace the example disk.

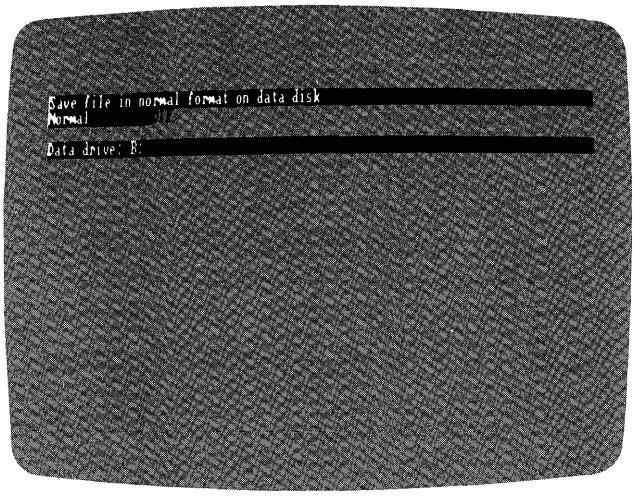
SAVING DATA

Now that you know how to format a data disk, you have to know how to write data onto it.

The Save function writes data in computer memory onto the current data disk. This is the only way to save data between VisiTrend/Plot sessions. If you turn the computer off or load a different program, you will lose the data in computer memory.

Move the cursor to Save, and press ↵.

The Storage Format menu, shown in Figure 2-30, gives you the option of storing data in the normal VisiTrend/Plot or the DIF format. If the data is to be used only with the VisiTrend/Plot program, save it with the Normal option. The DIF option stores data in a format that can be used by other VisiCorp programs, such as the VisiCalc program.

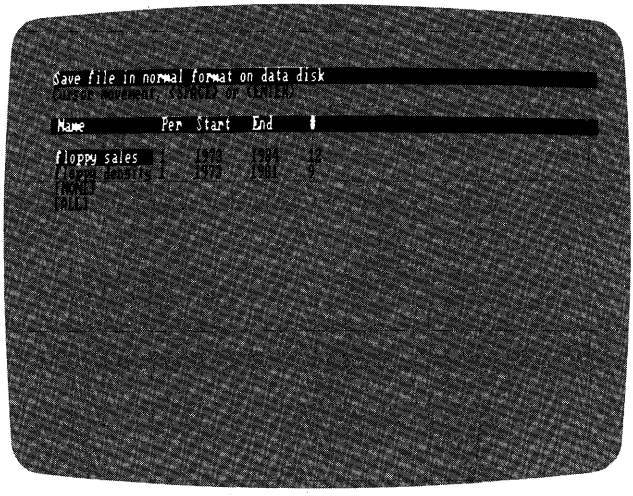


012-037/P

Figure 2-30. Storage Format Menu

With the cursor on Normal, press ↵ again.

Below the status area, the program displays a list of the data series in memory as shown in Figure 2-31. At the bottom of the list are the items [NONE] and [ALL].



012-038/P

Figure 2-31. List of Series for Saving

You can now:

- cancel the Save operation by moving the cursor to [NONE] and pressing ↵.
- save all the data series in a single file by moving the cursor to [ALL] and pressing ↵.
- save a single series by moving the cursor to the name and pressing ↵.
- save selected series in a single file by moving the cursor to the name and pressing the space bar. When you press the space bar, an asterisk (*) appears next to the series name. The asterisk means the series is selected to be saved when ↵ is pressed. The series to which the cursor points is also saved when you press ↵ even if it is not marked. You can unselect a selected-series by moving the cursor back to it and pressing the space bar again.

If the cursor is on [ALL] or [NONE], this option is used regardless of the number of asterisks in the list.

Move the cursor to [ALL] and press ↵. The directory of the files currently on the disk is listed under the status area. It is the same list you saw when you loaded the file. But there is a slight difference: there is now an entry called [NEW FILE] in this list.

You must select the file in which the selected series are to be saved, but you must be careful. If you select an existing file, you store the selected series in it, but you destroy all the data previously stored in the file. You must be careful not to erase any data you want to keep. For example, if you load a file that contains series 1, 2, and 3, then save only series 2 in the same file, the file will contain only series 2.

It is good practice to save all data in new files. If after a period of time you find you don't need the old data, you can erase the old file with the Delete function which is described later in this lesson.

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

Move the cursor to [NEW FILE], and press ↵.

When you choose to create a new file, the program prompts for a file name. Type **sample1**, then press ↵, and see what happens. An error message appears saying this file already exists; the Save operation is canceled. When saving series in a new file, you must use a file name different from all others on the data disk.

Press Esc to erase the error message and go back to the Main menu.

Remember to check the data disk drive assignment before beginning a Save. The data disk drive name cannot be changed during the operation. If you need to change the drive name but forgot to, cancel the Save function.

You can cancel a Save operation by selecting [NONE] from either the series name list or the file name list.

If you try to save data on a write-protected disk, you will get an error message and the Save operation will be canceled.

CLEARING SERIES FROM MEMORY

When you save data on a disk, the copy of the data in memory is not erased. After you have saved new and modified series on disk, you might want to clear them from memory to make room for new data you want to load. The Clear function erases some or all of the series from memory.

Move the cursor to Clear, and press ↵.

You can now:

- cancel the Clear operation by moving the cursor to [KEEP ALL] and pressing ↵.
- clear all the data series from memory by moving the cursor to [KEEP NONE] and pressing ↵.
- clear a single series from memory by moving the cursor to the name and pressing ↵.
- clear selected series from memory by moving the cursor to the name and pressing the space bar. When you press the space bar, an asterisk (*) appears next to the series name. The asterisk means the series is selected to be cleared when ↵ is pressed. The series to which the cursor points is also cleared when you press ↵ even if it is not marked. You can unselect a selected-series by moving the cursor back to it and pressing the space bar again.

You are going to clear the series Floppy Sales from memory. Remember, this doesn't affect the copy of the series that is on disk. Move the cursor to Floppy Sales, and press ↵.

After you press ↵, the program displays an updated list of the series in memory and gives you the choice of printing out the list of series or returning to the Main menu. Press ↵ with the cursor on Exit.

MOVING BETWEEN SUBPROGRAMS

When you are done loading and editing data, you normally want to go to either the Plot or the Trend subprogram. The Plot option loads the Plot subprogram. The Trend option loads the Trend subprogram.

You loaded the Plot subprogram in the Lesson One. In this lesson you will load the Trend subprogram.

Move the cursor to Trend, and press ↵.

Unlike the Plot subprogram, you can load the Trend subprogram without first loading or creating data series. The Trend subprogram contains the same edit functions as the Main subprogram; therefore, you can create data series in the Trend subprogram.

When the Trend subprogram is loaded, the Trend menu is displayed. Move the cursor to Main, and press ↵. Now the direction is reversed: you leave the Trend subprogram and return to the Main subprogram. The Main menu is again displayed.

When the Trend menu is displayed, you can also go directly to the Plot subprogram. Just move the cursor to Plot, and press ↵. The Plot subprogram will display the Select menu.

To go to the Trend subprogram from the Plot subprogram, start with the Plot menu displayed. Then select Exit and Trend. When the Trend menu appears, the Trend subprogram will be loaded.

When you load the Plot or Trend subprograms, you usually have one or more series in memory. (When going to Plot, you must have data in memory.) The data in memory is preserved when you change subprograms.

To see for yourself that the data is kept, move the cursor to Display and press ↵. Look at the list and remember what is on it. Now load the Plot subprogram and select any chart type from the Select menu. Compare the list of series with the list from the Display function. They are identical. No data was lost in the transition.

Now go to the Trend subprogram. Select the Display option and you will find that the list has not changed. The data remains no matter which program you load.

Select Main and return to the Main subprogram.

DELETING FILES FROM THE DATA DISK

You should delete files from your data disk from time to time to make space for new files and get rid of out-dated files. For this part of the lesson, remove the example disk and insert the disk you formatted with the Format function.

Save whatever series are currently in memory on the disk under the name **FILEA**.

The Delete function erases one file from your data disks. This function is part of the Files option. Move the cursor to Files and press ↵. Then move it to Delete, and press ↵ again.

The file name is displayed below the status area. Move the cursor to the file name and press ↵. Because this function permanently erases files, you are asked to verify that you do, in fact, want to erase a file. You must press the Y key to continue the Delete function. If you press any other key, the function is canceled. Press the Y key.

If the data disk has a write-protect tab on it, the file is not deleted.

You can verify that the file is deleted from the disk by selecting the Delete option again. The name FILEA is not in the list. Do not delete any other files from this disk. Move the cursor to [NONE] and press ↵.

EXITING THE VISITREND/PLOT PROGRAM

There is one remaining option in the Main menu, Quit. This option exits the VisiTrend/Plot program and puts you into the IBM DOS environment. The program tells you to insert a DOS disk in Drive A. Put Disk #1 into Drive A and press ↵. The A> prompt is displayed. The VisiTrend/Plot program is cleared from memory. To reload the VisiTrend/Plot program press the Ctrl, Alt, and Del keys simultaneously.

USING VISICALC DATA IN THE VISITREND/PLOT PROGRAM

This section describes how to move data from the VisiCalc program (Version 177 or later) to the VisiTrend/Plot program. If you do not use both of these products or have no need to transfer data, you can skip this section and go to the summary at the end of Lesson Two.

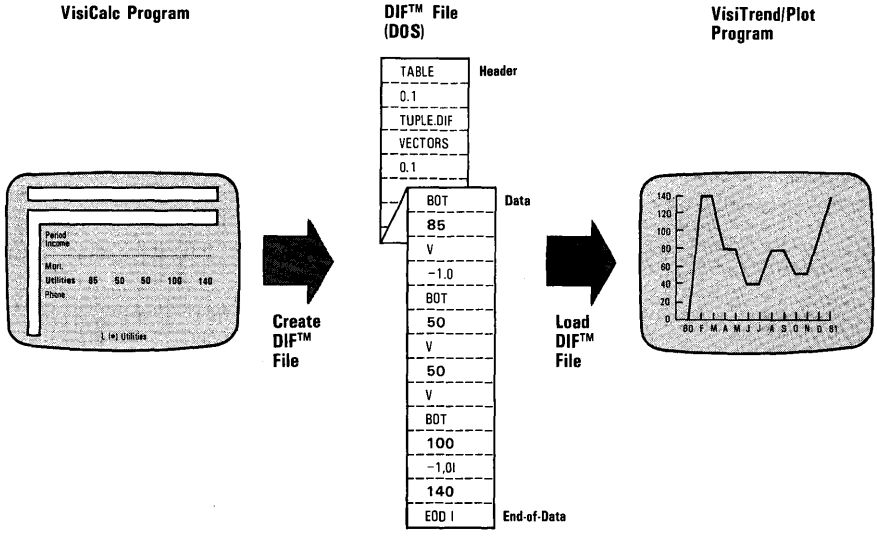
You can load and plot VisiCalc data with the VisiTrend/Plot facilities. The VisiCalc data must be saved in a DIF file.

You must use the /S# command to save the VisiCalc data in the DIF format. The stored data should be a sequence of data values that are meaningful to plot. When you enter data in a VisiCalc worksheet, do not mix periodicities.

You can store the VisiCalc data in rows or columns. A single file can contain up to 16 rows or columns. Each row or column is treated as a data series. When a row is used, the first field in the row becomes the data series name if it is a label. When a column is used, the first field in the column becomes the data series name if it is a label. If the first field is not a label, the VisiTrend/Plot program supplies a name for each series in the sequence: 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 these missing items for each series.

The following exercise takes two data series, Utilities and Telephone, from a VisiCalc worksheet, stores it as a DIF file, then loads it into the VisiTrend/Plot program as a data series. The steps in this exercise are summarized in Figure 2-32.

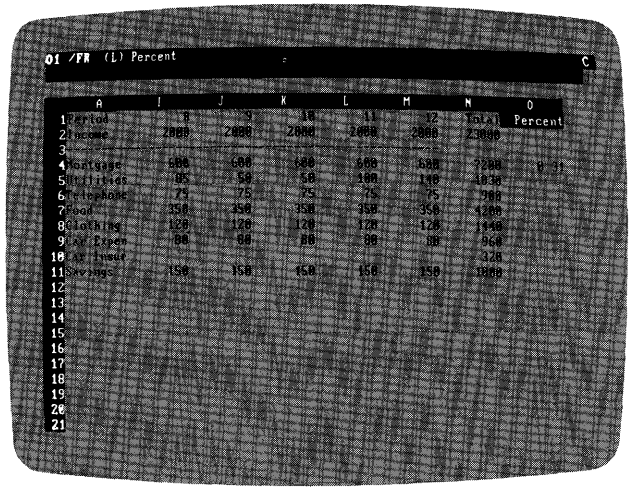


012-003

Figure 2-32. Using VisiCalc Data for Plotting

The VisiCalc worksheet to be used is from the personal budget example in Lesson Four of the VisiCalc manual. If you did the exercise in that lesson, you can store a portion of it on a VisiTrend/Plot data disk as a DIF file. Follow these instructions to create a DIF file from two rows of data in the VisiCalc worksheet:

1. Load the VisiCalc program; then load the VisiCalc file containing the worksheet created in VisiCalc Lesson Three. The screen with the worksheet on it should look like Figure 2-33.



005-016/P

Figure 2-33. VisiCalc Worksheet

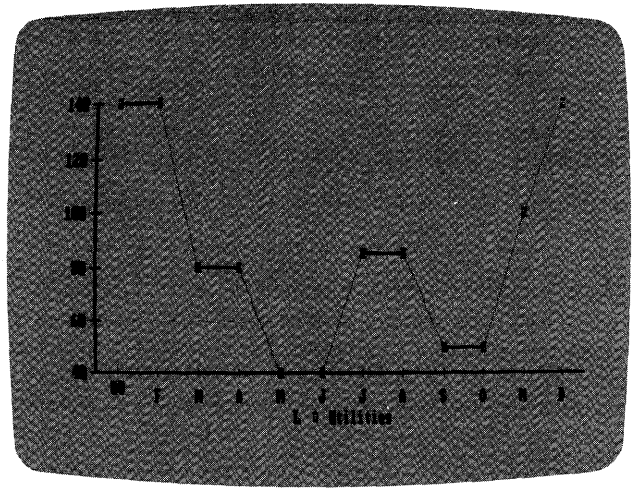
2. Move the cursor to the Utilities label. The cursor location marks the upper-left corner of the rectangle of data to be saved. The lower-right corner is specified later.
3. Enter **/S#** to save the data in the DIF format.
4. Enter **S** (SAVE).
5. Enter the name **UTIL.DIF**. You must add the suffix .DIF to the file name.
6. Specify the lower-right corner M7.
7. Enter R to save the data in rows.

Load the VisiTrend/Plot program. Select Load function and load the file named UTIL.DIF. Move the cursor to this file name, and press ↵.

The loading of the file begins. When the file has been loaded, the drive stops and the program prompts for a period for the first data series. Enter **12** because the data in this file is on a monthly basis. Next you are prompted for a major start date (year). Enter **1980**. Finally, you are prompted for a minor start date (period). Enter **1** for January. The program then asks for the same information for the second data series. Enter the same values as you did for the first series.

The program displays the list of series in memory. The B:UTIL.DIF file contains two data series named Utilities and Telephone. The series names are taken from the label in the first cell in the VisiCalc row.

You can go to the Plot subprogram and create a chart of these data series from your VisiCalc worksheet. If you've followed all the steps in this lesson so far, you can create a line chart using the Utilities data series that looks like Figure 2-34.



012-040/P

Figure 2-34. Chart Plotted from VisiCalc Data

You can also modify the data with the VisiTrend/Plot Edit or Trend functions (described in Lesson Three and Lesson Four). After modifying the data you can return to the VisiCalc program and put the data back into the worksheet.

USING VISITREND/PLOT DATA IN THE VISICALC PROGRAM

The following steps show you how to take a data series from the VisiTrend/Plot program and use it to build a VisiCalc worksheet. These steps are summarized in Figure 2-35.

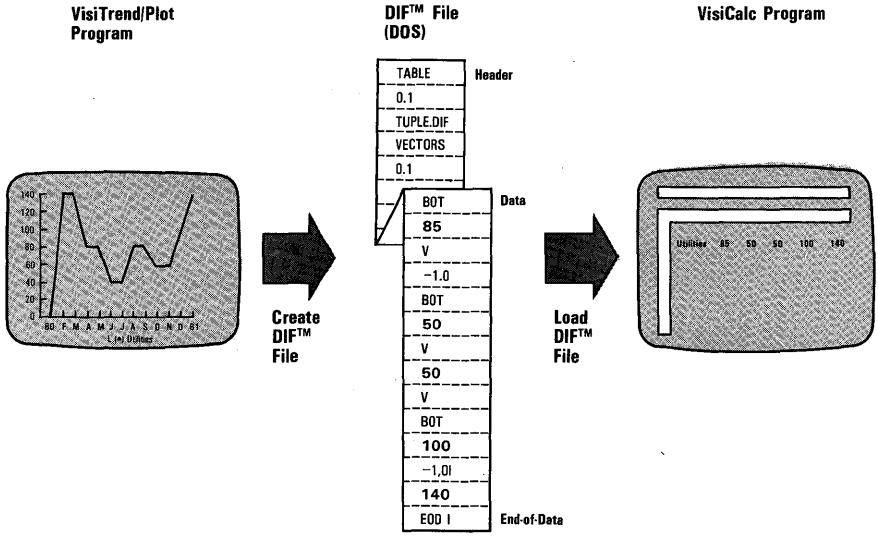
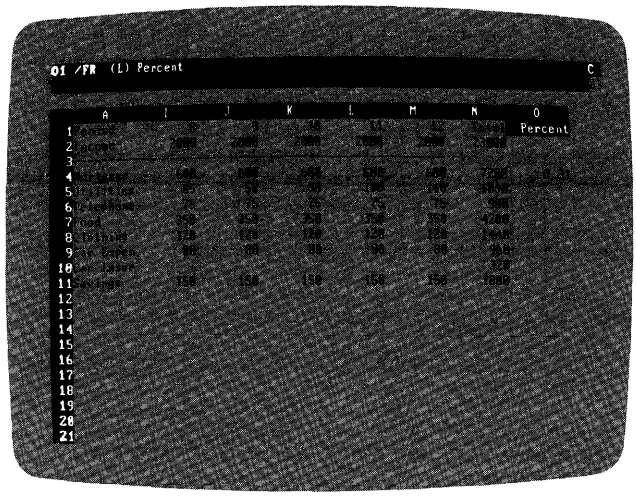


Figure 2-35. Using Data Series in the VisiCalc Program

Data saved in the DIF format does not contain the formulas, if any, from the worksheet. If the data series contains more than 63 data points, you must load it into a VisiCalc spreadsheet by columns.

1. Clear memory and Load the SAMPLE1.SER file from the example disk. Then Save both series in the DIF format under the name SAMPLE1D. The program adds .DIF to the name.
2. Load the VisiCalc program.
3. Load the SAMPLE1D.DIF file into the VisiCalc program from the VisiTrend/Plot data disk with the /S#L.
4. The data series in the SAMPLE1D.DIF file appear as two rows of values in the VisiCalc worksheet. Your screen should look like Figure 2-36.



005-016/P

Figure 2-36. Data Series Loaded in VisiCalc Worksheet

You can add data to this VisiCalc worksheet using additional DIF files that contain data series created in the VisiTrend/Plot program.

Notice that the VisiTrend/Plot series names do not become labels when transferred into the VisiCalc worksheet. You must add labels.

It is important to remember that the /S# command does not load or save VisiCalc formulas, only data values.

If you wish to create your own DIF programs for use with the VisiTrend/VisiPlot program, you will find the information in Appendices C and D helpful. For complete details on DIF, see the *Programmers Guide to the Data Interchange Format*, document number SATN-18, which is available from the DIF Clearinghouse, P.O. Box 527, Cambridge, MA 02139.

SUMMARY

This completes the Main subprogram functions except for Edit which is described in Lesson Three. You have used all the other Main subprogram functions. You might want to go back to the Load function and look at some of the other files on the program disk.

If you have any trouble with a function, look it up in Chapter Three (the Reference) or this lesson.

FUNCTIONAL SUMMARY

To	From	Select/Enter
Load data files without printing series information	Main menu	1. Load 2. File name 3. Exit
Load data files and print series information	Main menu	1. Load 2. File name 3. Print
List series in memory	Main menu	1. Display 2. Exit/Print
Change data disk name	Main menu	1. Device 2. Desired name.
Save one series in a file	Main menu	1. Save 2. Normal/DIF 3. Series name 4. File name/[NEW FILE] then file name
Save all series in a file	Main menu	1. Save 2. Normal/DIF 3. [ALL] 4. File name/[NEW FILE] then file name
Save several series in a file	Main menu	1. Save 2. Normal/DIF 3. Each series name except last ... Last series name 4. File name
Format a floppy data disk	Main menu	1. Files 2. Format 3. Put unformatted disk

(Continued)

To	From	Select/Enter
Delete data files from disk	Main menu	1. Files 2. Delete 3. File name 4. Y to proceed
Clear all series	Main menu	1. Clear 2. [KEEP NONE]
Clear one series	Main menu	1. Clear 2. Series name
Clear several series	Main menu	1. Clear 2. Series and press space bar 3. Last series and press ↵
Enter Trend subprogram	Main menu	1. Trend
Return to Main subprogram	Trend menu	1. Main
Enter IBM DOS	Main menu	1. Quit

LESSON THREE: THE EDIT FUNCTION

The purposes of the VisiTrend/Plot Edit function are to:

- Create new data series.
- Modify existing data series.

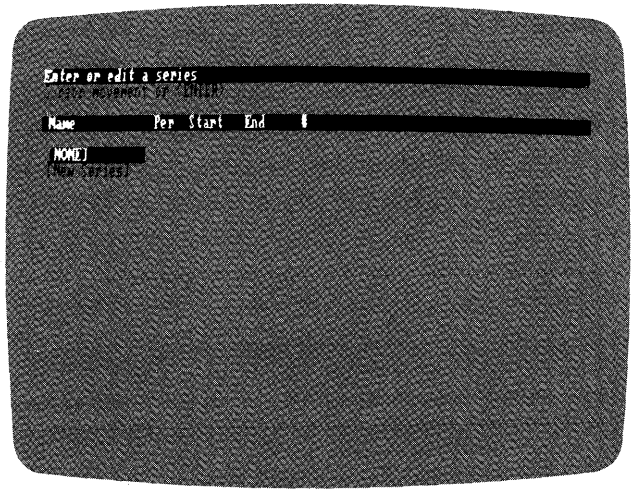
Identical Edit functions are available in the Main and Trend subprograms. This lesson uses the Edit function in the Main subprogram.

Load the VisiTrend/Plot program or return to Main subprogram if you are in the Plot or Trend subprogram. You do not have to load a file; in this lesson you will create a new data series. If you have data series in memory, you can leave them there. However, if memory is full, that is, if it has 16 series in it or 2000 data points, clear some of the series before continuing with this lesson.

Move the cursor to Edit and press ↵.

USING EDIT

After selecting the Edit function, you must enter a name for a new series or select an existing series from the displayed list. You did not have data in memory only [NONE] and [New series] are in the list as shown in Figure 2-37.



012-041/P

Figure 2-37. Series List for Editing

[NONE] returns you to the Main menu.

In this lesson you will enter data for a series called First. Move the cursor to [New Series], and press ↵. The status area changes to the data-entry format and prompts for a series name.

Type **First** then press ↵. Remember, you can correct typing mistakes with the BKSP key. The BKSP key erases the last character typed.

Next enter the period of the new series. The prompt shows the default period the program will use if just press the ↵ key. If you have not entered a different period in this session, the default period is 1. The default period is 1 or the last period you entered during this session.

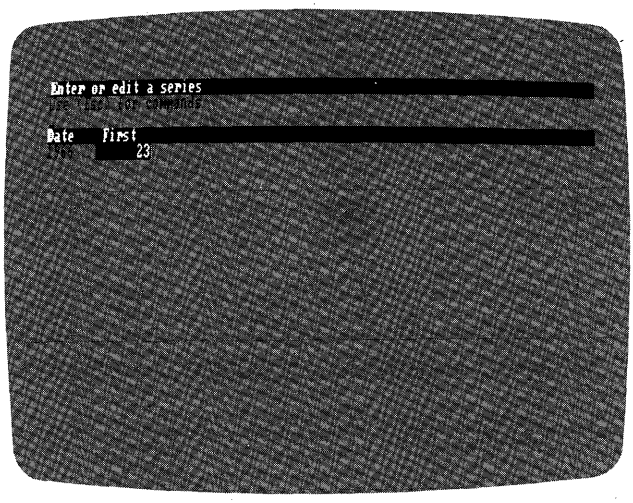
Type **1** and press ↵.

Next enter the start date of the new series. The program asks for a year. If the period is other than 1, you are prompted for the start year and period. A series can begin at any period in its start year. If you do not enter a date and only press ↵,the date 0 is used.

Enter **1966** and press ↵.

Finally, the program asks for the first value in the new series. The bottom line of the status area contains Date and First, as column headers. The cursor is in the column headed by the series name.

The value for 1966 is 23. Type **23**. The value appears in the third line of the status area until ↵ is pressed. You can correct it with the BKSP key. When it is correct, press ↵. The value appears under First. The start date is in the Date column. The display for creating a new data series is shown in Figure 2-38.



012-042/P

Figure 2-38. Creating a Series

The status area now reminds you that pressing Esc displays the Edit commands. This completes the initial sequence for entering a new series. If you had selected an existing series, you would have come immediately to this point in the program. The only difference is that a series, or the first 20 data points of the series, would be displayed on the screen.

Adding Values to the Series

To add a value for the year 1967, press the ↓ key. The date 1967 appears under 1966, and the cursor moves down one line. Type 28. Again the value appears on the third line of the status area. Press ↵, and the value appears opposite 1967.

Gaps are not allowed in the date sequence. The program automatically adds 1 to the date for each new entry. If the period is 1, the year is incremented by 1. If the period is other than 1, the period is incremented and the year is incremented when the period goes full cycle.

To add the next few values, repeat the preceding process: press the ↓ key, enter the value, and press ↵. Enter the values 33, 37 and 41. Note that a solid bar separating the dates from the values appears after you make a couple of entries.

There is a shortcut for entering new data. Press the ↓ key again to show the date 1971, type 44, but do not press ↵. Instead, press the ↓ key again.

The value 44 enters the correct place, and the cursor moves down a line to the next date.

Add the remaining values in this manner. Press the ↓ key and enter the values 44, 53, 61, 75, 64, 73, 82, and 79.

After entering the last value, the cursor is below the list with the date 1980. We don't have a value for 1980, so press ↑. The cursor moves up to the 1979 value, and the 1980 date disappears.

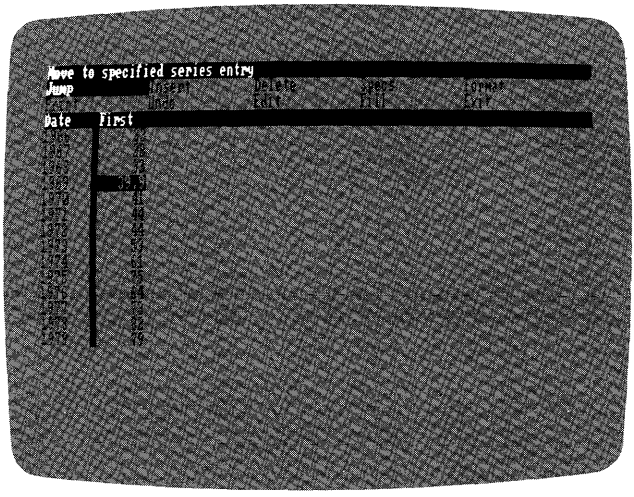
Replacing a Value

You can replace a value by moving the cursor to the old value and entering the new value. The new value replaces the old value when you press the ↵ or ↓ key.

With the ↑ key, move the cursor to the entry for 1969 which is 37. This value should have been 39.9. Type 39.9, and press ↵. 37 is replaced with 39.9.

THE EDITOR COMMANDS

You have been entered data and done simple modification with the Edit function; you can do more with the Edit Command menu, press the Esc key. The program displays the Edit menu as shown in Figure 2-39.



012-043/P

Figure 2-39. Edit Command Menu

With the Edit Command menu you can:

- Jump to a specific year (and period) within the series.
- Insert new data points between data points.
- Delete data points.
- Change the specifications (Specs) of a series.
- Format the manner in which data is displayed.
- Print the contents of a series.
- Undo (erase) all changes made to a series.
- Return to the entry level (Edit).
- Fill areas of a series with values generated by predefined algorithms.
- Exit to the Main menu, and save the work you have done.

Exit: Leaving the Edit Function

Move the cursor to Exit and press ↵. This option returns to the Main menu. When you exit route, the work you created or modified is kept in memory.

Returning to the Edit Function

Select Edit again. This time select the file named First, the one you just created. You are at the entry level of the Edit function. This time you don't have to enter a name, period, or starting date. The contents of the series are displayed. The status area contains the message about using the Esc key.

Jump: Moving from Point to Point

The Jump command lets you move from date to date in the series without repeatedly pressing an arrow key. Press Esc. The cursor is on Jump when you enter the Edit Command menu. Press ↵

You can move by pressing the ↑ or ↓ keys or by typing the year.

Pressing the ↓ key moves the cursor to the last entry in the series. The ↑ key moves the cursor to the first entry in the series. After the jump, you are returned to the Edit entry level.

If you enter a year, the cursor moves to that year. If the series has a period other than 1, you are prompted for the period also. If the specified year is displayed, the cursor simply jumps to it. If the year is on a screen other than the first screen of the series, the first screen is erased and the date appears at the bottom or top of a new screen (depending on the direction you are moving in the series). The cursor is on the value for the specified date.

If the date does not exist in the series, the program beeps and the date is not accepted. At this point, you should enter a valid date.

Press ↓ to jump to the end of the series.

You can return to the Edit menu without making a jump by pressing the Esc key.

Insert: Adding an Entry

The Insert command lets you add a value at the current cursor location in the series. Insertion with this command works like adding a value except that it operates anywhere in the series, not just at the end. The command inserts new data at the cursor location. All values at and below the cursor are pushed ahead to the next date. You can insert any number of lines as long as the series does not exceed the 250 data point maximum.

Move the cursor to value for the year 1969: 39.9. Press Esc. Select Insert. Type **35** and press ↵. 35 becomes the value for 1969 and all following values move up one year.

Pressing the ↵ key inserts a single value. If you have more than one value to insert, type the new data and press the ↓ key. Press ↵ after the last entry. You can correct errors with the BKSP key before pressing the ↵ key or the ↓ key. Pressing the ↵ key returns you to the entry level.

Delete: Erasing a Data Point

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

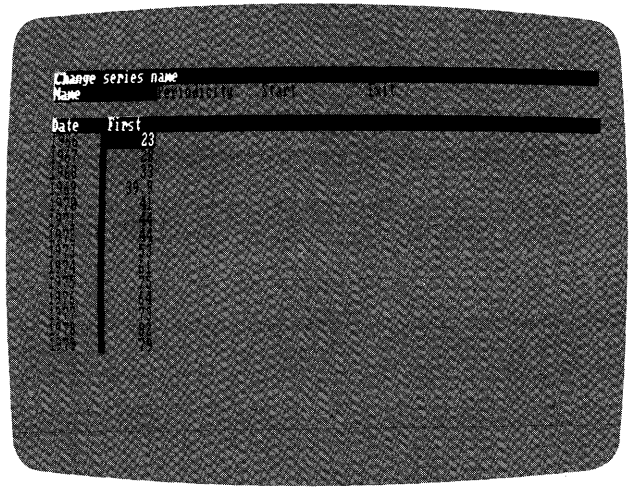
Move the cursor to the new value for the year 1969: 35. Press Esc. Select Delete. The status area shows the range to be deleted: 1969 to 1969. Move the cursor up and down and watch the range change. Return the cursor to the 1969 value and press ↵. The 35 is erased and the following values move back to their original positions.

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

Pressing ↵ when 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 return to the entry level.

Specs: Changing the Series Specifications

The Specs command lets you change the name, period, or start date of the series. This command displays the Specification menu which is shown in Figure 2-40.



012-044/P

Figure 2-40. Specification Menu

When you change a series specification, the change takes place immediately on the screen. A new series name replaces the old name when you press ↵. A new period or starting date changes the date and/or period on the screen. The data points do not change, only their date and/or period.

Press Esc. Select Specs. Move the cursor to Periodicity and press ↵. Type **2** and press ↵. The dates change from 1966 through 1979 to 1966 through 1972 with 2 periods per year.

You can press the ↵ key without entering data. When you do this, the program assumes values. For Name, it generates the name **SERIESn**, where n is a number from 0 through 99. For Periodicity, it uses the default period. For Start, it uses the date 0 and, if applicable, the period 1.

You can return to the edit entry display without changing a specification by selecting Exit.

Format: Changing the Data Display

The Format command lets you specify how the series data is displayed. You can select fixed-decimal format and specify the number of digits to the right of the decimal point (0 to 6) and column width (6 to 16). Or you can select the floating-decimal format and specify the column width.

The command first prompts for a number of decimal places (0 to 6) or the floating-decimal format (−1). Pressing ↵ retains the current format and precision. Next, it asks for the column width. Pressing ↵ retains the current column width.

In the floating point format the numbers limited to 7 digits of precision, if possible. The displayed number are accurate up to 7 digits. In the fixed format, the data is displayed as you request. This can result in the display of numbers far beyond the program's internal storage precision.

If the program displays a series of greater than symbols (>>>>>>>):

- The value is too large for the column width. If this is the case, increase the column width.
- You are in the fixed format and the number can only be displayed in the floating format. Table 2-2 shows how different values are displayed in the two formats.

Table 2-2. Numeric Display Format Ranges

Value	Floating Format	Fixed Format
X < .000001	in exponential format	>>>>>>>>>
.000001 < x < .001	in exponential format	as entered
.001 < x < 10000000	as entered	as entered
X > 10000000	in exponential format	>>>>>>>>>>

If you do not choose a display format, the current format is used.

Press Esc. Select Format. Type **1** and ↵ for the fixed-decimal format with one decimal place. Type **10** and ↵ for a column width of 10.

The Format command does not affect how the values are stored, only how they are displayed. The format remains in effect until changed or until you exit the Edit function.

Print: Listing a Series

The Print command lets you print the displayed series in its entirety on your printer.

When Print is selected, the displayed series is printed without the bold bars, and without any blank lines at the bottom of the screen.

If you have a printer, press Esc and select Print.

After the displayed series is printed, you are returned to the entry level.

Undo: Remove All Changes

The Undo command cancels all the changes, except Format, made to the series since you selected the Edit function. If you Undo a newly created series, it is completely erased.

Press Esc and select Undo. The series is returned to its condition when you last selected it for edit.

Keep in mind that the Undo command removes all changes made since selecting the series, not just the last change.

Edit: Returning to the Entry Level

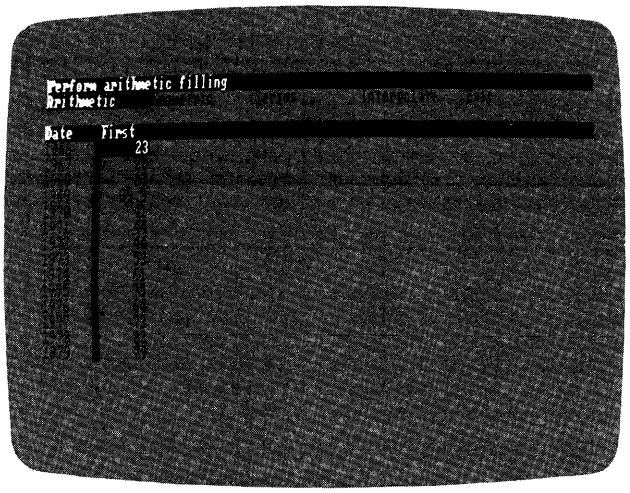
The Edit command takes you back to the entry level of the Edit function without executing any of the Edit commands.

Press Esc and then select Edit.

Fill: Adding to a Series

The Fill command inserts values into the middle of a series and interpolates missing values. You can insert values in an arithmetic or geometric progression beginning with the value at the current cursor location. You can also select a whole series and insert it into the series being edited. You can fill in missing values in a series, interpolating between two known values.

The Fill command displays its own menu, shown in Figure 2-41.



012-045/P

Figure 2-41. Fill Command Menu

The Arithmetic and Geometric functions operate in a like manner. They prompt for a number of values to be inserted. The number can be any value that, when added to the existing points in the series, does not exceed the maximum of 250 points in a series or 2000 points in memory. Next the function prompts for a factor to be used in the calculation of the new values. In the Arithmetic function, the next data point is computed by adding the factor to the previous data point. In the Geometric function, the next data point is computed by multiplying the previous data point by the factor.

The Series function displays the current list of series in memory. You can select a series to insert, in its entirety, 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 function.

The Interpolate function performs a linear interpolation of values beginning at the current cursor location and continuing to the first non-zero value. Point the cursor to the first zero value in the sequence before invoking the function. This function fills in missing data values for zero values in the data series. Interpolation ends with the first non-zero value.

If the value at the cursor is not zero, the command is canceled. If the value is zero, the function looks at the preceding period for a starting point and the next non-zero for an ending value. It then linearly interpolates all points in between.

The Exit option returns to the Edit entry level without performing a Fill command.

With the cursor on the 1966 value, press Esc. Select Fill and then select Geometric. Type **5** and ↵ to add 5 new data points. Type **2** and ↵ as the geometric progression factor. The program adds 5 points beginning with year 1967. Each new data point is double the previous point.

FUNCTIONAL SUMMARY

To	From	Select/Enter
Enter Edit function	Main Menu	1. Edit
Create a data series	List of series	1. [New Series] 2. Series name 3. 1 through 12 for periodicity 4. Starting year or reference point 5. Desired values 6. Exit 7. Save 8. Normal/DIF 9. New series name 10. Existing file name/[NEW FILE] then new file name
Edit a data series	List of series	1. Series name
Add a value	Series	1. DA beyond last vaue 2. New value
Go to the beginning or end of a series	Series	1. Esc 2. Jump 3. ↓, ↑
Go to a specific point	Series	1. Esc 2. Jump 3. Reference point
Change a value	Existing val.	1. New value
Insert a new value	Preceding value	1. Esc 2. Insert 3. New value
Delete one value	Value to delete	1. Esc 2. Delete 3. ↵

(Continued)

To	From	Select/Enter
Delete several values	Series	1. First value to be deleted 2. Delete 3. Last value to be deleted
Set fixed point	Series	1. Esc 2. Format 3. Number of places (0-6) 4. Column width (0-16)
Set floating point	Series	1. Esc 2. Format 3. −1 4. Column width (0-16) 5. Esc 6. Exit
Change column width	Series	1. Esc 2. Format 3. ↵ 4. Column width (0-16)
Add to/multiply previous value	Value	1. Esc 2. Fill 3. Arithmetic/Geometric 4. Number of values 5. Factor
Copy values from another series	Value	1. Esc 2. Fill 3. Series 4. Series name
Perform linear interpolation	Series	1. Esc 2. Interpolate 3. Value
Change name/period	Series	1. Esc 2. Specs 3. Name/Periodicity 4. New name/0-99
Change start of range	Series	1. Esc 2. Specs 3. Start 4. Year and period
Erase all changes	Series	1. Esc 2. Undo
Print series	Series	1. ↵ 2. Print

LESSON FOUR: THE TREND SUBPROGRAM

You need some familiarity with statistics to completely understand the Trend subprogram functions. However, you need no special background to use the program.

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

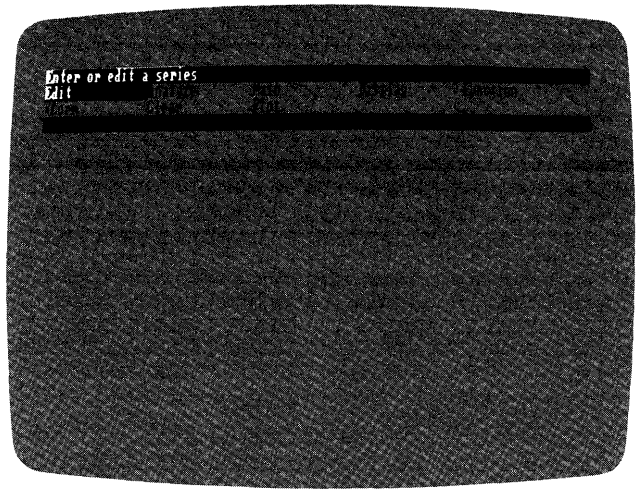
- Moving averages, smoothed data, percent of change, leading, lagging, and cumulative totals.
- Mathematical and logical transformations of data into new series.
- Linear multiple regressions with up to five independent variables (using ordinary least squares), including standard errors of coefficients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

LOADING THE TREND SUBPROGRAM

This lesson uses the series in the STOCKMKT.SER file. This file contains 13 series. If you have any new or modified series in memory, Save them on disk and Clear memory. Then Load STOCKMKT.SER and select Return to return to the Main menu. Now you are ready to begin the Trend subprogram lesson.

Move the cursor to Trend, and press ↵.

The Trend menu, shown in Figure 2-42, replaces the Main menu.



012-046/P

Figure 2-42. Trend Menu

Five of the eight menu items should look familiar. You used Edit, Main, Display, Clear and Plot in the Main or Plot subprograms. If you are not sure about the use of these functions, review their use in lessons One, Two, or Three.

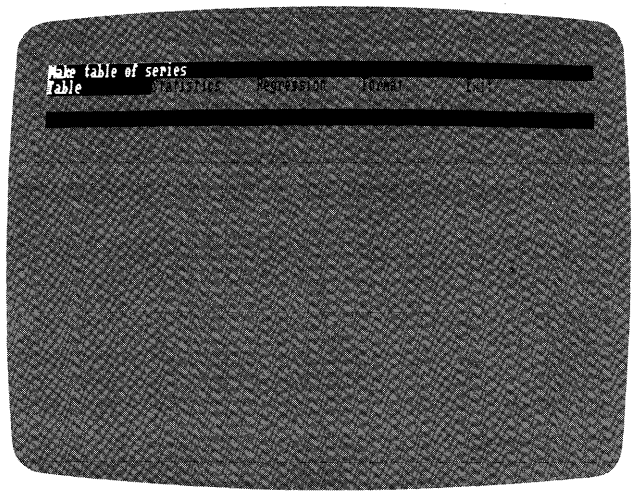
The remaining three functions are the heart of the Trend subprogram:

- Analyze performs linear multiple regression and trendline forecasting; calculates common data series statistics such as minimum, maximum, mean, variance, standard deviation, and coefficient of correlation; generates tabular output; and formats the displayed data.
- Function generates new series from existing ones. It calculates the moving average, percent of change, and cumulative total; does exponential smoothing; and generates leading and lagging series.
- Xform lets you develop your own transformation of a data series. It allows the creation of new series through mathematical and logical operations on existing series.

The Function options and Xform each create one new series. The multiple regression function in Analyze creates two new series. Before using these functions, select Display to make sure there is enough space for the new series. If there is not enough space, you must make space with the Clear function.

USING THE ANALYZE FUNCTION

Move the cursor to Analyze, and press ↵. The Analyze function displays the Analyze menu, shown in Figure 2-43.



012-047/P

Figure 2-43. Analyze Menu

There are two familiar functions in this menu: Exit and Format. Exit returns to the Trend menu without performing any operation. Format lets you specify how the data is displayed. This function works exactly like the Format function in the Edit Command menu. It lets you specify:

- Fixed or floating point formats.
- The precision (0-6 decimal places) in the fixed-point format.
- The column width (6-16).

The remaining menu items, Table, Statistics, and Regression, are described in the following sections.

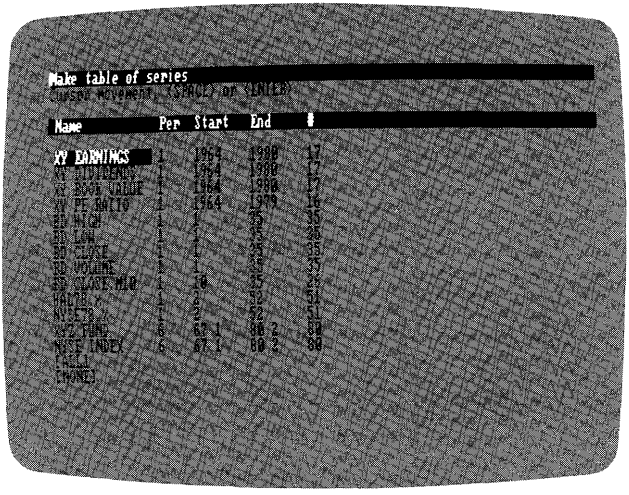
Listing Series in Table Format

The Table function lets you display information about a series on the screen or print it on a printer.

Because there is limited display space on the screen, this function does not display series for which it has no room. The number of series that can

be displayed depends on the column size specified in the Format function. You enter the program using a column width of 7 characters and the floating point format.

With the cursor on Table, press ↵. The program displays list of series as shown in Figure 2-44.



012-048/P

Figure 2-44. List of Series for a Table

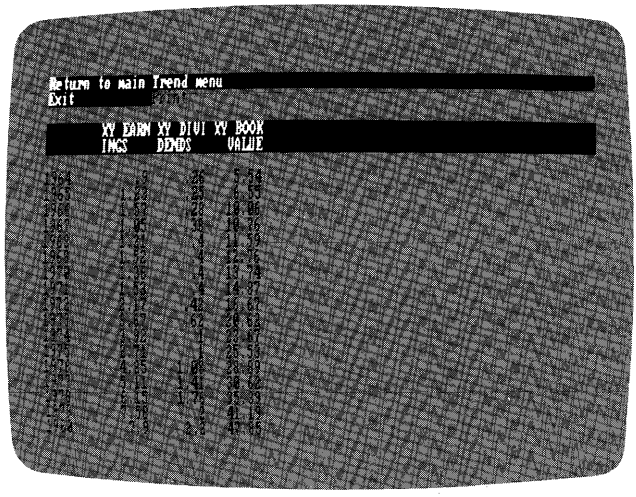
You can select a single series by moving the cursor to the name and pressing ↵. To select two or more series, move the cursor to each name in turn and press the space bar. As you have seen before, pressing the space bar marks a name with an asterisk (*), indicating that the series will be selected when ↵ is pressed. You can remove the asterisk (and deselect the item) by pressing the space bar a second time.

[ALL] selects all items on the list. Unless the list is small, not all series will fit on the screen. [NONE] exits the function without selecting a series.

Move the cursor to XY EARNINGS, and press the space bar. Do the same with XY DIVIDENDS. Move the cursor to XY BOOK VALUE, and press ↵.

The program displays the union of the series ranges (the earliest start date and the latest end date). The maximum range is 250 data points. You can Keep that range or Change it. If you decide to Change it, you are asked for start and end dates and, if applicable, periods. Select Keep.

This function lines the values up by date for easy comparison and evaluation. The dates are down the left side of the screen. The series are displayed in the order in which you selected them. If a series name is too long for one line, it is split between two lines. If possible the program splits the names at spaces. Names that do not fit on two lines are truncated. The table in Figure 2-45 contains information from the XY EARNINGS, the XY DIVIDENDS, and XY BOOK VALUE series.



012-049/P

Figure 2-45. Table of Series

The status area gives you the choice of continuing or printing the table on the printer.

You always have the choice of printing the display before exiting to the Trend menu. The program can display a maximum of 19 lines of data points on the screen. When there are more data points to be displayed, you have the option of exiting to the Trend menu, continuing to the next set of data points, or printing the current screen.

Select Exit.

Calculating Series Statistics

The Statistics function displays a table of common descriptive statistical measurements:

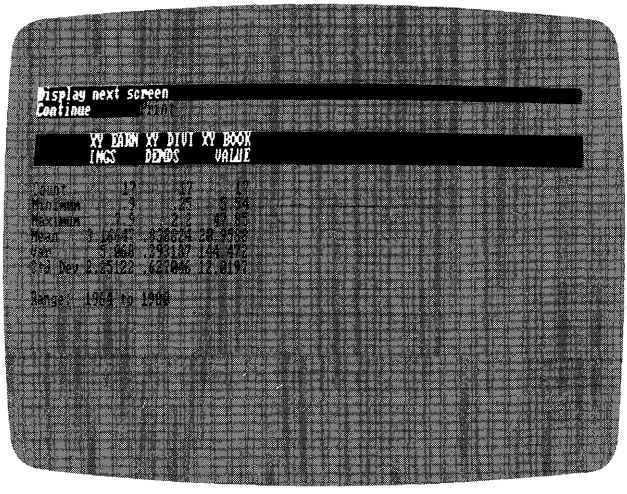
- The count of data points in each series that were used in the calculations.

- The minimum and maximum values in each series.
- The arithmetic mean (average) of each series.
- The variance for each series.
- The standard deviation for each series.
- If more than one series is selected, the coefficients of correlation between all combinations of the selected series.

Move the cursor to Analyze and press ↵. Then move the cursor to Statistics and press ↵. The function displays the list of series just as Table did. Select XY EARNINGS, XY DIVIDENDS, and XY BOOK VALUE.

The range is displayed, and you have the option of keeping this range or changing it. The range used by the Statistics function is the intersection of the ranges (that part of all selected series that is common to the others) of the selected series, not the union of ranges the Table function used. Press ↵ with the cursor on Keep.

When the computations are complete, the calculated values are displayed in columns with the 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 2-46 shows how the specified statistics are displayed.

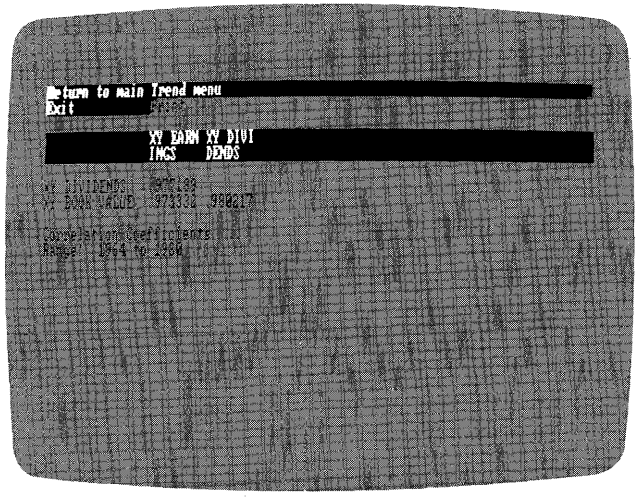


012-050/P

Figure 2-46. Statistics Function Display

You have the option of continuing or printing the statistics. The only way to save the statistics is to print them now; they are not saved on disk or in memory. If you press Continue, a display of correlation coefficients appears. Print prints the display on the printer. Correlation coefficients are not calculated if any series has a variance of 0.

Select Continue. The function calculates the coefficients of correlation between the three selected series and displays them in a matrix as shown in Figure 2-47.



012-051/P

Figure 2-47. Coefficients of Correlation Display

You have the choice of printing the coefficients or exiting. With the cursor on Exit, press ↵. You return to the Trend menu.

Performing a Linear Multiple Regression

The final option on the Analyze menu is Regression which performs a linear multiple regression (least squares). Multiple regression is a method of developing a formula that relates a single variable (called the dependent variable) to a possible five other variables (called the independent variables). The resulting equation should explain the dependent variable in terms of the independent variables and a constant. Put another way, the Regression function can tell you if there is a linear relationship between the independent and dependent series.

The VisiTrend/Plot Regression function accepts up to five independent variables. The function requires, as a minimum, as many data points in the intersection of the ranges as there are coefficients to be estimated. If a constant to be computed in the regression, minimum number of data points increases by one.

This technique can be used to forecast the output of one industry on the basis of the output of another industry. For example, we should be able to show that the steel industry follows the performance of the auto industry. It can also 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:

$$y(i) = B + m(1)x_1(i) + m(2)x_2(i) + \ldots + m(5)x_5(i)$$

NOTE: You can do exponential and other types of regressions by using the Xform option to convert series to a form acceptable for a linear multiple regression. The Xform option is described later in this lesson under "Writing Your Own Series Transformation."

The Regression option 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 in the Reference chapter under "The VisiTrend/Plot Menu Functions."

The Regression function generates two new series. The first is a fitted series developed from the generated constant and coefficients. The second is a series of the differences (residuals) between the actual dependent series values and the fitted values. The new series have the same name as the dependent series with a qualifier appended to the name. The qualifiers are listed in Table 2-3.

Table 2-3. Regression Series Name Qualifiers

Qualifier	Purpose	Comments
.Fnn	Fitted series	nn is a program-generated number
.Rnn	Residual series	nn is the same for the fitted and residual series from a single regression.

Move the cursor to Analyze and press ↵; then to Regression and press ↵.

The names of the series in memory are displayed. The status area directs you to select a dependent variable. Move the cursor to XY PE RATIO, and press ↵. This example tests to see if the price/earnings ratio can be explained by the earnings, dividends, and book value.

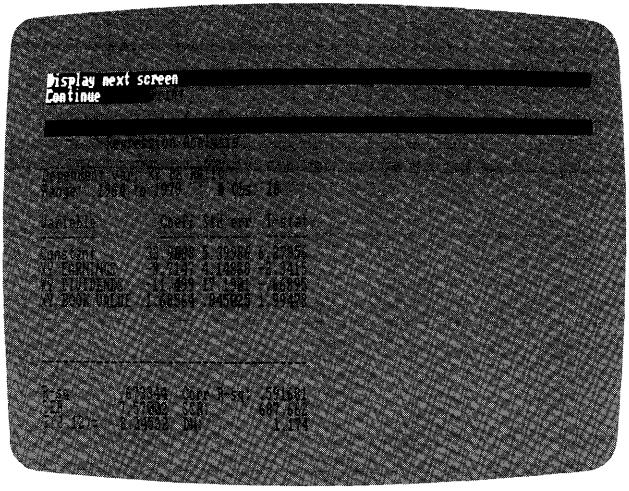
Next you must select the independent variables. You can select from one to five series as independent variables. The independent variables must have the same period as the dependent variable. Move the cursor to XY EARNINGS, and press the space bar. Do the same for XY DIVIDENDS and XY BOOK VALUE. Now press ↵.

The intersection of the ranges of the dependent and independent variables is displayed in the top line of the status area. You have the option of keeping this range or changing it.

More points must be in the range intersection than there are coefficients to be estimated. The exact number of points varies, depending on the use of a constant. For example, when you use a constant and select three independent variables, you must have five data points in the intersection of the ranges of the dependent and independent variables. In this same example, if you use no constant and select three independent variables, you must have four data points in the intersection of the ranges. Press ↵ with the cursor on Keep.

You can generate the regression with or without a constant. In this example, select Yes.

The time it takes to perform the regression varies with the number of data points and number of series. The regression analysis is displayed as shown in Figure 2-48.



012-052/P

Figure 2-48. Regression Analysis Display

If there is not enough room for the fitted and residual series, they are not created. The message that there is no room appears in the status area. You should return to the Main menu and clear some series from memory. Then go through the regression steps again.

When the analysis is displayed, you can continue or print the analysis.

The only way to save the regression analysis is to print it. You cannot save it in memory or on disk. You must run the regression again if you want the data at a later time.

Select Continue.

Now the analysis disappears, and you are asked if you want to save the series containing the fitted and residual values. If you select No, the series are discarded and you must do the regression again if you want them at a later time. Select Yes to save the series. The Regression function exits to the Trend menu.

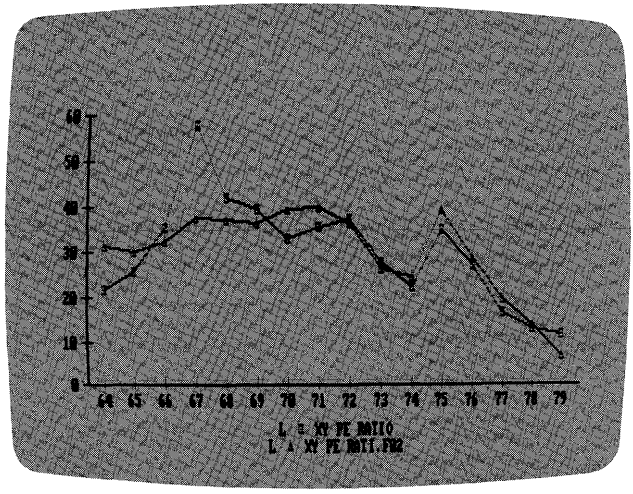
Move the cursor to Display, and press ↵. Note that the bottom two items on the Display list are XY PE RATI.F01 and XY PE RATI.R01. The number on the end is program supplied; it is the same for both series.

To see the newly created values:

1. Return to the Trend menu.
2. Select Analyze and Table.
3. Select XY PE RATIO, XY PE RATI F01, and XY PE RATI R01.
4. Select Keep.

The values are displayed with their date.

Figure 2-49 shows a line chart of the dependent and the fitted series plotted together.



012-053/P

Figure 2-49. Actual and Fitted Data Chart

Trend Forecasting with the Regression Function

The Regression function also does trend forecasting. It calculates the best straight-line fit 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.

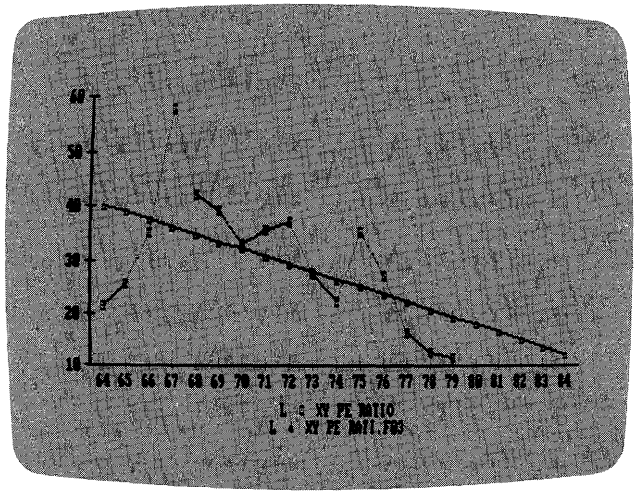
The function generates the same displays and series that are generated in the multiple regression: the regression analysis, the fitted series, and the residual series.

Before beginning this function, select Exit to go back to the Trend menu, then select Clear. Remove the XY PE RATI.F01 and XY PE RATI.R01.

With the cursor on Exit, press ↵ to go back to the Trend menu.

To generate a five-period forecast of the XY PE RATIO series, select Analyze, Regression, and XY PE RATIO. 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 ↵. You cannot include any series as independent variables when doing a trend forecast.

Next you are prompted to specify a number of periods to forecast. Enter **5**, and press ↵. When the range prompt is displayed, select Keep to use the range of the dependent variable. The regression analysis displays. After you have read the analysis display, select Continue. Select Yes to save the fitted and residual series. The fitted and the dependent series are shown in Figure 2-50.



012-054/P

Figure 2-50. Trend Forecast Chart

USING FUNCTION

Remove the XY PE RATI F02 and XY PE RATI.R02 from memory with the Clear option.

Move the cursor to Function and press ↵. Each item in the Function menu generates a new series.

Each function generates a new series that has the name of the source series with a qualifier added to the end of the name. The qualifiers for each function are listed in Table 2-4.

Table 2-4. Function Series Name Qualifiers

Function	Qualifier	Comment
Moving Average	.Mnn	nn = number of periods averaged
Smoothing	.S	
Percent Change	.%	
Difference	.D	
Lag	.−nn	nn = number of periods lagged
Lead	.+nn	nn = number of periods leading
Total	.T	

The Function menu items are all much alike. After selecting the function, you are prompted to select the source series from the series in memory. Some functions require no further input while others prompt for an additional factor. Following the descriptions of the individual functions there is an example showing how to generate a moving average.

Smoothing

The Smoothing function performs a single exponential smoothing of the source series. The series generated by this technique is based on the most current data point and current generated data point. This function generates a new series with .S appended to the name of the source series.

The program asks for a smoothing factor (λ) which must be greater than 0 and less than 1. The smoothed series is calculated with the formula:

$$y(i) = \lambda \quad x(i-1) + (1-\lambda \quad)y(i-1) \text{ and } y(1) = x(1)$$

where $y(i-1)$ is a data point in the new series, $x(i-1)$ is a data point in the source series, and lambda is the smoothing factor. A high smoothing factor (a value greater than 0.5) gives greater weight to the point in the source series, and a low smoothing factor, to the previous point in the

source series, and a low smoothing factor, to the previous point in the smoothed series. The generated series lags the source series by one period as shown in Figure 2-51. This lag is a one period forecast for the data in the source series.

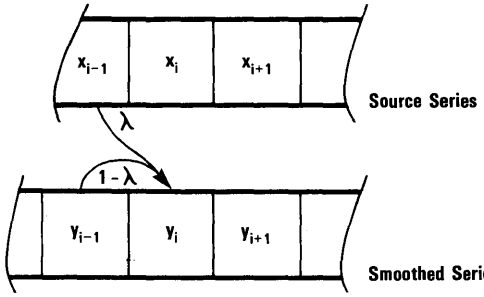


Figure 2-51. Smoothing

Percent of Change

The Percent-Change function calculates the percent of change between data points i and i + 1, and puts the value at point i + 1 in the new series. This function generates a new series with .% appended to the name of the source series.

The Percent-Change function lets you evaluate the change in related series rather than trying to compare divergent magnitudes in the original series. For example, you may generate percent-of-change series for sales and cost-of-sales data. The original data can look like there is a low correlation when in fact the percent of change shows a positive cause-and-effect relationship.

Difference

The Difference function computes the difference between adjacent data points in the source series. The difference between points i and i + 1 is put into point i + 1 in the generated series. This function generates a new series with .D appended to the name of the source series.

When Difference displays the names of the series in memory. You can select one series for the Difference function.

Lag

The Lag function shifts the values in the source series a specified number of periods to the future in the generated series. This function generates a new series with . – nn appended to the name of the source series, where nn is the number of periods lagged.

A common usage 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 not be until February. The Lag function shifts the advertising expenditures forward in time where they can be evaluated against the sales they prompted, that is:

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

The program asks for the number of periods to be lagged. The new series begins and ends at the specified number of periods later than the source series. Figure 2-52 shows the effect of a one-period lag on a series.

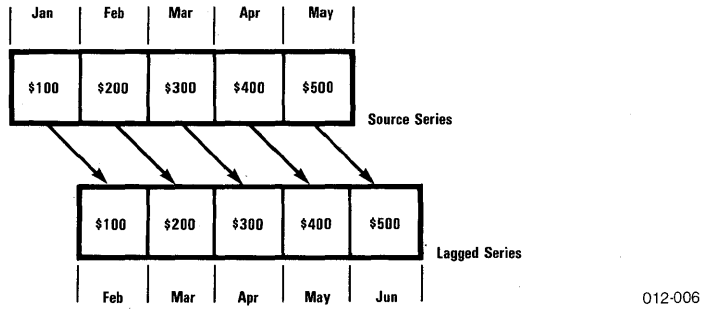


Figure 2-52. One-period Lag

Lead

The Lead function shifts the values in the source series a specified number of periods to the past in the generated series. This function generates a new series with .+nn appended to the name of the source series where nn is the number of periods.

The Lead function is the reverse of the Lag function. Like the Lag function, a common usage 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 not be until February. The Lead function shifts the sales figures back in time where they can be evaluated against the advertising expenditure.

The program asks you for the number of periods. The new series begins and ends the specified number of periods before the source series. Figure 2-53 shows the effect of a one-period lead on a series.

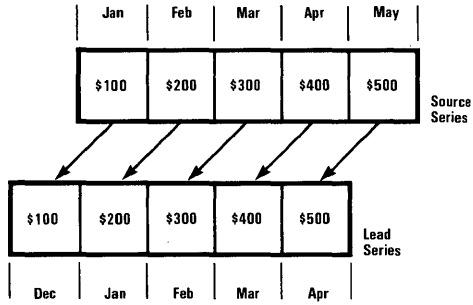


Figure 2-53. One-period Lead

Totaling a Series

The Total function calculates the cumulative total of the points in the source series. A given point in the new series is the total of that point and the preceding points in the source series. The most common usage of this function is to generate year-to-date totals of monthly or quarterly data. This function generates a new series with .T appended to the name of the source series.

Moving Average

The Moving-Average function calculates the moving average of the source series for a specified number of periods. This function creates a file with the identifier .Mnn, where nn is the number of periods.

There are three common methods of calculating the moving average:

- The N + 1 method (used in the Trend subprogram) which locates the first point of the moving-average series at one point beyond the periods being averaged as shown in Figure 2-54.

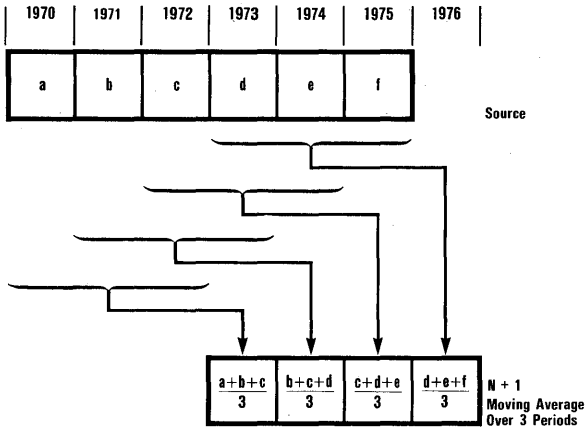


Figure 2-54. N+1 Moving Average Method

- The N method which locates the first point of the moving average series at the last point of the periods being averaged as shown in Figure 2-55.

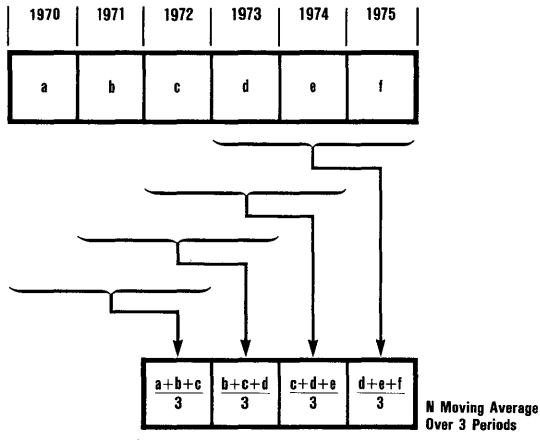


Figure 2-55. N Moving Average Method

- The Centered method which locates the first point of the moving average series at the center of the periods being averaged as shown in Figure 2-56.

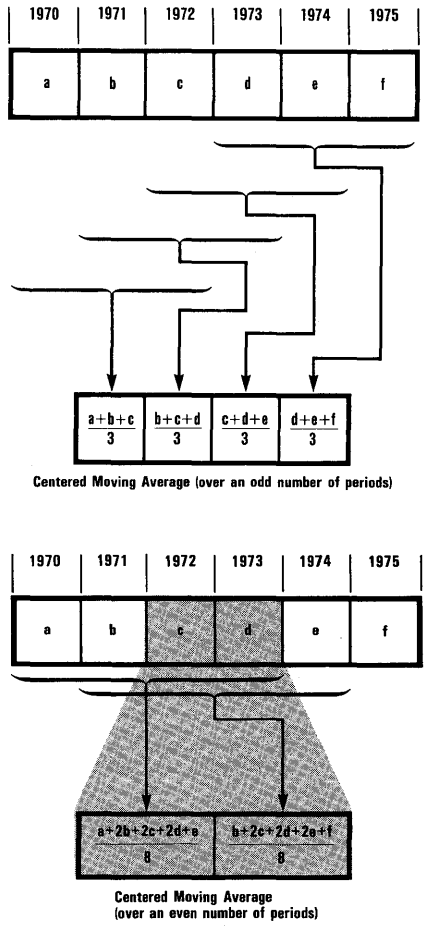


Figure 2-56. Centered Moving Average Method

The moving average is essentially a smoothing technique. A common use of this function is to remove the noise or 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 would generate a moving average over a four-quarter period.

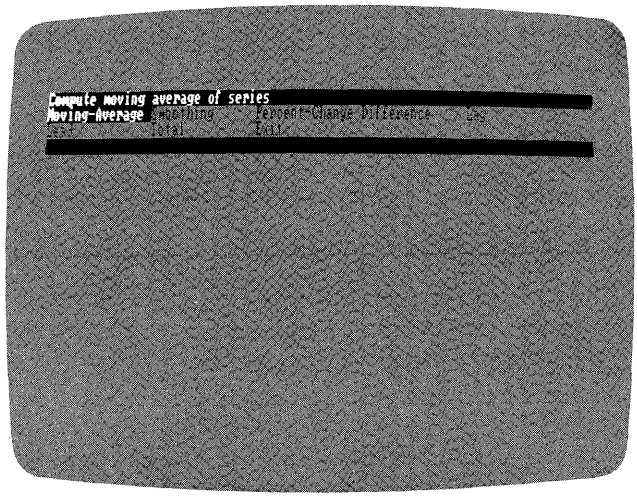
You are prompted for the number of periods.

A Function Example

The Function menu options are executed in a like manner. This section describes a typical Function menu option.

This is an example of the use of the Trend N+1 Moving-Average function. Before starting, move the cursor to Display, and press ↵. You must have at least one free series in memory. If you already have 16 series in memory, remove one with the Clear function.

In the Trend menu move the cursor to Function and press ↵. The Function menu is displayed, as shown in Figure 2-57.



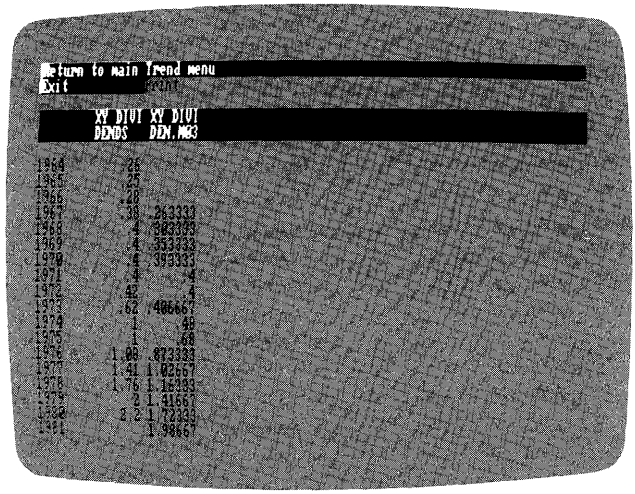
012-055/P

Figure 2-57. Function Menu

The first item (under the cursor) is Moving-Average , press ↵. You are asked to select a series. Move the cursor to XY DIVIDENDS, and press ↵. Next you are asked to enter the number of periods over which the average is to be calculated. Enter **3**, and press ↵. The Trend menu returns to the screen.

Move the cursor to Analyze, and press ↵; then to Table, and press ↵. When the series list appears, move the cursor to XY DIVIDEND and press the space bar. Then move the cursor to the new series at the end of the list with the name XY DIVIDEN.M03, and press ↵. When asked about the range, select Keep.

Figure 2-58 shows the table of the two series. The series are listed in the order in which you selected the series.



012-056/P

Figure 2-58. Series After Moving Average

How to Convert an N+1 Moving Average

You can convert the Trend N + 1 moving average to an N or Centered moving average.

CONVERTING TO AN N MOVING AVERAGE

To create to an N moving average, first perform the N+1 moving average for the desired number of periods. You must move the .Mnn moving average back in time by one period. Select Lead, the .Mnn series generated with Moving-Average, and enter a Lead period of 1. This series, with the identifier .+01, generated by Lead is an N moving average.

CONVERTING TO A CENTERED MOVING AVERAGE (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.

CONVERTING TO A CENTERED MOVING AVERAGE (EVEN NUMBER OF PERIODS)

When the number of periods (p) being averaged is even, the conversion to a centered moving average is more complex. Follow this procedure:

1. Perform a p period N+1 moving average.
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.

WRITING YOUR OWN SERIES TRANSFORMATION

The Xform function lets you write your own transformation formula. The formulas are limited to 158 characters. You can use 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), = (equal), > (greater than), and >= (greater than or equal).

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(seriesx): Sign of data points in seriesx
- INT(seriesx): Integer part of data points in seriesx
- SQR(seriesx): Square root of data points in seriesx
- LOG(seriesx): Natural logarithm of data points in seriesx
- EXP(seriesx): e to the power of data points in seriesx
- RND: Random number between 0 and 1
- ABS(seriesx): Absolute value of data points in seriesx

- SIN(seriesx): Sine of data points in seriesx
- COS(seriesx): Cosine of data points in seriesx
- TAN(seriesx): Tangent of data points in seriesx
- ATN(seriesx): Arctangent of data points in seriesx

You can use these functions as they are used in a Basic program. The only difference here is that you can use a series as the variable on which the function operates. 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 as XY EARNINGS. Each data point in the new series is the square root of the corresponding data point in XY EARNINGS.

A word of explanation about RND: it's the only Transform function that does not require at least one argument in a formula. It operates like a constant in a Transform expression, in the sense that it does not have a range associated with it.

You can include series names in your transformation formula. The Xform function displays the list of series currently in memory. You select a series by moving the cursor to the name of the desired series and press ↵.

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

Before beginning, use the Display function, and make sure you have room for a series in memory.

Move the cursor to Xform, and press ↵. The function prompts for a name for the series that holds the transformed data. Enter **BD AVG**, and press ↵.

If you don't enter a series name, the Trend subprogram automatically supplies one for you. If you have no room for the BD AVG series, it is not created, and you see an error message. Because you have cleared room in memory, the BD AVG series name is accepted.

Next you are asked whether the transformation should be performed on the intersection or the union of the series named in the transformation formula.

If you select Union the resulting series range will be from earliest in all series to the latest date in all series. All periods for which there is no data are assumed to be 0. This may give you a resultant series with unexpected values if you multiply or divide by a 0-filled data point.

If you select Intersection the resulting series range be the period that is common to all series.

Select Intersection.

A list of the series in memory is displayed. The top line of the status area tells you to enter the transform, move the cursor, or press ↵. You can enter any transform operator or function from the keyboard, enter a series name by moving the cursor with the ↑ or ↓ keys, or press ↵ to indicate that the formula is complete. The transform formula uses all of these. This display is shown in Figure 2-59.

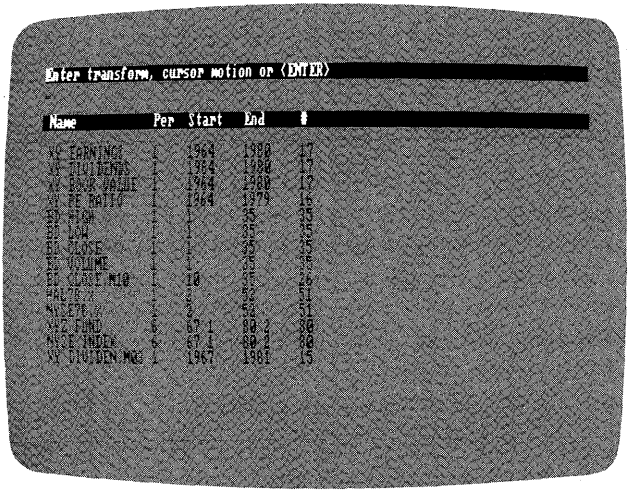


Figure 2-59. Transform Display

When you want to erase part of a formula you have entered, press the BKSP key. The right most entry is erased each time you press the BKSP key. If a series name is the right most element when you press the BKSP key, the whole name is erased. You do not have to erase each letter of the name.

Even though it's customary to show mathematical functions in capital letters, such as OR and COS, you can type them in upper or lower case in your formula. The Trend subprogram accepts either.

Press the (key. A (appears in the formula line in the status area.

Press the ↓ key. A cursor appears in the series list. Also the name under the cursor appears in the formula line in the status area. Press the ↓ key again; the cursor moves down, and the name in the status area changes. Move the cursor to BD HIGH, and press ↵. The cursor disappears from the list, and BD HIGH remains in the formula.

Enter +.

Again press the ↓ key. Again a cursor appears and a series name is written in the status area. This time move the cursor to BD LOW and press ↵.

Enter).

Enter / (for division).

Enter **2.**

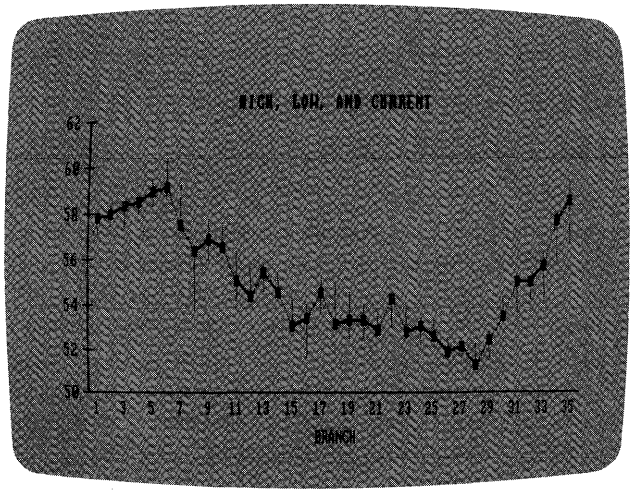
You now have a formula in the status area that reads:

(BD HIGH + BD LOW)/2

To generate a new series with this formula, press ↵. If the last item in the formula had been a series name, you would have had to press ↵ twice, once to enter the series name and once to execute the formula. You are given the choice of keeping or changing the range. Select Keep.

When the function is finished, the Trend menu returns. Move the cursor to Display, and press ↵. The list shows that the function created a new series with the name BD AVG. **Figure 2-60** shows the new series plotted in a line chart with BD HIGH and BD LOW.

NOTE: Series data, entered via the editor or loaded, is converted to a binary format and subsequent computations are done in binary arithmetic. The program uses two binary formats: single precision (a 24 bit mantissa with precision equal to 7.22 significant decimal digits) and double precision (a 53 bit mantissa with 15.95 decimal digit precision). Statistics and regressions are computed in double precision. The program stores series data in single precision. You can expect the program to remember in excess of 7 (7.22 to be exact) significant digits for each data point. Displayed values are rounded to 7 significant digits. It is important to remember that the program stores greater precision than it displays. The displayed number 238.9267 is a value in the range 238.92665 and 238.92674999... Any number between 87.999995 and 88.0000049999... is displayed as 88. Keep this in mind when working with values that have a large number of significant digits. This is especially true for sine, cosine, and tangent.



012-009/P

Figure 2-60. Chart After Transformed Series

Some Uses for the Xform Function with Multiple Regression

While the Function and Analyze options offer many series data functions, they may not meet all your needs. The Xform function allows such operations as 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 perform a non-linear regression by using the Xform function to create a new series, Z, that is equal to X squared. Then you use the new series, Z, as an independent variable to perform the linear regression:

$Y = f(Z)$

As a further example of this 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.

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 use the Function items that you have not used. Finally, you can save your Trend output on the data disk and plot the data with the Plot program.

FUNCTIONAL SUMMARY

To	From	Select/Enter
Enter Trend subprogram	Main menu	1. Trend
List series data in a table	Trend menu	1. Analyze 2. Table 3. Series name SPACE BAR 4. Last series name ↵ 5. Keep/Change 6. Continue/Printer
Calculate series statistics	Trend menu	1. Analyze 2. Statistics 3. Series name SPACE BAR 4. Last series name ↵ 5. Keep/Change 6. Continue/Print
Perform a linear multiple regression	Trend menu	1. Analyze 2. Regression 3. Dependent variable series 4. Up to 5 independent variable series 5. Keep/Change 6. Yes/No (Use/don't use constant 7. Continue/Print 8. Yes to save values; NO to discard
Calculate a moving	Trend menu	1. Function average 2. Moving-Average 3. Source series name 4. Number of periods
Perform exponential	Trend menu	1. Function smoothing 2. Smoothing 3. Source series name 4. Smoothing factor
Calculate percent of change	Trend menu	1. Function 2. Percent-Change 3. Source series name
Calculate difference	Trend menu	1. Function 2. Difference 3. Source series name

(Continued)

To	From	Select/Enter
Generate a lagging series	Trend menu	1. Function 2. Lag 3. Source series name 4. Number of periods
Generate a leading series	Trend menu	1. Function 2. Lead 3. Source series name 4. Number of periods
Generate a cumulative total series	Trend menu	1. Function 2. Total 3. Source series name
Write a series transformation	Edit menu	1. Xform 2. Series name 3. Intersection/Union 4. Formula (series names, math operators)

LESSON FIVE: PLOTTING EXAMPLES

This lesson is 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 disk in files named ACMERPT.SER, REGIONAL.SER, and XYCHART.SER.

The ACMERPT.SER file contains annual revenue, units shipped, annual expenses, and income tax data for 1981.

The REGIONAL.SER file contains Acme Company sales by geographic region in 1981.

The XYCHART.SER file contains series of values for two math functions.

This lesson assumes you are familiar with Lesson One and Lesson Two covering the Plot and Main subprograms.

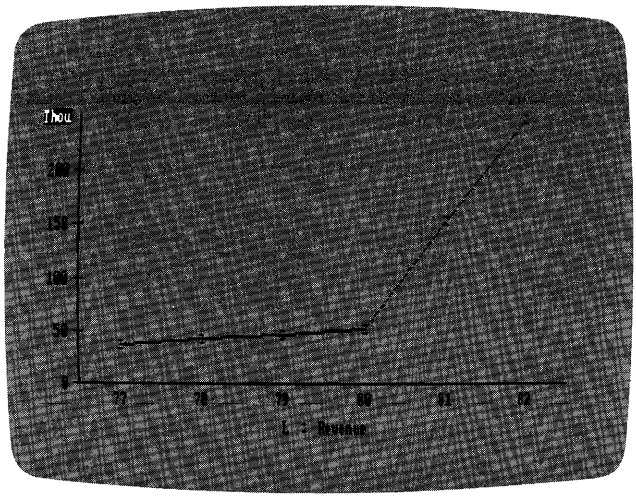
GETTING STARTED

Load the VisiTrend/Plot program and then load the ACMERPT.SER, REGIONAL.SER, and XYCHART.SER files. Now Plot to go to the Plot subprogram. If you have trouble with any of these operations, review Lesson Two.

This lesson shows how to draw many different charts and how to combine charts. Each exercise begins with a picture of the chart. The picture is followed by a list of the keys you must press. A key name preceded by a word or phrase enclosed within parentheses indicates a cursor position before pressing the indicated key. A word or phrase in quotation marks preceded by the word "Enter" indicates that the word or phrase must be typed. For example:

- SPACE BAR means press the space bar.
- ↵ means press the ↵ key.
- Line ↵ means move the cursor to Line, and press the ↵ key.
- "Enter **2200** ↵" means enter the value 2200 at the keyboard, and press the ↵ key.

SINGLE-LINE CHART



012-058/P

Figure 2-66. Sample Single-Line Chart

Beginning in the Select menu:

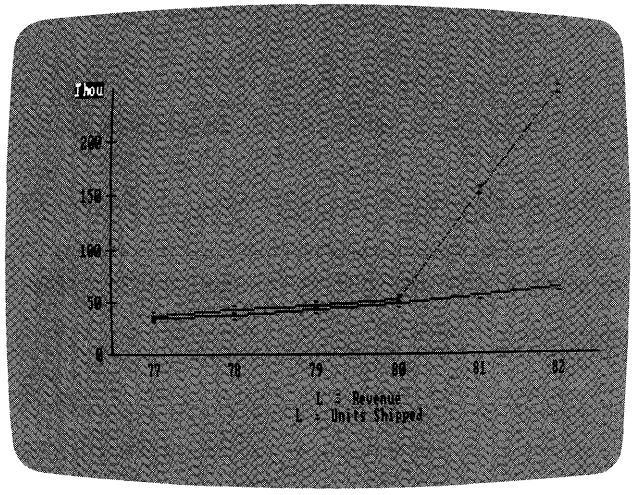
Line ↵

Revenue ↵

Plot ↵

You drew 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 Y-axis values must be multiplied by 1000.

TWO-LINE CHART



012-059/P

Figure 2-67. Sample Two-Line Chart

Beginning in the Plot menu:

Select ↵

Line ↵

Revenue **SPACE BAR**

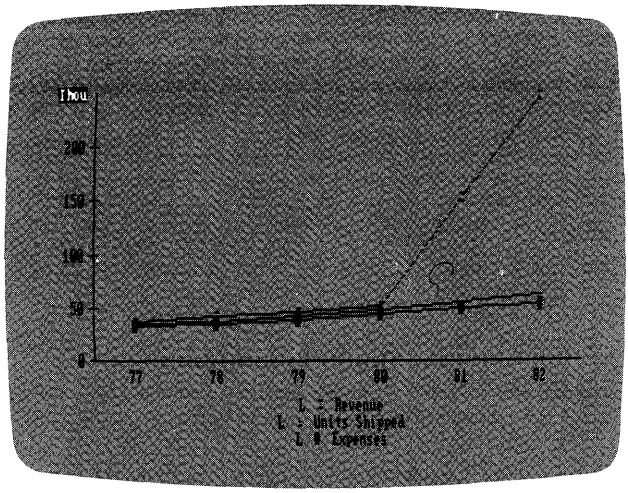
Units Shipped ↵

Plot ↵

The chart contains two lines instead of one. The two lines are plotted with different symbols: the square, that you saw in Lesson One, and a triangle with a dot inside. The legend at the bottom of the chart identifies the chart type for each of the plotted series, shows what plotting symbol was used for each, and gives each series name. The bottom status area line contains the name of the first series selected.

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

THREE-LINE CHART



012-060/P

Figure 2-68. Sample Three-Line Chart

Beginning in the Plot menu:

Select ↵

Line ↵

Revenue **SPACE BAR**

Units Shipped **SPACE BAR**

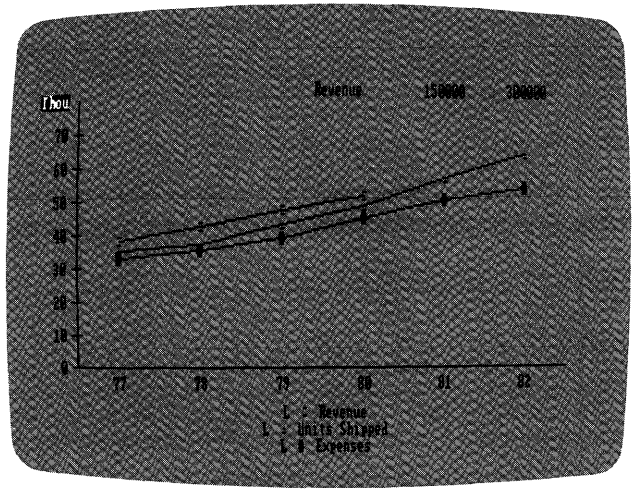
Expenses ↵

Plot ↵

The new feature of this chart is the use of the number sign (#) as the plotting symbol of the third series.

This chart is difficult to read. The information for the years 1977 through 1980 is crammed into a small space. The only points that show up well are the 1981 and 1982 revenue points. This chart may be satisfactory if its purpose is to show how revenue increased in 1981. However, if the other information is equally important, it might be a good idea to change the range to 1975 through 1980 and handle the 1981 and 1982 revenue figures in some other manner.

Another approach is to change the scale to show the earlier data clearly and let 1981 and 1982 revenues go off the chart and show its value with a moveable title. This is the approach used in Figure 2-69.



012-061/P

Figure 2-69. Rescaled Three-Line Chart

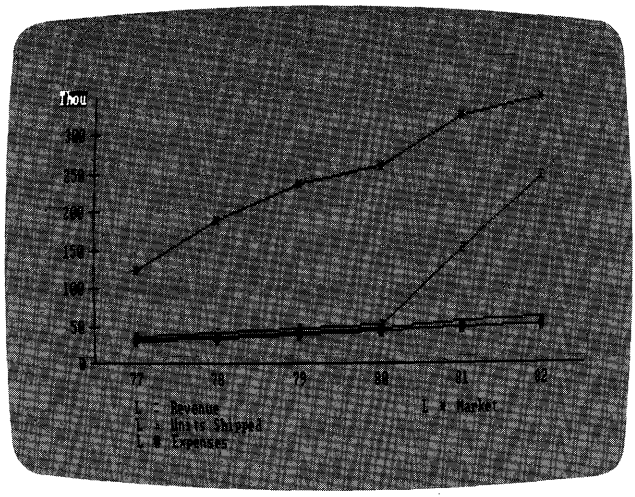
Go ahead and make the improvements that were suggested in the preceding paragraph. After you've made these improvements, return to the Plot menu. When the Plot menu appears, go to the Select menu. Specify the Line chart type; then observe the series list that appears, but do not select any. You are going to use the same series as in the first part of this exercise, but this time, you are going to use a shortcut to select them. 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 positioning the cursor on each series name to be plotted and marking it with an asterisk, you need to position the cursor on [Same], and press ↵. Do that now.

When the Plot menu reappears, keep the cursor on Plot, and press ↵. Revenue, Units Shipped, and Expenses are drawn again as they were before you changed the scale.

[Same] can be used as a shortcut on all chart types except a pie chart and an XY chart. Also be aware that it operates only in the Plot portion of the VisiTrend/Plot program. If you transfer to the Main or Trend subprogram then return to Plot, the [Same] setting is canceled.

So far you've used the program to do multiple-series plotting of two and three series. As you've noticed, each series has a corresponding legend.

The program displays up to six legends on a chart, even though up to 16 series can be plotted on the same 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.



012-062/P

Figure 2-70. Location of Multiple Legend Items

Beginning in the Plot menu:

Select ↵

Line ↵

Revenue **SPACE BAR**

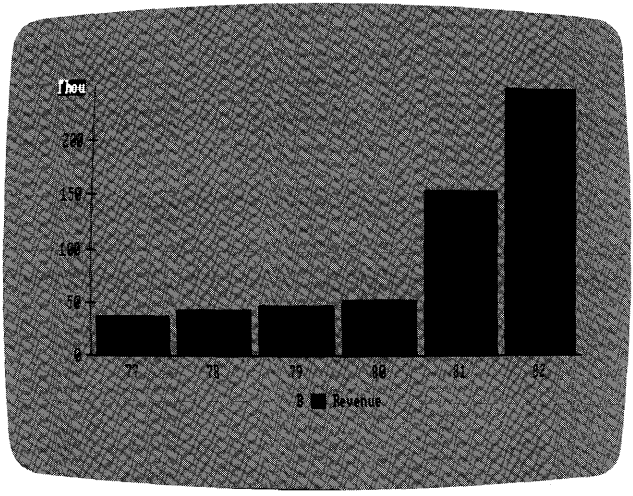
Units Shipped **SPACE BAR**

Expenses **SPACE BAR**

Market ↵

Plot ↵

SINGLE-BAR CHART



012-063/P

Figure 2-71. Sample Single-Bar Chart

Beginning in the Plot menu:

Select ↵

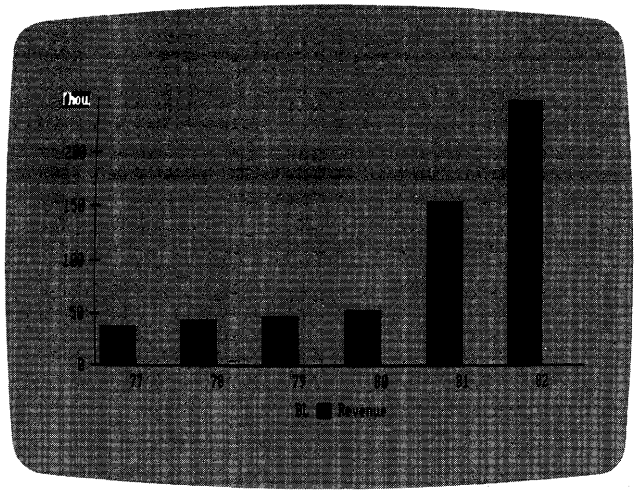
Bar ↵

Full ↵

Revenue ↵

Plot ↵

Again, this chart is no different than the bar charts you did in Lesson One. It can be made different by selecting half-width bars. Repeat the preceding sequence but select Left instead of Full. Beginning in Plot menu:



012-064/P

Figure 2-72. Sample Left-Bar Chart

Select ↵

Bar ↵

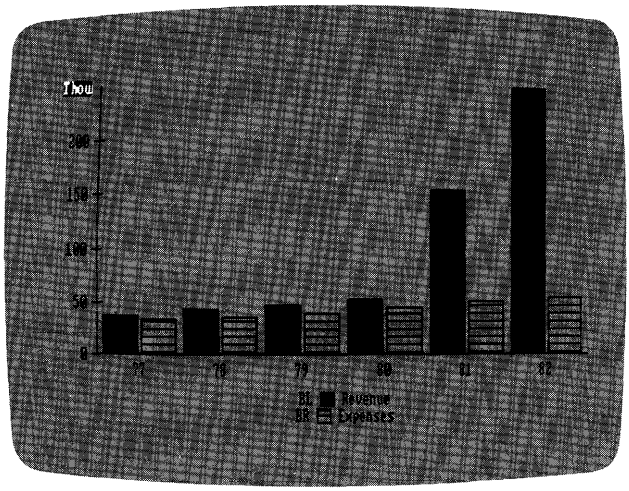
Left ↵

Revenue ↵

Plot ↵

The only differences in the chart are the width of the bars and the legend. Where it previously contained a B for bar it now contains BL for bar left.

If you want to compare expense data to revenues, you can overlay it on the existing chart. Beginning from the Plot menu:



012-065/P

Figure 2-73. Sample Bar Chart With Overlay

Select ↵

Bar ↵

Right ↵

Expenses ↵

Options ↵

Format ↵

Shaded ↵

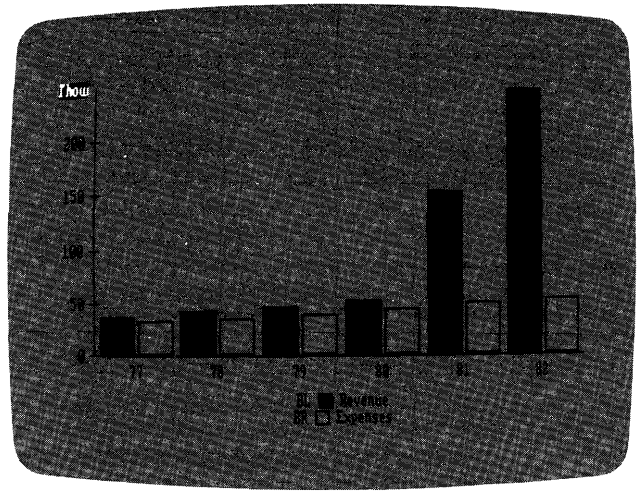
Overlay ↵

The Overlay **option draws a chart over an existing chart. It does not erase the existing chart as the** Plot **option does. The sequence** Options, Format, **and** Shaded **is necessary to distinguish the new bars from the old. If this sequence had been eliminated, both sets of bars would be solid. You can use the** Format **or the** Shade **options to differentiate between the bars.**

The overlayed chart uses the range and scale of the existing chart. There is no limit to the number of overlays you can add to a chart. Only the first six series are identified in the legend.

The next section describes another method of drawing a comparative-bar chart.

COMPARATIVE-BAR CHARTS



012-066/P

Figure 2-74. Sample Comparative-Bar Chart

Beginning in the Plot menu:

New ↵

Bar ↵

Both ↵

Revenue ↵

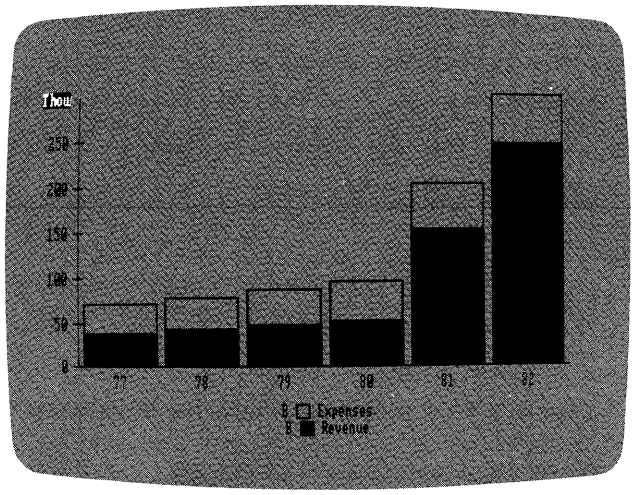
Expenses ↵

Plot ↵

The program asked for the left and right series separately, in individual passes through the series name list. If you had selected the series by marking them with an asterisk (as you did for multiple line charts) you would have drawn a stacked chart as shown in Figure 2-75.

The overlay chart used the range and scale of the first chart you drew. When you use the Both option, the program uses the union of the ranges and a scale that fits both series.

Note that the sequence to draw the preceding chart began with the New option instead of the Select option. The New option resets the Format option which was set for the overlay chart. The Select option does not reset Format, Shade, and Background options.



012-067/P

Figure 2-75. Stacked-Bar Chart

The preceding chart was created by the following sequence, beginning in the Plot menu:

Select ↵

Bar ↵

Full ↵

Revenue **SPACE BAR**

Expenses ↵

Plot ↵

Generating the chart in this way, the two values are added. You can use this style of bar chart when you are interested in the sum of the two series. When bars are stacked, the legends reflect the order of stacking. That is, the first legend corresponds to the topmost values, the second legend corresponds to the next lower, and so on.

THE PIE-CHART DATA

In the following sections you are going to draw pie charts. The data used for drawing pie charts must meet the following requirements:

- Each value used in a pie chart must be from a different series. The value from each series chosen is a slice of the pie. Up to 16 series can be used.
- All the series must have the same period. For example, if series A period is 1, it can be used only with other series having a period of 1.
- All values must be at the same location in each series. In other words, at least one location must be common to all the series to be 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 of time, or to a set of circumstances. In the next example, the 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. Keyed to points of time, the values could represent, for example, total revenues for each month of the year.

A pie chart shows a single point of time (or a single set of circumstances) and not a comparison of different points (or circumstances) as other charts can.

Figure 2-76 shows how the pie chart data requirements apply.

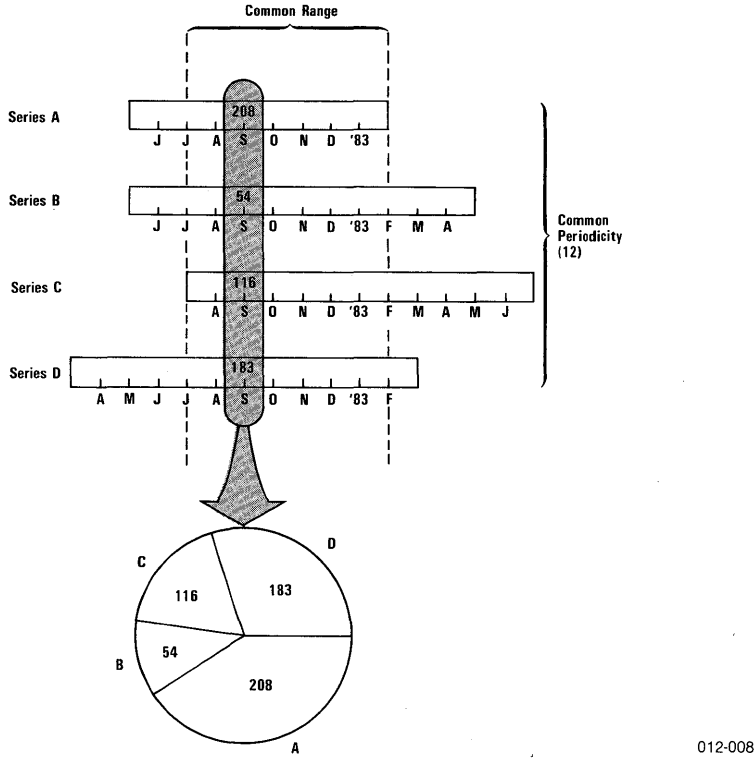
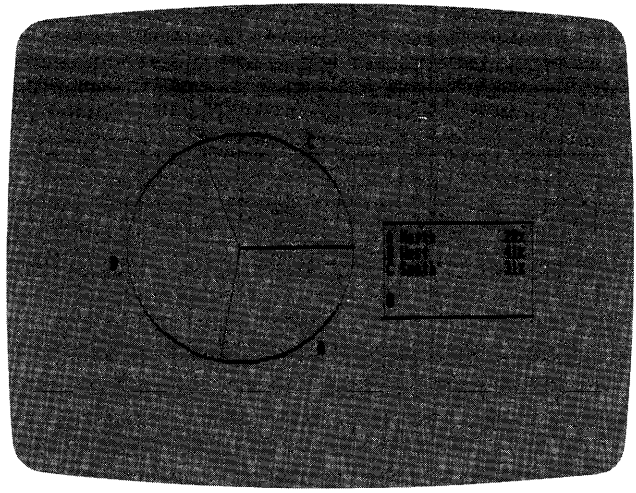


Figure 2-76. Choosing Series for a Pie Chart

The data for the pie chart in the next section is in four series: North, West, South, and Central. Each series has two data points. The first data point in each series represents the total revenue attributed to three regions (the Central value is 0). The second data point in each series reflects the allocation of total revenue if a fourth region (Central fourth) were added.

A PIE CHART



012-068/P

Figure 2-77. Sample Pie Chart

Beginning in the Select menu:

Pie ↵

North **SPACE BAR**

West **SPACE BAR**

South ↵

Enter 0 ↵

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. The first series always begins at the 3 o'clock position and extends in a clockwise direction.

The bottom line of the legend contains a 0, the date or reference number of the selected data.

Shading and Titling a Pie Chart

Press ↵ to proceed to the shading function.

The Shading function asks you to enter a letter or press ↵. It is asking for a letter indicating a segment of the pie. You can specify the labels in any order; you can skip any you don't want shaded. If you change your mind, you can change the shade of a segment you have shaded. Pressing ↵ without a letter exits the shading function.

Enter **A**, and press ↵. The Shade menu is displayed. You can choose black, white, fine gray, and coarse gray. Original specifies the form in which the segment is originally displayed. Select White. Segment **A** is filled in.

You are asked for another letter. Enter **B**, and press ↵. This time select Fine Gray, and press ↵. The **B** segment is filled in. Leave the **C** segment as it is, black. Press ↵. You are asked to confirm that you want to exit the shading function. This confirmation is necessary because you have only one chance to shade the chart. Once you leave this function you cannot get back to it without starting the chart over from the beginning.

Enter **Y** when the Title exit prompt appears.

The legend doesn't add much to the chart. It will look better if the legend were erased and the legend information put on the chart itself. Whereas the Legend function returned the legend in other charts, it erases the legend and the segment letters in pie charts. Select Legend, and press ↵. You should remove the legend before locating titles over the legend or over the segment letters. Anything covering them is also erased.

Use the Top and Moveable functions to make the chart look like **Figure 2-78.**

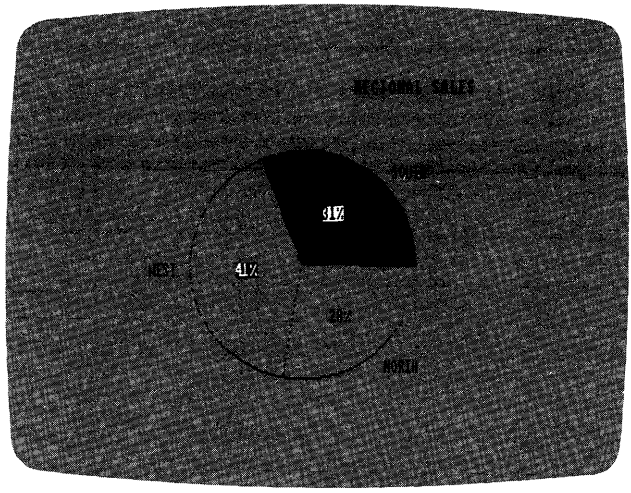


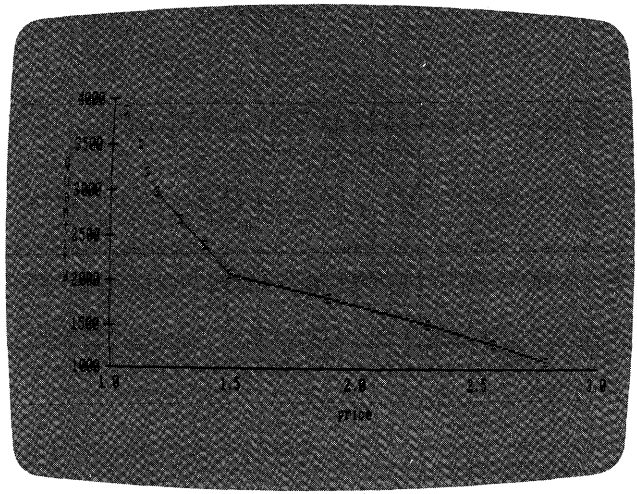
Figure 2-78. Shaded and Titled Pie Chart

When you've finished titling the chart to look like Figure 2-78, move the cursor to Exit, and press ↵. The pie chart disappears and the Select menu reappears. **Your work on the chart is not lost.** Select None. The chart reappears along with the Plot menu.

From the Plot menu you can save, print, or add to the chart. The Screen option saves the pie chart screen image on disk. The Print option prints it on the printer. The Text option, which is covered later in this lesson under "Creating Annotation and Text Pages," lets you add text to the chart.

To try your hand at another pie chart, use the same three series plus the Central series, and use 1 for the year instead of 0.

AN XY CHART



012-069/P

Figure 2-79. Sample XY Chart

Beginning in the Plot menu:

Select ↵

XY ↵

Price ↵

Quantity ↵

Plot ↵

An XY chart does not have a time axis. The Y-axis contains the scale for the Quantity series and the X-axis contains the scale for the Price series.

The plotted values are points from the two series with matching dates. The first point plotted is the first value from each series, the second point is the second value, and so on.

The VisiTrend/Plot program automatically draws an XY series with plotting symbols and a line. However, when there are more than 40 data points in the combined series, only a line is plotted. For example, if your chart contains 43 data points those data points are plotted with a line

only. But you can force all 43 data points to be drawn as plotting symbols on a line by specifying Both in the Format option in the Options menu, then plotting again. As with other chart types, you can respecify the symbols to be used through the Format option in the Plot menu.

The normal use of the XY chart is to determine if there is a correlation between two series. The direction, slope, and curvature of the line shows the relationship between the two series. An analysis of the XY patterns is beyond the scope of this manual.

A secondary use of the XY chart is to plot two sets of values against each other. Normal use of the VisiTrend/Plot program is with time series. To use the program to plot non-time series, you must put the X-axis values in one series and the Y-axis values in another. Then generate an XY chart of the two series. You must put the related X- and Y-axis points at the same time point in their respective series.

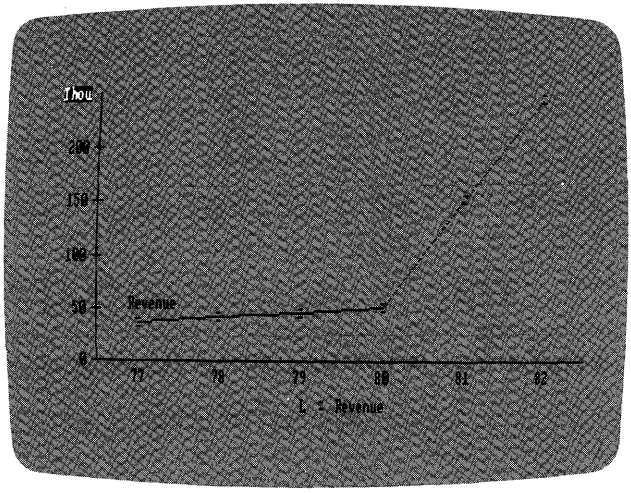
When using the Overlay function with an XY chart, remember these two points:

- XY charts cannot be mixed with other chart types in overlays.
- Legends are laid out differently on overlayed XY charts. On overlaid XY charts, legend items appear only under the X-axis, stacked in two columns as for other types of overlaid charts.

DATA OFF-SCALE DURING AN OVERLAY

When you used the overlay function earlier in this lesson to create a comparative-bar chart, you encountered no problems with scale, or range, or any other plotting factors. However, when you are using the overlay function on actual charts, it's quite easy to be off-scale regardless of the type of chart you are working with.

In Lesson One, you encountered an off-scale condition when overlaying was not involved. The program gave you two options: Proceed and Cancel. When overlaying, the program gives you three options: Proceed, Redraw, and Cancel.



012-070/P

Figure 2-80. Line Chart With Added Title

Beginning in the Plot menu:

Select ↵

Line ↵

Revenue ↵

Plot ↵

Esc

Options ↵

Title ↵

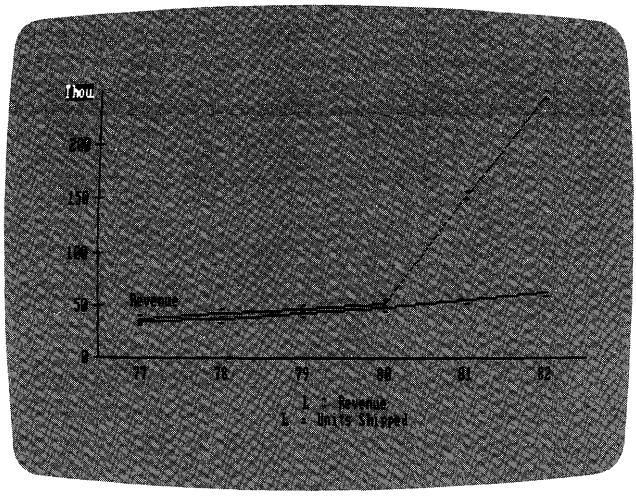
Moveable ↵

Enter Revenue ↵ **(Move to location shown in Figure 2-80.)**

Normal ↵

Exit ↵

Next, add a second series using the Overlay **operation.**



012-071/P

Figure 2-81. Overlaid Line Chart

Beginning from the Plot menu:

Select ↵

Line ↵

Units Shipped ↵

Overlay ↵

So far, so good. You have been able to plot two series on the same scale using the Overlay **function.**

Again beginning from the Plot menu:

Select ↵

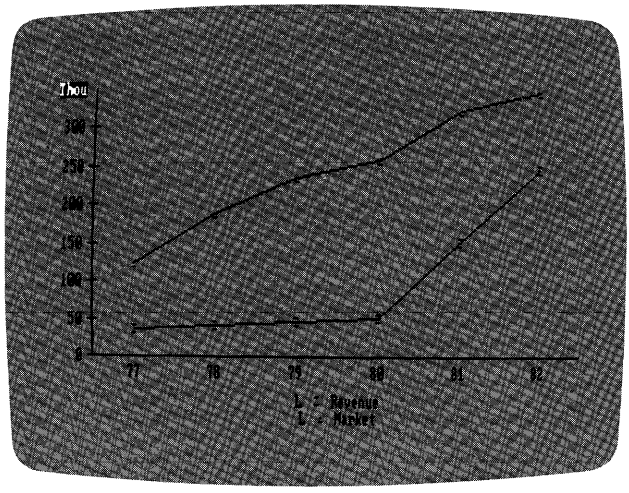
Line ↵

Market ↵

Overlay ↵

This time the overlay is not successful 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 when overlaying wasn't involved. Redraw, however, rescales the chart, then redraws it. This has several consequences, as you will see.

Select Redraw. A warning about intermediate series lost appears in the status area. Press ↵ to go ahead with the operation. Your screen should look like the following Figure 2-82.

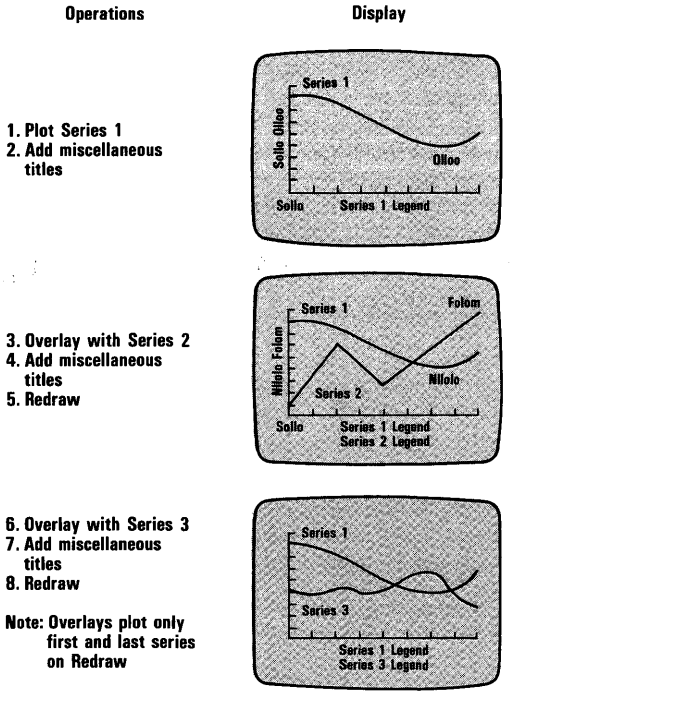


012-072/P

Figure 2-82. An Off-Scale Chart Redrawn

The Units Shipped series is gone and so is the title. Using Redraw after successful overlays erases all those overlays; it also erases any titles associated with those overlays. Only the originally selected series and the last attempted Overlay series are redrawn.

The relationships among legends, overlays, and the Redraw function are illustrated in Figure 2-83.



012-009

Figure 2-83. Relationships Among Legends, Overlays, and Redraw

An additional comment about Redraw: if the Units Shipped overlay attempt had been off-scale, a Redraw would have redrawn the Revenue data points but would have wiped out the Revenue title.

DISPLAYING TWO CHARTS AT ONCE

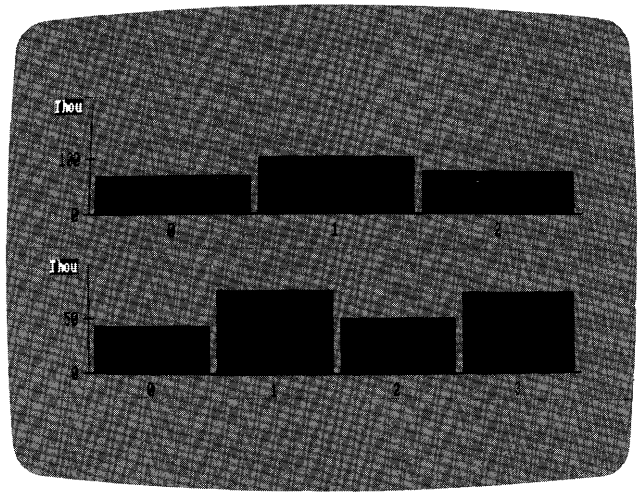
The data you used for the pie charts can also be shown in a different form. The Before and After series contain the same data as the North, West, South, and Central series. Before contains three data points representing the sales figures for a three region division. After contains four data points representing the same sales figures for a four sales region division.

It is often desirable to show before and after data at the same time, in two different charts. The Window function in the Plot menu divides the screen into two parts. You can draw different charts in each window. You can put any kind of chart into the windows except the pie chart. A pie chart requires the whole screen.

The Window menu gives you the choice of dividing the screen into side-by-side or top-and-bottom sections. This example uses top-and-bottom sections. The Window menu also lets you switch between windows and return to single window format.

The top window is active if you select Horizontal windows and the left window is active if you select Vertical windows.

When you switch between windows, you lose the current active series and option data for the window you are leaving. When you return to the window, you must start over if you want to change an option and Plot the chart again.



012-073/P

Figure 2-84. Sample Window Charts

Beginning from the Select menu:

None ↵

Window ↵

Horizontal ↵

Bar ↵

Full ↵

Before ↵

Plot ↵

Esc

Window ↵

Switch ↵

Bar ↵

Full ↵

After ↵

Plot ↵

When you are working in one of the windows, the window is indicated by a code on the extreme right end of the bottom status line. The code is W for window, and T for top or B for bottom. If you use side-by-side windows, the codes are R for right and L for left.

Legends are not included in charts drawn with the Window function. You must create any legends with the Title functions. You can include the meaning of the numbers in the legend, or replace the numbers with names, or put in meaningful abbreviations such as N, W, S, and C for North, West, South, and Central.

There are two ways to return to the single window format: select New from the Plot menu or None from the Window menu.

CREATING ANNOTATION ON CHARTS AND TEXT PAGES

Suppose you have created a chart on the screen, and you would like to use it in a management report or in a slide presentation. The chart itself might need some enhancements, such as an extra-large title and different X-axis labeling. You'd also like to support it with a page of supplementary information. You could use the Title option to make some of these enhancements, but not all of them. Another VisiTrend/Plot program feature, the Text function, does everything that the Title function does and more. Text allows you to place text in various styles anywhere on a displayed chart. It also allows you to create entire pages of text, and to combine a chart on the same page with text.

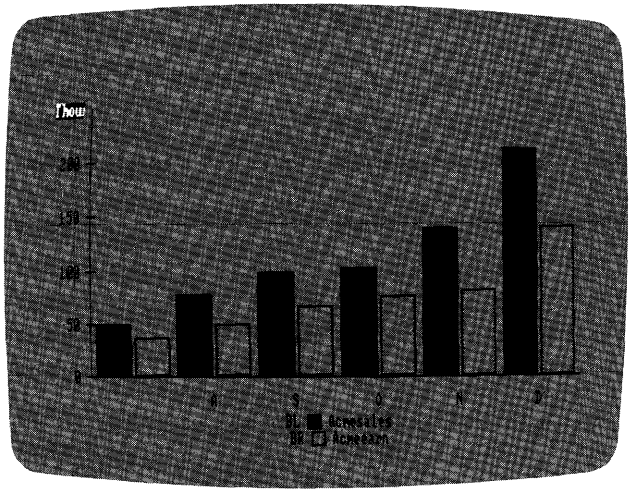
A slide presentation example is a good way to introduce you to the features of the Text function and give you some practice using them. You are going to enhance an existing chart and create a page of supplementary notes in support of the chart.

The existing chart, shown in Figure 2-85, is located on the example disk in a file named ACME1.PIX. Beginning from the Plot menu:

Screen ↵

Load ↵

ACME1.PIX.



012-074/P

Figure 2-85. Chart For Text Exercise

You will make several changes on this chart. They can all be made with the Text option.

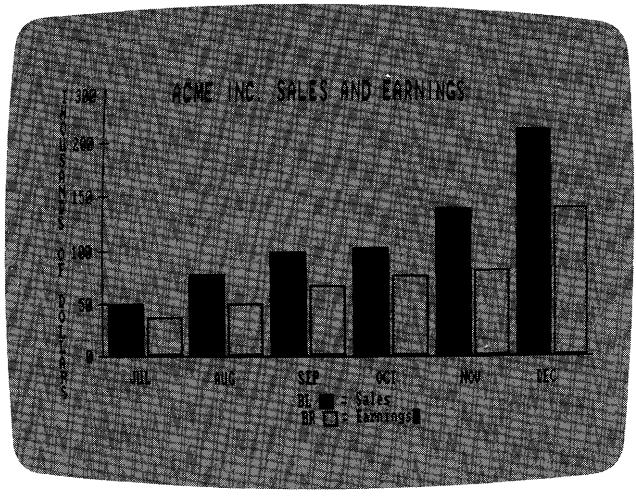
Press Esc, move the cursor to Text, and press ↵. The status area is erased, and a white rectangular block cursor appears in the upper-left corner of the screen. You can move the block cursor anywhere on the screen with the arrow keys. Table 2-5 lists the commands available to you in the Text option.

Table 2-5. Text Commands

Function	Command
Change cursor movement (course/fine)	Ctrl-Z
Move cursor up	↑
Move cursor down	↓
Move cursor left	←
Move cursor right	→
Move cursor 5 places right	[TAB]
Move cursor to beginning of next line	↵
Erase character	Space Bar
Turn on/off large type	Ctrl-F
Turn on/off bold face	Ctrl-B
Turn on/off inverse video	Ctrl-R
Clear screen	Ctrl-Home
Return to Plot Menu	Esc

Before changing the chart, take a few minutes to experiment with moving the cursor. The → key and ← key move the cursor one space to the right and one space to the left, respectively. ↵ moves the cursor to the beginning of the next line. (In Text operations, the ↵ key works like it does on a typewriter.) ↑ moves the cursor up one line, and ↓ moves the cursor down one line. These cursor movement keys are the only way that the cursor can be moved into the chart without blanking out anything. Using the space bar and BKSP to move the cursor erases the screen at that space.

When you are familiar with the cursor movement keys, move the cursor back to the upper left-hand corner of the screen. Take a look at Figure 2-86. It shows what the chart will look like after you change it.



012-075/P

Figure 2-86. Chart Changed With Text

The first change consists of titling the chart in large font letters. To turn on the large font, press Ctrl-F. The title has to be centered on the chart, so press → enough times to get the cursor in the correct position. Now type **ACME INC. SALES AND EARNINGS**.

Press ↵ twice to skip a line. Type **1982** centered under ACME INC. SALES AND EARNINGS. You won't need any more large font letters in this exercise, so turn off the large font by pressing Ctrl-F again.

Next change Thou on the Y-axis with the scale value 250. To do this you must first erase Thou, then type 250 in its place. Move the cursor as close to the T in Thou as possible using the arrow keys. Now press the space bar enough times to erase Thou. Be careful that you don't erase the tip of the Y-axis. You may see some residue. If so, you have to position the cursor so that the space bar erases the residue when it is pressed again.

If the cursor does not line up exactly where you want it, press Ctrl-Z. When you press one of the arrow keys with Ctrl-Z in effect, the cursor moves only a tiny fraction of the normal cursor movement. Practice moving it around now.

As soon as the cursor is where you want it, press Ctrl-Z again. Normal cursor movement is again in effect. After erasing the Thou, type **250** in its place.

Next, add a vertical label along the left side of the Y-axis. The label reads "Thousands of Dollars" to explain the abbreviated Y-axis values. Move the cursor to the beginning of the top line, and type **T**. Press ↵. Type the remainder of the word down the side of the screen.

Now you can expand the letter abbreviations along the X-axis. Move the cursor to the line containing the letter abbreviations. Replace the single letter abbreviations by writing over them. Use Ctrl-Z to position the cursor over the existing letter before entering the expanded abbreviations.

The last change is to modify the legend. It is necessary to erase the existing words in the legend first, then type over them. Be careful to erase only the words in each legend item. If you accidentally erase a plotting symbol, the only way to restore it is to reload the chart. This destroys all the changes you've made so far.

Erase the words in the legends. Again use Ctrl-Z to position the cursor over the first letter. Press the space bar repeatedly until the words are erased. Now type **= Sales** and **= Earnings** to the right of the plotting symbols. Use Ctrl-Z to position the cursor.

You've now completed enhancements on the loaded chart, and the screen should look like the photograph in Figure 2-86.

To save this chart you must exit the Text function and store the chart on a disk file. Press Esc to exit the Text function and redisplay the Plot menu. When the Plot menu returns:

Screen ↵

Save ↵

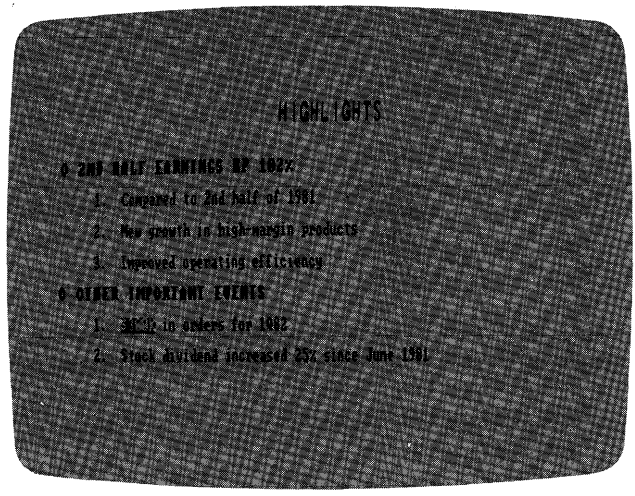
[NEW FILE] ↵

Enter **Slide1** ↵

As soon as the screen has been saved on disk, the Plot menu reappears. Select Text again.

The modified chart is still on the screen and must be erased before you can continue. Press Ctrl-Home to erase the screen. The only thing you should see on the screen now is the block cursor in the upper-left corner.

The next exercise gives you practice in using the Text function to create a text-only page. The page you are going to create will look like Figure 2-87 when you have completed the exercise.



012-076/P

Figure 2-87. Page of Text for Exercise

To create the page of notes shown in the preceding photograph, you'll be using most of the same Text features that you used to enhance the Sales and Earnings chart. You'll also be using two new features: boldface letters and inverse video.

As the photograph shows, you must center the title at the top of the page in large font letters. Not only that, the large font is combined with boldface. To create the title as shown in the photograph, follow this sequence:

1. Press Ctrl-F to turn on the large font.
2. Position the cursor.
3. Press Ctrl-B to turn on boldface.
4. Type HIGHLIGHTS and press ↵ twice to skip a line after the title.

The bulleted subtitles are also in boldface letters, but they are normal font size. Before typing the first subtitle, press Ctrl-F to return the letters to normal font size. The boldface feature remains in effect until you press Ctrl-B again. Type **o** for a bullet; skip one space; then type **2nd Half Earnings Up 102%.** Press Ctrl-B to turn off boldface; then press ↵ twice to skip a line after the subtitle. Type the three items and the second subtitle as shown.

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 and Ctrl-R for inverse video. This sequence is arbitrary; features don't have to be combined in any special sequence. 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 disk file just as you stored the chart, with the Save function in the Screen menu.

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

FUNCTIONAL SUMMARY

To	From	Select/Enter
Draw multi-line chart	Select menu	1. Line 2. Series names SPACE BAR 3. Last series name ↵ 4. Plot
Replot previous series	Select menu	1. Line/Bar/Area/Pie/High-Low-Close/XY 2. [Same] 3. Plot
Draw comparative bar chart	Select menu	1. Bar 2. Both 3. Left series name 4. Right series name 5. Plot
Draw stacked-bar chart	Select menu	1. Bar 2. Normal/Both/Left/Right 3. Series name SPACE BAR 4. Last series name ↵ 5. Plot
Draw, shade, and title a pie chart	Select menu	1. Pie 2. Series names SPACE BAR 3. Last series name ↵ 4. Year or reference number 5. Segment letter 6. Original/Black/Fine Gray/Course Gray/White 7. Y to proceed

(Continued)

To	From	Select/Enter
Draw, shade, and title a pie chart	Select menu	8. Title 9. Add titles 10. Exit
Draw XY chart	Select menu	1. XY 2. Series name for X-axis 3. Series name for Y-axis 4. Plot
Recover from off-scale overlay.	Scale message	1. Redraw
Display two charts	Plot menu	1. Window 2. Horzontal/Vertical 3. Line/Bar/Area/High-Low-Close/XY 4. Series name 5. Plot 6. Window 7. Switch 8. Line/Bar/Area/Pie/High-Low-Close/XY 9. Series name 10. Plot
Annotate charts and create text screens	Plot menu	1. Text

Text functions	
Change cursor movement (course/fine)	Ctrl-Z
Move cursor up	↑
Move cursor down	↓
Move cursor left	←
Move cursor right	→
Move cursor 5 places right	[TAB]
Move cursor to beginning of next line	↵
Erase character	Space Bar
Turn on/off large type	Ctro-F
Turn on/off bold face	Ctrl-B
Turn on/off inverse video	Ctrl-R
Clear screen	Ctrl-Home
Return to Plot Men	Esc

REFERENCE

The Reference is designed to let you find specific facts and answer special questions quickly and easily. Use it at any time along with the lessons or later when you need to refresh your memory about some detail.

USEFUL FACTS ABOUT PROGRAM OPERATIONS

The capabilities of the VisiTrend/Plot program are:

- Memory holds a maximum of 2000 data points or 16 series.
- A maximum of six legend items can appear on a multi-series plot.
- A series can contain up to 250 data points.
- The union of ranges of two or more series can contain up to 250 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 one more data point than there are independent variables; two more if a constant is used.
- An Xform formula cannot exceed 158 characters.
- A moveable title is limited to 77 characters.

KEYBOARD USAGE

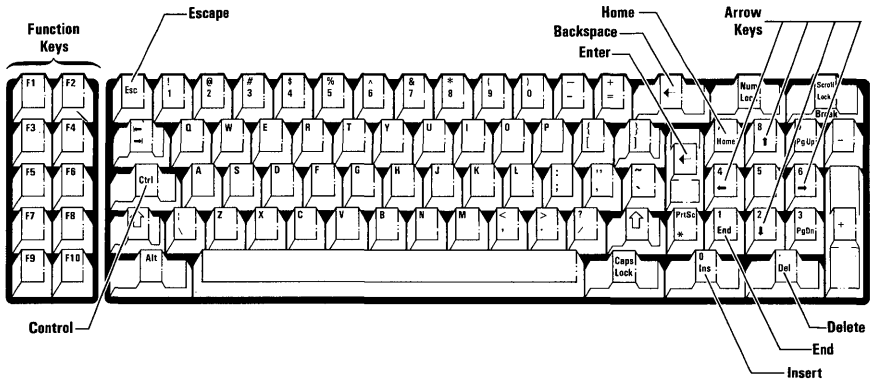


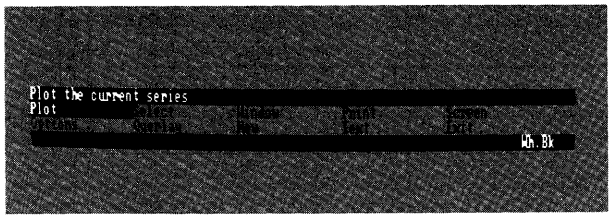
Figure 3-1. The Keyboard

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

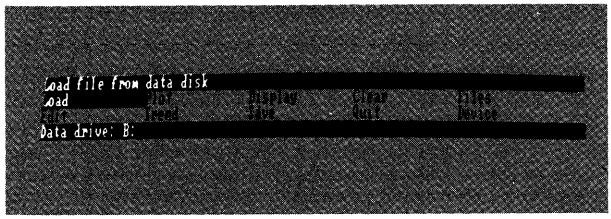
- The ↵ key issues the command indicated by the cursor in a menu, selects a list item indicated by the cursor, or enters data typed at the keyboard.
- The Space Bar marks and unmarks list items when multiple selection is allowed. In the Text function, the space bar works just like the space bar on a typewriter.
- The → key moves the cursor to the right in a menu.
- The ← key moves the cursor to the left in a menu.
- The ↑ key moves the cursor up in a menu or list.
- The ↓ key moves the cursor down in a menu or list.
- The BKSP key corrects errors during data entry by erasing the last displayed character.
- The Esc key aborts the current operation. It is also used to display or erase the menu when a chart is on the screen. It terminates the Text function.
- The Y key is an affirmative response to the prompts to verify your request when deleting files, and exiting the pie chart shading function.

THE STATUS AREAS

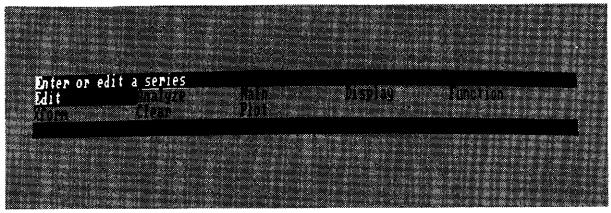
Figure 3-2 shows the Main, Trend, and Plot subprogram status areas and their components.



012-077/P



012-078/P



012-079/P

Figure 3-2. Subprogram Status Areas

- The long prompt gives a longer description of the menu item to which the cursor is pointing.
- The cursor indicates a menu item. The indicated item is selected if the ↵ key is pressed.
- The data disk name indicates the drive for the disk that you will load data from or store data on (the data disk).
- The chart type indicates the type of chart that was last selected.
- The series name indicates the selected series or the first of multiple series selected.
- The window code indicates that the window mode is active and which window is selected: top (WT), bottom (WB), left (WL), or right (WR).

SHADING CODES

Table 3-1 lists VisiTrend/Plot shades and the codes for each that appear in the Plot status area.

Table 3-1. Shading Codes

Shade	Code
Original	Wh
Black	Bk
White	Wh
Fine Gray	FG
Coarse Gray	CG

SERIES NAMING CONVENTIONS

The VisiTrend/Plot program creates several series that are transformations of existing series. These transformations are modified series produced by the Trend subprogram. The VisiTrend/Plot program uses the name of the source series with a qualifier appended to the end as the name of the new series. Table 3-2 lists the qualifiers generated by the program and what they mean.

Table 3-2. Series Name Qualifiers

Qualifier	Function	Comment
.Fnn	Fitted series	nn is program generated number.
.Rnn	Residual series	nn is program generated number.
.Mnn	Moving average	nn is number of periods averaged.
.S	Smoothed series	
.T	Total series	
.%	Percent change	
.−nn	Lagging series	nn is number of periods lagged.
.+nn	Leading series	nn is number of periods lead.

RANGES

How Range Is Used

Range is usually the period of time covered by the chart. The VisiTrend/Plot program plots range on the X-axis (the horizontal axis). The range does not have to be measured in units of time, although it

usually is. The range can be a reference number assigned to items; for example, the range could be reference numbers representing eight sales regions. The VisiTrend/Plot documentation treats most ranges in units of time because most ranges are measured in time: daily, weekly, monthly, quarterly, or yearly.

The range has two parts, the major range which is usually expressed as years and the minor range or the period. The period divides the range into subparts. You can divide the range into any number of parts from 1 (no division) to 99. Normal uses of the period are to divide the year into months (12 parts), quarters (four parts), or weeks (52 parts). The use of both the major and minor range is up to you. The major range can be days or weeks or months; it does not have to represent years. Likewise, the period can represent any division you want it to represent.

How to Calculate the Range

The range is calculated before each plot from the date information in the selected series. The range for a single series is the time from the start date to the end date.

The calculated range for multiple series depends on the type of chart being plotted. Line and area charts use the union of the individual ranges. That is, the start date for the chart is the earliest start date in the selected series and the end date is the latest end date in the selected series. High-low-close, bar, and XY charts use the intersection of the individual ranges. That is, the earliest date and latest date that are common to all selected series are used as the range. Figure 3-3 shows the relationship between union and intersection of ranges.

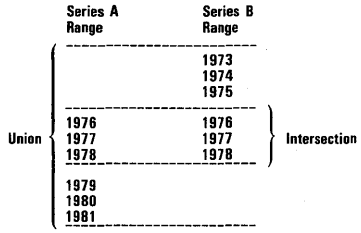


Figure 3-3. Union and Intersection of Ranges

The maximum number of points that can be plotted is 250 and the minimum is 2.

The pie chart is a special case. A pie chart is a comparison of different items at a single reference point rather than a comparison of the same item at different reference points.

How to Change the Range

The VisiTrend/Plot program always determines a range for whatever series are being plotted. There are circumstances where you may want to limit that range. The range you specify must have at least two data points and no more than 250 data points. It must also have at least two data points in common with the selected series.

The Range function in the Options menu allows you to change the program-calculated range.

SCALES

Scale is the scope of values plotted on the Y-axis (vertical axis). The scale is totally dependent on the data being plotted. It may be positive, negative, or span the zero point. Its increments may be in units from fractions to a number of the 38th power.

How to Calculate the Scale

The program selects a range of values that encompasses the highest and lowest values in the series. This range is rounded up or down to values that are round and even. It then sets a number of divisions that result in round and even labels when possible.

The VisiTrend/Plot program usually does a satisfactory job of figuring out a good scale for your data. If you desire a scale other than the one the program generates, you should use the Rescale function in the Options menu to obtain more meaningful Y-axis labels.

You must enter data in decimal notation as opposed to exponential notation. The program displays large and small numbers in exponential notation and specifies a scaling factor at the top of the Y-axis.

How to Change the Scale

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

The Rescale function in the Options menu lets you change the program-calculated scale and the number of divisions. To choose the number of divisions, subtract the low end-of-the-scale value from the upper-end value and pick a number of divisions that divide evenly into that value.

THE VISITREND/PLOT MENU FUNCTIONS

This section describes the VisiTrend/Plot menu functions in alphabetical order. It lists the subprogram in which the function is used and the menu in which it is found.

The menu flow diagrams in Figures 3-4, 3-5, and 3-6 show how to get to the various menus in each program.

Flow between the subprograms is via the Plot, Trend, and Main options. You can call any subprogram to either of the others.

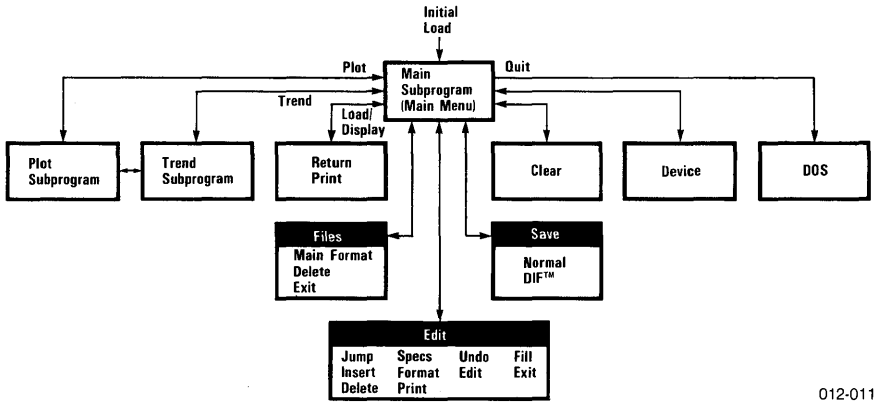


Figure 3-4. Main Subprogram Flow

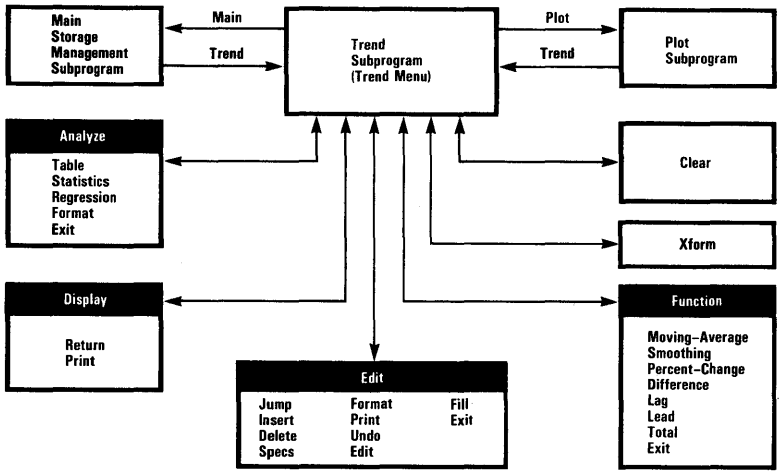


Figure 3-5. Trend Subprogram Flow 012-012

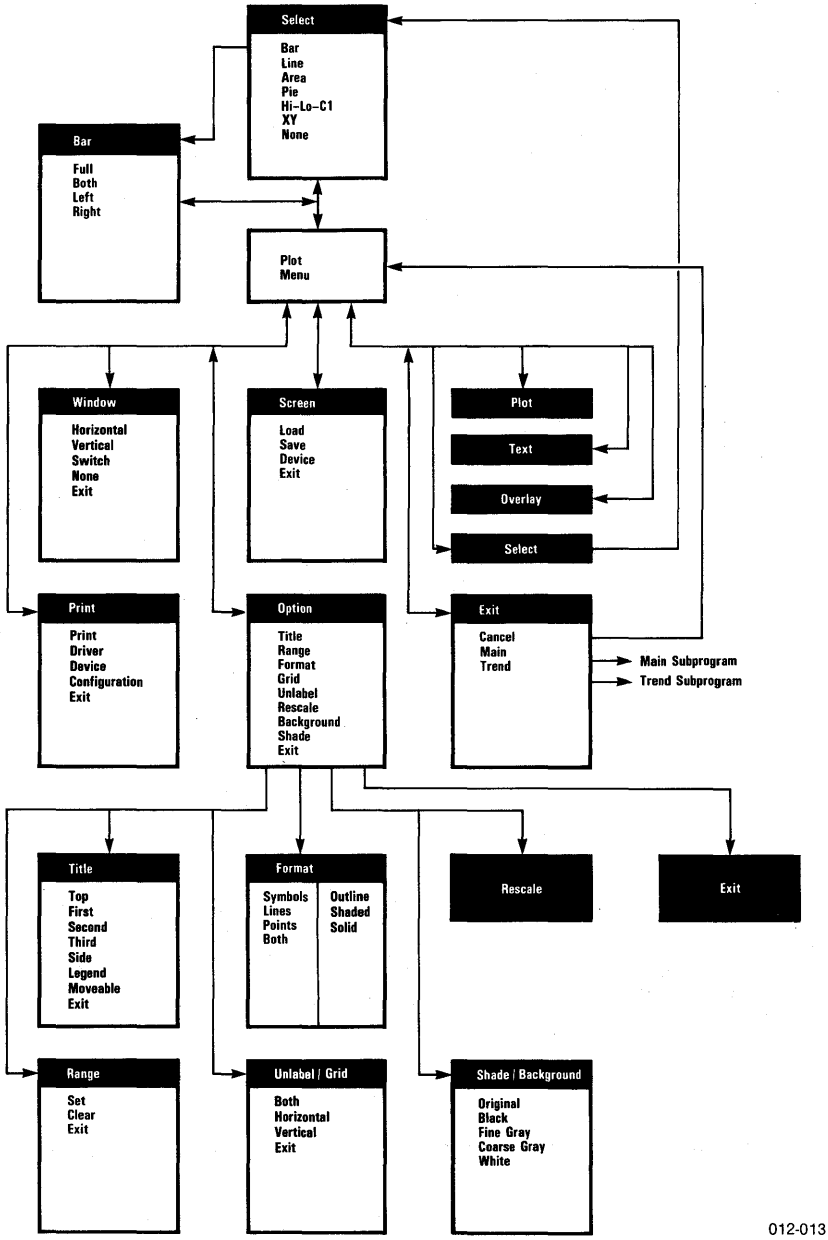


Figure 3-6. Plot Subprogram Flow

Analyze (Trend subprogram—Trend menu)

The Analyze option displays the Analyze menu. The functions in the Analyze menu list series contents, calculate and display series statistics, perform data regressions and trendline forecasting, and format data. For information on the specific functions see Format, Regression, Statistics, and Table.

Area (Plot subprogram—Select menu)

The Area function specifies that an area chart is to be drawn. You must choose one or more series. 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 mixed values, you will not get full detail for either series. In this situation, use the Overlay function to draw a line chart of one of the series. All area charts are plotted from the base line; they are not stacked.

Arithmetic (Main subprogram—Fill menu) (Trend subprogram—Fill menu)

The Arithmetic function inserts new data into the current series beginning at the location of the cursor. The new data is an arithmetic progression. You are prompted for the number of points to be inserted and the factor by which the preceding point is to be increased or decreased. The new data points are inserted immediately following the data point currently indicated by the cursor.

Background (Plot subprogram—Options menu)

The Background function sets the background shade of the plot. Background can be used with all chart types except a pie chart. This function displays a menu that gives you these choices: black, white, original shade, fine gray, and coarse gray.

The program displays the code for the shade in the lower-right corner of the status area. Two shades are listed; the first is the plotting shade and second is the background shade.

The Background shade is retained until it is explicitly changed with the Background function or until it is reset with the New function.

When you change the background shade, the VisiTrend/Plot program changes the plotting shade to avoid using the same shade for background and plotting and to provide a clear, readable plot.

Table 3-3 lists the plotting shades the program uses for the various background shades. The following plotting shades apply if the background shade was selected last.

Table 3-3. Plotting Shades Generated by Background

	Line		
Selected Background Shade	**First Shade (and 4th)**	**Second Shade (and 5th)**	**Third Shade (and 6th)**
Original	White	White	White
Black	White	White	White
Fine Gray	Black	Black	Black
Coarse Gray	Black	Black	Black
White	Black	Black	Black

	Area and Bar		
Selected Background Shade	**First Shade (and 4th)**	**Second Shade (and 5th)**	**Third Shade (and 6th)**
Original	White	Fine Gray	Coarse Gray
Black	White	Fine Gray	Coarse Gray
Fine Gray	Black	Coarse Gray	White
Coarse Gray	Black	Fine Gray	White
White	Black	Coarse Gray	Fine Gray

Bar (Plot subprogram—Select menu)

The Bar function specifies that a bar chart is to be drawn. You must choose one or more series. When choosing multiple series, all series are plotted; the bars for the various series are stacked on top of each other. That is, the first series is plotted on the base line and subsequent series are plotted from the top of the existing bars. The series are plotted in the order in which they are chosen.

When selecting a bar chart, you have the choice of full-width bars centered on the tick marks, or half-width bars located to the left or right of the tick marks. The half-width bars are normally used to draw comparison charts.

No zero line is drawn for bar charts with negative values. Negative values can be plotted but a zero line is not drawn on the screen.

Bar-chart bars are displayed in one of three formats: solid, outlined, and shaded (outline plus horizontal stripes).

Bold (Plot subprogram—Title menu)

The Bold function specifies that the subject title be displayed in bold characters. The alternatives to bold titles normal and inverse titles.

Both (Plot subprogram—Bar, Format, Grid, and Unlabel menu)

The Both function specifies that both of the subject items are to be used or deleted. In the Bar menu, Both means a left bar and a right bar will be plotted at each major tick mark. The bars will be different shades. In the Format menu, Both means that plotting symbols and lines are used for line charts. In the Grid menu Both means that horizontal and vertical grid lines are drawn on the chart. In the Unlabel menu Both means that horizontal and vertical labels will be erased from the chart.

Cancel (Plot subprogram—Data off-scale condition) (Plot subprogram—Moveable title) (Plot subprogram—Exit menu)

When the message about data off-scale appears during an attempted Plot, you may select Cancel. Cancel cancels the Plot request and returns to the Plot menu without destroying the previous chart. For a bar chart, the plot cancels when the first off-scale data point is encountered.

In the Moveable Title menu Cancel erases the title and returns to the Title menu.

When Exit is selected from the Plot menu, you can transfer directly to the Main menu, to the Trend subprogram, or back to the Plot subprogram. Cancel cancels the Exit request and returns the Plot menu.

Clear (Main subprogram—Main menu) (Trend subprogram—Main menu) (Plot subprogram—Options menu)

In the Main and Trend subprograms, the Clear function erases selected series from memory. You can select all, none, or specific series to be erased. This function does not affect the files stored on disk.

In the Plot subprogram, the Clear function specifies that the range values you defined are to be disregarded and the range values stored with the series are to be used. This function has no effect if you did not define a range.

Configuration (Plot subprogram—Print menu)

The Configuration function lets you select the printer driver and the printer used by the program. This option performs the same function as the Driver and Device options except that the selections made with this option remain in effect while the Driver and Device options are only effective for the duration of the current VisiTrend/Plot session.

Continue (Main subprogram—various menus) (Trend subprogram—various menus)

The Continue function is used in several functions that display data on the screen. If there is more data to be displayed, the Continue function displays the next screenfull. When the last screen is displayed, Continue exits the function and displays the next menu.

Delete (Main subprogram—Edit menu) (Main subprogram—Files menu) (Trend subprogram—Edit menu)

In the Edit menu, the Delete function deletes selected data points from the series being edited. The deletion begins at the item indicated by the cursor position when the function begins. The deletion ends at the item you select with the cursor after initiating the function. All data points between and including the beginning and ending points are deleted. The cursor can be moved up or down on the list.

In the Files menu, the Delete function deletes selected files from the data disk. You select the file to be erased from the list of files. Before the file is erased, you are asked to confirm that you want to permanently erase the file.

Device (Main subprogram—Main menu) (Plot subprogram—Screen menu)

The Device function changes data disk drive. The currently assigned drive name is displayed in the bottom line of the status area. The remainder of the screen contains a list of available drives. To change the drive move the cursor to the desired entry and press ↵.

Device (Plot subprogram—Print menu)

The Device function changes the printer. The function displays a list of the printer and communications cards installed in the computer. To change the printer move the cursor to the desired device and press ↵. This function only changes the printer for the current session, use the Configuration option to permanently change the printer selection.

DIF (Main subprogram—Main menu)

The DIF (Data Interchange Format) function specifies that the series being saved is to be stored in a DIF file. Data in this format can be used with other VisiCorp programs, such as the VisiCalc program, that support the DIF format. The alternative is the Normal format, which is only usable by the VisiTrend/Plot program.

The DIF format is described in *Programmer's Guide to the Data Interchange Format*, document number SATN-18, which is available from the DIF Clearinghouse, P.O. Box 527, Cambridge, MA 02139.

Difference (Trend subprogram—Function menu)

The Difference function computes the difference between adjacent data points in the source series. The Difference function lists the series currently in memory. From that list you can select one series for a Difference operation. This function creates a new series with the name of the source series and .D appended to the end.

Display (Main subprogram—Main menu) (Trend subprogram—Trend menu)

The Display function lists the data series currently in memory. The display includes the series name, period, start date, end date, and number of data points in the series. Selecting Return returns to the Main menu or Trend menu. Selecting Print prints this display. The program displays this list after each Load and Clear.

Driver (Plot subprogram—Print menu)

The Driver function in the Print menu allows you to change the printer driver used for graphic printing. The change is made by selecting a driver from the list of drivers. You can also specify automatic line feeds in the Driver function. The changes made in the Driver function remain in effect until changed or the end of the current VisiTrend/Plot program session.

Edit (Main subprogram—Main menu) (Trend subprogram—Trend menu)

The Edit function invokes the Edit facilities. 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 also the following Edit commands:

Delete	Jump
Exit	Print
Fill	Specs
Format	Undo

Exit (Plot subprogram—various menus) (Trend subprogram—various menus) (Main subprogram—various menus)

The Exit function leaves the current menu without performing a function. Usually, the Exit function returns to the preceding menu. In the Plot menu it displays the Transfer menu, providing the option of going to the Trend or Main subprogram.

Files (Main subprogram—Main menu)

The Files function displays the Files menu from which you can format a disk, delete a file from a disk, or return to the Main menu. See Format, Delete, and Exit.

Fill (Main subprogram—Edit menu) (Trend subprogram—Edit menu)

The Fill function displays the Fill menu. From this menu you can generate data to be placed in the series being edited. The data can be an arithmetic series, a geometric series, or a series currently in memory. You are prompted for the number of values and a factor by which to increase or decrease the series. If the data is to be another series, you select the series from a list of series in memory. In all cases, the new data is inserted following the item currently indicated by the cursor. Fill also provides a linear interpolation function to approximate missing data points. See Arithmetic, Geometric, Insert, and Interpolation.

First (Plot subprogram—Title menu)

The First function, like the Second and Third functions, specifies the titles at the bottom of the chart. First specifies the first bottom-title line. Table 3-4 lists the maximum title lengths for the differert fonts and title locations. This title is centered across the bottom of the chart. If the @ symbol is typed as the last character in the title, the title will be left-justified. You must choose between bold typeface, normal typeface, and inverse video in the titles. The bottom titles cover the legend lines.

Table 3-4. Maximum Title Lengths

Location		Typeface		Maximum Length
Left	Centered	Bold	Normal or Inverse	
X			X	73
X		X		58
	X		X	77
	X	X		64

Format (Main subprogram—Edit menu) (Main subprogram—Files menu) (Trend subprogram—Edit menu) (Trend subprogram—Analyze menu)

In the Edit menus and the Analyze menu, the Format function specifies how data is displayed on the screen. Unless otherwise specified, data is displayed in the floating decimal-point format. In the fixed format, you can specify the precision (number of digits to the right of the decimal point, from 0 to 6), and the column width (total number of characters used to display the number, from 6 to 16 characters). Numbers that are too large or too small for the column width and precision are displayed as greater-than symbols (>). Very large and very small numbers that require an exponential format display (1e-8, for example) are displayed as (>>>>) in the fixed format. You cannot enter values in the exponential format; the program displays numbers less than .000001 and greater than 7 digits to the left of the decimal point to the exponential format. The range of values accepted by the program is from 1.175495e-38 to 3.402823e+38.

In the Files option menu, Format allows you to format a disk for use with the program as a data disk. You are asked to insert the disk to be formatted in the data disk drive. The VisiTrend/Plot program allows you to cancel the Format operation even after a disk has been inserted. *Never Format a program disk or the example disk.*

Format (Plot subprogram—Options menu)

The Options menu Format function specifies how a line, bar, or XY chart is to be displayed. This function is not available for area, pie, and high-low-close charts. It displays a different menu for each chart. When the function is chosen for an unsupported chart, a error message is displayed.

The line-chart and XY-chart Format menus allow the choice of plotting with symbols only, lines only, points only, or both symbols and lines.

The bar-chart Format menu allows the choice of plotting with solid, shaded, or outlined bars.

The chart format is retained until you change it with the Format function, or until you select a different type of chart, or until you choose the New function.

Full (Plot subprogram—Bar menu)

The Full option draws full-width bars centered on the tick marks.

Function (Trend subprogram—Main menu)

The Function option displays the Function menu. The Function menu options calculate the moving average, do exponential smoothing, calculate the percent change, create new series with a specified lead or lag from an existing series, and create a new series with the cumulative total of the source series. For further information on these functions see Moving-Average, Smoothing, Percent-Change, Lag, Lead, and Total.

Geometric (Main subprogram—Edit menu) (Trend subprogram—Edit menu)

The Geometric function inserts new data into the series begin editied in a geometric progression. You are prompted for the number of data points to be generated and for the factor by which each preceding point is to be multiplied. The data points are inserted immediately following the data point indicated by the cursor.

Grid (Plot subprogram—Options menu)

The Grid function draws grid lines on the displayed chart. The function is valid for all charts except pie charts. It offers the choice of vertical, horizontal, or both grid lines. You can erase grid lines by selecting them a second time. For example, to erase horizontal grid lines, select horizontal grid lines again. You can erase horizontal, vertical or both. You cannot select this option until a chart is displayed.

Hi-Lo-Cl (Plot subprogram—Select menu)

The Hi-Lo-Cl function lets you draw a high-low-close chart. You are prompted to select the high series, the low series, and the close series. When prompted for the close series, you can select None instead. You cannot generate high-low-close charts with multiple sets of series. A high-low-close chart is 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.

Horizontal (Plot subprogram—Grid, Unlabel, and Window menus)

In the Grid menu, the Horizontal function specifies that horizontal grid lines are to be drawn. If horizontal grid lines already exist, this function erases them.

In the Unlabel menu, the Horizontal function specifies that the horizontal range labels (X-axis) are to be erased.

In the Window menu, the Horizontal function specifies that the screen is to be divided into top and bottom windows as opposed to side-by-side (Vertical) windows.

Insert (Main subprogram—Edit menu)

The Insert function inserts a new data point anywhere within the series being edited. The new point is inserted immediately preceding the data point under the cursor. The points that follow this point 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.

Interpolate (Main subprogram—Edit Fill menu) (Trend subprogram—Edit Fill menu)

The Interpolate function performs a linear interpolation of the values beginning at the value immediately preceding the cursor and continuing to the first non-zero value after the cursor. The cursor must be on a zero value. The function replaces the zero values with the interpolated values between the two values. If the cursor is not located at a zero value, the function is canceled.

Inverse (Plot subprogram—Title menus)

The Inverse function can be used after a title created with the Title menu functions. Selecting Inverse displays the title in inverse video on the screen. The alternatives to this option are Bold and Normal

Jump (Main subprogram—Edit menu) (Trend subprogram—Edit menu)

The Jump function moves the cursor to a specific date in the series being edited. You are asked for the date, ↑, or ↓. With the arrow keys you can move the cursor to the beginning (↑) or end (↓) of the series.

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 forward in time. The lagging series name is the same as the source series with ". – nn" appended to it, where nn is number of periods lagged. For example, a series that lags the series PE RATIO by 2 periods is given the name PE RATIO. – 02. Figure 3-7 shows the effect of the Lag function. You are prompted for the source series and for the number of periods that the new series is to lag by.

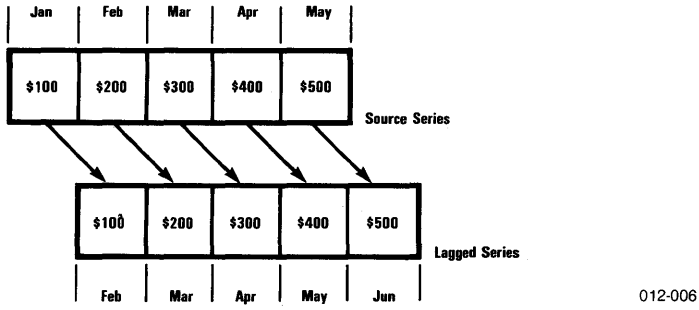


Figure 3-7. Lag Function

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 backward in time. The lead series name is the same as the source series with ". + nn" appended to it, where nn is the number of periods of lead specified. For example, a series that leads the series PE RATIO by three periods is given the name PE RATIO. + 03. Figure 3-8 shows the effect of the Lead function. You are prompted for the source series and for the number of periods the new series is to lead by.

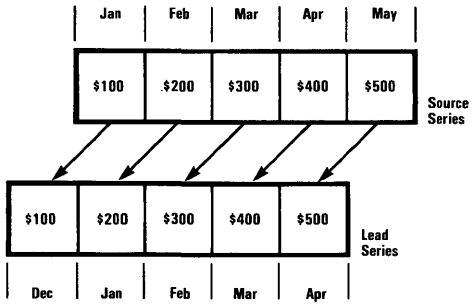


Figure 3-8. Lead Function

Left (Plot subprogram—Bar Chart menu)

The Left option specifies that half-width bars are to be drawn and placed to the left of the tick marks. Left, along with Right can be used for comparative-bar charts.

Legend (Plot subprogram—Title menu)

The Legend function redisplays the chart legend after it has been erased by a bottom title. This function erases all bottom-title lines that covered legend lines. Bottom-title lines that did not cover a legend line are not erased. With a pie chart, Legend erases the pie chart legend. Once the pie chart legend is erased, it cannot be redisplayed without redrawing the entire chart.

Most legend items contain a legend type code, plotting symbol for the corresponding series, and the name of the corresponding series. XY charts, without overlays, only display the series name along the appropriate axis. The legend 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-close 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 series on an overlaid XY chart

Y Y-axis series on an overlaid XY chart

Line (Plot subprogram—Select menu)

The Line function lets you draw a line chart. You must choose one or more series. All series must have the same period. The program uses different symbol when drawing multiple series. The first uses the square, the second uses a triangle, the third uses the number sign, the fourth uses the asterisk, the fifth uses the plus sign, and sixth uses an X. If more than six series are selected, the three symbols are reused. The legend lists the names of the first six series and the symbol used for each.

Lines (Plot subprogram—Format menu)

The Lines function specified that Line or XY charts be drawn with lines only (no symbols). This Format menu function is only valid for Line and XY charts.

Load (Main subprogram—Main menu)

The Load function loads a file from disk. Files contain one or more series. You select a file name from the list of files on the data disk.

As many series from the file as can be put into memory are loaded. This type of partial load only occurs with files stored in the normal VisiTrend/Plot storage format. When loading from a DIF format file, one point from each series is loaded until the 2000 data point limit is reached.

Load (Plot subprogram—Screen menu)

The Screen menu Load function displays a list of the screen image (.PIX) files on the data disk. The selected file is displayed on the screen from which you can enhance it with the Text or Title functions, put it back on disk with the Screen menu Save function, or print it with the Print function.

Main (Plot subprogram—Exit menu)
(Main subprogram—Files menu)
(Trend subprogram—Main menu)

The Main function exits the Plot and Trend subprograms and returns to the Main subprogram. The series in memory are kept during these transfers.

Moveable (Plot subprogram – Title menu)

The Moveable function places titles anywhere on the chart. A moveable title is limited to 78 characters (62 when displayed in bold), and is initially displayed near the center of the chart. You can put as many moveable titles on the chart as you want.

As the name implies, the title can be moved to any location on the screen. Movement is controlled by the ↑, ↓, ←, and → keys. The arrows on these keys indicate the direction they move the title.

The number keys, 1 through 9, increase the distance of title movement each time an arrow key is pressed. The higher the number the farther the title travels. Initial movement is at the 2 rate.

Pressing ↵ after positioning the title displays the Moveable Title menu appears that offers typeface options. Bold displays the title in boldface, Inverse displays it in black letters on a white background, and Normal allows you to change back to the normal typeface after selecting Bold or Inverse. Selection of Bold, Inverse, or Normal before exiting the Typeface menu does not fix the title.

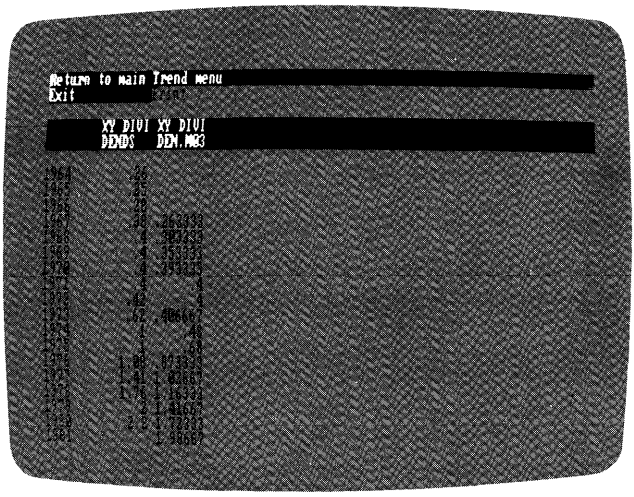
Cancel erases the title on the chart and returns to the main Title menu. The chart is unaffected unless Normal, Bold, or Inverse are selected before Cancel.

Selecting Exit fixes the title in place then returns to the Title menu. After a title is fixed in place, it can be erased with the Text function or by a mask created with the Moveable title function. The mask consists of blank spaces bounded by periods. When this mask is positioned over a title, and fixed in place, the title and the periods are erased.

Moving-Average (Trend subprogram – Function menu)

The Moving-Average function calculates an N + 1 moving average of a specified number of points within a selected series. The function asks you to select the source series and to specify the number of periods over which the moving average is to be calculated. The number of periods must be in the range 1 through the number of data points in the source series. The new series containing the moving average has the name of the source series with ".Mnn" appended to it. nn is the number of periods over which the average is calculated. For example, if you specify a moving average over three periods for the series DIVIDENDS, the new series is named DIVIDENDS.M03.

Figure 3-9 shows a source series and a moving period over three periods.



012-056/P

Figure 3-9. Moving-Average

Name (Main subprogram—Edit Specs menu)

The Name function changes the name of the series being edited.

New (Plot subprogram—Plot menu)

The New function clears the screen. It resets all options you have set and unselects series. New resets the default plotting and background shades. It returns to single window operation if two windows are set. The New function returns to the Select menu.

None (Plot subprogram—various menus)

The None function exits from a list without making a selection. None usually returns to the menu from which you called the current menu.

Normal (Plot subprogram—Title menu) (Main subprogram—Save menu)

In the Title menu, selecting Normal displays the subject title in the normal typeface, as opposed to bold or inverse video typefaces.

In the Save menu, selecting Normal stores a series in the normal VisiTrend/Plot storage format, as opposed to the DIF format. In the normal format, the data can only be used with the Plot subprogram. The VisiPlot storage format is described in Appendix C.

Options (Plot subprogram—Plot menu)

The Options function displays the Options menu which lets you change plotting and formatting values such as range, scale, background, and format. It also adds titles to a chart. For more information see Title, Range, Format, Grid, Unlabel, Rescale, Shade, and Background.

Original (Plot subprogram—Shade menu) (Plot subprogram—Print menu)

The Original option in the Shade menus returns the background and plotting shades to the initial program-selected shades, black and white (Bk.Wh). If you have not changed the shades, this option has no effect. When used with the Background function, Original changes both the background and the plotting shade. Used with the Shade function, it changes only the plotting shade to white (Wh).

Overlay (Plot subprogram—Plot menu)

The Overlay function draws a chart on top of an existing chart, unlike the Plot function which erases the existing chart before drawing a new one. Overlay does not compute range or scale values; it uses the existing values of the current chart. If the chart to be overlaid does not fit in the existing range and scale, an error message is issued and you have the option of proceeding or canceling overlay.

You must display a chart before you use Overlay.

The overlying chart must have the same period as the existing chart. You cannot change the Range, Scale, or Background between a Plot and an Overlay.

If you follow an Overlay function with a Plot function, only the last selected series is drawn; that is, the series selected for the last Overlay, not for the original Plot or any previous Overlay.

You can overlay all types of charts except pie charts. You can mix chart types—except pie charts and XY charts—with the Overlay function.

Percent-Change (Trend subprogram—Function menu)

The Percent-Change function calculates the percent of change between successive points of a selected series and creates a new series containing the percent-change data. The newly created file has the name of the source series with ".%" appended to it. For example, if you

execute the Percent-Change function on the series named EARNINGS, the generated data is put into the series EARNINGS.%. 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 and a period of 1.

Periodicity (Main subprogram—Edit Specs menu) (Trend subprogram—Edit Specs menu)

The Periodicity function changes the period of series being edited. The display shows what the current period is. You are asked to enter a new one. The valid periods are 1 through 99. If you don't enter a new period, the existing default (which is listed) is used. If you specify a new period, the currently displayed series is erased and redisplayed with the new period. The current beginning date is retained.

The most common periods are 1 (yearly), 2 (twice a year), 4 (quarterly), 12 (monthly), 30 (daily), and 52 (weekly).

Pie (Plot subprogram—Select menu)

The Pie function draws a pie chart. A pie chart is a circle that is divided into segments. The size of each segment is determined by the ratio of the segment-data value to the sum of all the data values.

An individual pie chart compares the values of 2 to 16 series at a specified date or reference number. It does not compare the different values in a single series. (It is possible to do a pie chart for a single series but the resulting chart is a circle, and the single series has a percentage of 100%.)

In a pie chart, the segments are drawn in a clockwise direction beginning at 3 o'clock. You are prompted for the date or reference point. Each selected series must have a value for the specified date or reference point. If some series have very small relative values that result in small percentages, the legend letters around the chart may overlap. If this occurs, change the order in which the series are selected so that small segments are not side by side.

The pie chart is drawn with a letter outside the segments that corresponds to a line in the legend. The legend is to the right of the chart in a box that contains the series name and its relative percent of the total. The date or reference number 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%.

Pressing ↵ displays the shading prompt. You may shade any or no segments. All the usual titling capabilities apply. You can erase the legend with the Legend function of the Title menu. This use of the Legend function applies only to pie charts. Once you have finished shading and titling the chart, you cannot alter it.

Points (Plot subprogram—Format menu)

Selecting Points causes all subsequent line and XY charts to plotted with points only until the format is changed, New is selected, or a different type of chart is selected.

Plot (Plot subprogram—Plot menu)

The Plot function plots the currently selected data series according to the current options. The Plot function erases an existing chart before it draws another one. The error message Please select first is displayed if no series is selected. After the chart is drawn, pressing Esc (or any other key) returns the Plot menu to the screen.

Plot (Main subprogram—Main menu)
(Trend subprogram—Trend menu)

The Plot function exits the current subprogram and loads the Plot subprogram. The series in memory is not lost during the transition.

Print (Plot subprogram—Plot menu)
(Main subprogram—various menus)
(Trend subprogram—various menus)

The Print function reproduces the screen image on the supported printer. In the Plot menu it displays the Print menu. For more information on the Print menu options see Driver, Device, and Configuration. In the other menus it prints the current text screen on the printer.

Proceed (Plot subprogram—Data off-scale)

Choosing Proceed draws an off-scale, partial plot. Each time an off-scale value is encountered, a beep sounds. Drawing is stopped when the first off-scale value is encountered.

Quit (Main subprogram—Main menu)

The Quit function exits the VisiTrend/Plot program and asks you to insert an IBM DOS disk. Remove program disk number 2, insert an IBM DOS disk, and press any key.

Range (Plot subprogram—Options menu)

The Range function displays the Range menu. From the Range menu you can Set a new range or Clear a range you have previously Set. When Set is chosen, it prompts for new starting and ending dates. The chart is not redrawn until the Plot function is executed. You also have the option to Clear a user-set range. Clear has no effect on the range if you have not changed it with the Set option. You also have the option of exiting the function.

See the description of Range for a description of how the Visitrend/Plot program sets ranges for different chart types.

Redraw (Plot subprogram—Data off-scale)

The Redraw option rescales a chart if you attempt to overlay a series with data points out of the current charts scale. This option selects a scale that fits the originally plotted chart and the series you were attempting to overlay. If other series were overlayed the orignal chart, are not included when the chart is redrawn. To include them in the final chart you must select and overlay them on the redrawn chart.

Regression (Trend subprogram—Analyze menu)

The Regression function calculates an ordinary least-squares linear multiple regression, such that:

$$y(i) = B + m(1)x_1(i) + m(2)x_2(i) + \ldots + m(5)x_5(i)$$

You must specify the dependent variable and from one to five independent variables from the series in memory. If you select more than five series for independent variables, only the first five are used. You are asked if you want to keep or change the current range for the selections. In a regression, the current range is the intersection of the ranges of the dependent and independent variables. The intersection of the ranges must have one more point than there are independent variables, two more if a constant is used. Finally, you are prompted to choose whether the regression is to be computed with a constant term or through the origin (no constant).

The Regression function can generate a forecast series. This option is chosen by selecting [Trend] as the independent variable. You are asked to specify the number of periods to be forecast. The function develops a straight line series based on the dependent variable. It then extends the straight line series the specified number of periods beyond the dependent series.

The results of the regression are displayed on the screen. These include the name of the dependent variable, the range, and the number of data points. For each independent variable, the series name, coefficient, standard error, and T-statistic are displayed. Below this information, 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 with one independent variable and no constant, the F-statistic and the corrected R-bar squared are undefined.

After the results of the computations are displayed, you have the option of printing the display on a printer. If you do not print them, they are discarded.

If at least two free series are in memory and the data-point limit hasn't been reached, you have the option of keeping or discarding the generated series. If you keep the values, they are saved under the name of the dependent variable with ".Fnn" appended to the fitted series and ".Rnn" appended to the residual series. n is a program-generated number.

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

$$X = \begin{bmatrix} x_0(0) & x_1(0) & \cdots & x_{k-1}(0) \\ x_0(1) & x_1(1) & & \vdots \\ \vdots & \vdots & & \vdots \\ x_0(n-1) & x_1(n-1) & \cdots & x_{k-1}(n-1) \end{bmatrix} = \begin{bmatrix} \text{Ind} & \text{Ind} & & \text{Ind} \\ \text{Series} & \text{Series} & \cdots & \text{Series} \\ \# 0 & \# 1 & & \# k-1 \end{bmatrix} \quad \bar{Y} = \begin{bmatrix} y(0) \\ y(1) \\ \vdots \\ y(n-1) \end{bmatrix} \quad M = \begin{bmatrix} m(0) \\ m(1) \\ \vdots \\ m(k-1) \end{bmatrix}$$

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, column 0 of X is all 1's. If $n>k$ and $(X'X)^{-1}$ is invertable, coefficient estimates

$m(0), \ldots, m(k-1)$

are given by

$$M = (X'X)^{-1} X'Y$$

Coefficients for a Trend forecast are computed in exactly this manner also. In this case, column 0 of X is an artificial series of all 1's, and column 1 of X is an artificial series with data values 1, 2, 3, ..., n.

Regression Statistics:

1. The standard errors of coefficients are given by

   $$s(i) = \sqrt{\text{diag}_i\,(SER^2\,(X'X)^{-1})}$$

   where diag denotes the i^{th} 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 i^{th} dependent data value, i.e.

$$\hat{y}(i) = \sum_{j=0}^{k-1} m(j)x_j(i)$$

then the i^{th} 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

$$SER = \sqrt{\frac{1}{n-k} \quad SSR}$$

5. The Coefficient of Determination R is

$$R^2 = 1 - \frac{SSR}{SST} \quad (SST \neq 0)$$

$$\text{where } SST = \sum_{i=0}^{n-1} (y(i) - \bar{y})^2$$

$$\text{where } \bar{y} = \frac{1}{n} \sum_{i=0}^{n-1} y(i) \quad \text{(mean of y(i))}$$

6. The Corrected Coefficient of Determination R is given by

$$\bar{R}^2 = R^2 - \frac{k-1}{n-k}\left(1 - R^2\right)$$

7. The F Statistic is

$$F(k-1, n-k) = \frac{n-k}{k-1}\left(\frac{R^2}{1-R^2}\right) \text{ if } R^2 \neq 1 \text{ and } k \neq 1$$

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)

The Rescale function changes the Y-axis scale established by the subprogram. The function prompts for a new minimum and a new maximum value. It also requests the number of divisions into which the Y-axis is to be divided (tick marks). For an XY chart, it also prompts for maximum, minimum, and number of divisions for the X-axis.

If you specify a minimum 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.

See the Scale section for a description of how the program sets scales for the charts.

Return (Main subprogram—various menus) (Trend subprogram—various menus)

When the choice is between Print and Return, the Return function returns to the subprogram main menu.

Right (Plot subprogram—Bar menu)

The Right function specifies that a bar chart is to be drawn with half-width bars to the right of the tick marks. This function, along with the Left function, can be used to draw comparative-bar charts.

Save (Plot subprogram—Screen menu)

The Save function stores the screen image in a disk file. The saved screen image can subsequently be loaded back onto the screen from disk. A list of all screen image files is displayed and you have the choice of selecting one of them. Screen image files stored by the Save function are given the suffix . PIX.

Save (Main subprogram—Main menu)

The Save function writes one or more series to a disk file for permanent storage. You must choose whether the data is to be saved in the normal VisiTrend/Plot format or the DIF format. After you select a format, the function displays a list of the series currently in memory and requests that you select those to be saved. It then displays a list of the files currently on the data disk. You can choose to store the selected series in an existing file or create a new file. If you choose an existing file, all the data that is currently in that file is erased and replaced by the new series, not just those series with the same name. If you choose to store the series in a new file, you are prompted to name the file. If you do not specify a name, the SAVE function is canceled.

Screen (Plot subprogram—Plot menu) (Plot subprogram—Pie chart options)

The Screen function displays the Screen menu, which loads a screen image from a disk file to the screen, saves a screen image on a disk file, or specifies which disk drive is the data disk drive. For more information see Load, Save, Device, and Exit.

Second (Plot subprogram—Title menu)

The Second function, like the First and Third functions, specifies a title at the bottom of the chart. Second specifies the second bottom-title line. Table 3-5 lists the maximum title lengths for the differert fonts and title locations. This title is centered across the bottom of the chart. If the @ symbol is typed as the last character in the title, the title will be left-justified. You must choose between bold typeface, normal typeface, and inverse video in the title. The bottom titles cover the legend lines.

Table 3-5. Maximum Title Lengths

Location		Typeface		Maximum Length
Left	Centered	Bold	Normal or Inverse	
X			X	73
X		X		58
	X		X	77
	X	X		64

Select (Plot subprogram—Plot menu)

The Select function displays the Select menu from which you can select the type of chart to be drawn. The Select function does not eliminate the current active series until a new chart is selected and it does not change the current options in effect. You can keep the currently active series by choosing None and returning to the Main menu. To eliminate the current active series and the current options you have set, use the New function to display the Select menu.

The selected series name is displayed in the bottom line of the Plot status area. If you select multiple series, the name of the last one selected is displayed in the status area.

Series (Trend subprogram—Fill menu)

In the Fill menu, the Series function inserts a series from memory into the currently displayed series. The new data immediately precedes the data point at the cursor. The new data is given the date of the point at the cursor. The points that follow are pushed ahead and given new dates and/or periods as appropriate.

Set (Plot subprogram—Range menu)

The Set function sets a new range for the series. You are asked to enter new start and end dates for the new range. The range you set can be eliminated with the Range menu Clear function.

Shade (Plot subprogram—Options menu)

The Shade function changes the plotting shade used to draw a chart. The shading menu offers five selections.

The program displays the code for the shade in the lower-right corner of the status area. Two shades are listed; the first is the plotting shade, and the second is the background shade.

The plotting shade is changed when the background shade is changed. See Background for a listing of the plotting shades generated when Background is used. Table 3-6 lists the shades used for second and third selected series when the first plotting shade is selected with the Shade option. You can use only two plot shades with the Background option, three shades with the Shade option. Shade must be used after Background. Multiple plotting shades only apply to multiple selections plotted at the same time. The sequence is not carried between plotting and overlaying; that is, when a series is overlaid, the shade sequence starts over with the first shade regardless of the number of series already plotted.

Table 3-6. Plotting Shades Generated by Shade

Selected Shade (and 4th shade)	Second Shade (and 5th shade)	Third Shade (and 6th shade)
Original/White	Fine Gray	Coarse Gray
Black	Coarse Gray	Fine Gray
Fine Gray	Coarse Gray	White
Coarse Gray	White	Fine Gray
White	Fine Gray	Coarse Gray

Side (Plot subprogram—Title menu)

In the Title menu, Side specifies that a title is to be placed to the left of the Y-axis. The side title is written from top to bottom and centered vertically along the Y-axis. The side title is limited to 19 characters. The Unlabel function erases the side title. If you have created left and right windows, you can put a different Side title in each. In the window mode, a single Side title is drawn when top/bottom charts are displayed and separate Side titles are drawn when left/right charts are displayed.

Smoothing (Trend subprogram—Function menu)

The Smoothing function performs single exponential smoothing of the source series. You are asked to select a series from those in memory. You must enter a smoothing factor (lambda), which must be between 0 and 1. The smoothed series is saved under the name of the source series with ".S" appended to the name.

For each data point i in series X and a smoothing factor of lambda, the function generates a corresponding point i in series Y according to the algorithm:

$$Y(i) = \lambda\ X(i-1) + (1-\lambda\ )Y(i-1)$$

Specs (Main subprogram—Edit menu) (Trend subprogram—Edit menu)

The Specs function changes the specifications of the series being edited. 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—Edit Specs menu) (Trend subprogram—Edit Specs menu)

The Start function changes the starting date of the series being edited. The series dates are changed immediately and shown in the display.

Statistics (Trend subprogram—Analyze menu)

The Statistics function computes the data point count, minumum, maximum, mean, varience, and standard deviation one or more series. When two or more series are selected, this function also computes and displays the correlation coefficients of the selected series.

The function uses the following formulas:

For a series x(i), i = 0, 1, ..., n−1

The mean $\bar{x} = \frac{\sum_{i=0}^{n-1} x(i)}{n}$

The population variance $\sigma^2 = \frac{ss}{n}$ where $ss = \sum_{i=0}^{n-1} (x(i) - \bar{x})^2$

The population standard deviation $\sigma = \sqrt{\frac{ss}{n}}$

The Statistics display is 79 columns wide. If more data than will fit in 79 columns is selected, some of the data will not be displayed.

The program prompts you to select one or more series. After selecting the series, you have a chance to keep the existing range or change it. If you don't change the range, the function uses the intersection of the ranges of all selected series. If you change the range, you are prompted for major and minor (if applicable) start and end dates. You have the option of printing the statistics.

Switch (Plot subprogram—Window menu)

The Switch function switches from one window to the other when the program is in two-window mode. This function does not affect the chart displayed in the current window. The current window designation, which is in the lower-right corner of the status area, is changed to show the window that is being used.

When you switch windows, the chart in the window you leave is frozen. You can only changes to it with the Title menu options.

Symbols (Plot subprogram—Format menu)

The Symbols function draws a chart with plotting symbols alone (no interconnecting lines). This function is used in the Format menu for line and XY charts. Up to seven different symbols are used. When there are more than six series drawn on the same chart, the symbols are repeated in sequence. That is, the first-series symbol is used for the seventh series, the second-series symbol is used 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 (Dot inside a square)
△ Second series (triangle)
\# Third series
* Fourth series
\+ Fifth series
X Sixth series

Table (Trend subprogram—Analyze menu)

The Table function produces a table of one or more series. You are prompted to select the series to be displayed. After selecting the series, you are given the option to keep the existing range or change it. If you don't change it, the program uses the union of the ranges of all selected series. If you change the range, you are prompted for start and end dates.

The function display is a total of 79 character-columns wide. If you select more series than will fit, those that will not fit are ignored.

The table is displayed 19 lines at a time. After each 19 lines, you are prompted to continue to the next 19 lines, print the current screen display and continue, or exit the function.

Text (Plot subprogram—Plot menu)

The Text function allows you to place customized titles, labels, legends, and notes on a displayed chart. It also allows you to create text-only pages. When this function is selected, your computer and its associated printer operate much like an electronic typewriter. The Text function can be used on a new display and can also be used on a display that has been loaded from a disk file. Table 3-7 summarizes the command keys usable in the Text function.

Table 3-7. Summary of Text Command Keys

Operation	Command Keys
Erase a character	space bar/BKSP
Change cursor movement	Ctrl-Z
Move cursor up	↑
Move cursor down	↓
Move cursor left	←
Move cursor right	→
Move to beginning of next line	↵
Change font size	Ctrl-F
Tab five spaces	[TAB]
Turn bold face on/off	Ctrl-B
Turn inverse video on/off	Ctrl-R
Clear entire screen	Ctrl-Home
Terminate Text function	Esc

Third (Plot subprogram—Title menu)

The Third function, like the First and Second functions, specifies a title at the bottom of the chart. Third specifies the third bottom-title line. Table 3-8 lists the maximum title lengths for the differert fonts and title locations. This title is centered across the bottom of the chart. If the @ symbol is typed as the last character in the title, the title will be left-justified. You must choose between bold typeface, normal typeface, and inverse video in the title. The bottom titles cover the legend lines.

Table 3-8. Maximum Title Lengths

Location			Typeface	Maximum Length
Left	Centered	Bold	Normal or Inverse	
X			X	73
X		X		58
	X		X	77
	X	X		64

Title (Plot subprogram—Options menu)

The Title function displays the Title menu, which contains the functions to add top, bottom, side, and moveable titles to the currently displayed chart. For more information see Top, First, Second, Third, Side, Legend, and Moveable.

Top (Plot subprogram—Title menu)

The Top function centers a title over the displayed chart. If the @ symbol is typed as the last character in the title, the title will be left-justified. Table 3-8 lists the maximum title lengths for the differert fonts and title locations. You are prompted to enter the title then asked if it should be displayed in normal typeface, bold typeface, or inverse video. You return to the Title menu for the Top function.

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 first data point in the Total series is equal to the first point in the source series. The second point in the new series is equal to the first plus the second points in the source, and so forth.

Trend (Main subprogram—Main menu) (Plot subprogram—Exit menu)

The Trend function loads the Trend subprogram.

Undo (Main subprogram—Edit menu) (Trend subprogram—Edit menu)

The Undo function discards all changes made to a series during an editing session. This function restores the series to the condition it was in when it was selected for editing. When you Undo a newly created series, it is deleted.

Unlabel (Plot subprogram—Options menu)

The Unlabel function erases the X- and/or Y-axis labels. The function displays the Unlabel menu which offers the choice of erasing horizontal (X-axis) labels, vertical (Y-axis) labels, or both. You can also exit the function without erasing either. When the vertical labels are erased, a left title is not erased. If no chart is displayed, this function immediately returns to the Main menu.

Vertical (Plot subprogram—Grid, Unlabel, and Window Menus)

In the Grid menu, Vertical draws vertical grid lines on the current chart.

In the Unlabel menu, Vertical erases the current vertical labels.

In the Window menu, Vertical divides the screen vertically into side-by-side windows.

Window (Plot subprogram—Plot menu)

The Window function divides the screen into two windows, switches between the windows, and changes back to one full-screen window format. This function divides the screen horizontally with top and bottom windows or a vertical, configuration with side-by-side windows.

The chart legends are not displayed in the window mode.

The window mode is displayed in the lower-right corner of the status area. If the area is blank, the screen is not divided into two windows. When the screen is divided, the codes WT, WB, WL, or WR are displayed, indicating that the current window is the top, bottom, left, or right window.

The two-window mode is canceled by selecting None from the Window menu. It is also canceled by selecting the New function from the Plot menu.

Xform (Trend subprogram—Main menu)

The Xform function mathematically transforms any existing series or groups of series to create a new series.

You are prompted to enter a name for the series to receive the transformed values. If you press ↵ without entering a series name, the program generates a name in the form Seriesn, where n is a digit.

After naming the new series, you are prompted to enter the transform expression. The list of series in memory is displayed with this prompt.

To enter the transform, type it at the keyboard. However, do not type the name of the series. To enter a series name into the transform, press the ↑ or ↓ key. The cursor appears in the series listing. The indicated name appears in the transform. Pressing the arrow keys moves the cursor up and down the listing in the normal manner. As the cursor moves, the currently indicated series name replaces the previous name in the transform. To select a series, press ↵ or enter the next character in the transform expression.

When the formula or expression is complete press ↵ to perform the transformation and create the new series. If the last item in the transform is a series name, you must press ↵ twice, once to select the series and once to fix the transform.

You can erase the last character or series name you entered by pressing the BKSP key. A series name is erased as a whole, not a character at a time.

You can make an error several ways in creating a transform. You can enter an invalid expression, such as one with unbalanced parentheses, or 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. When an error is encountered, Can't! Bad transform: bad expression is displayed.

In creating transforms you can use the following mathematical operators:

Arithmetic operators:

+	Addition
–	Subtraction
*	Multiplication
/	Division
∧	Exponentiation

Logical operators:

AND
OR
NOT

Comparative operators:

<	Less than
< =	Less than or equal
=	Equal
>	Greater than
> =	Greater than or equal

Functions (with allowable input ranges):

SGN(x)	Sign
INT(x)	Integer part of
SQR(x)	Square root (0.0 < = x < = 3.402823e+38)
LOG(x)	Natural logarithm (0.0 < x < = 3.402823e+38)
EXP(x)	e to the power of (–87.33654 < = x < = 88.72282)
RND	Random number between 0 and 1
ABS(x)	Absolute value of

Trigonometric functions:

SIN(x)	Sine (–2.98156e+8 < x < 2.981568e+8)
COS(x)	Cosine (–2.981568e+8 < x < 2.981568e+8)
TAN(x)	Tangent (–2.981568e+8 < x < 2.981568e+8)
ATN(x)	Arctangent (–3.402823e+38 < = x < = 3.402823e+38)

The functions are applied exactly as in Basic. In place of the Basic variables, you substitute the name of a VisiTrend/Plot series.

XY (Plot subprogram—Select menu)

The XY function specifies that an XY chart is to be drawn. You are asked to select the series to be plotted along the X-axis and 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 an XY chart is the intersection of the two series and is not explicitly shown in the chart. You can change the range.

An XY chart can be drawn with points or plotting symbols. If you don't make a choice with the Format function, plotting symbols are used.

When you Rescale an XY chart, you are asked for new scale values for both the X-axis and Y-axis.

The X-axis scale factor, when required, is displayed below the X-axis.

ERROR MESSAGES

The following are 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.

(loud beep)
A beep is sounded whenever inappropriate data is entered or an illegal operation is attempted. When inappropriate data is entered, no message is displayed, only the beep is sounded. 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 access data diskette!
You attempted to load or save a file or series from the data disk but the disk drive door is open or the disk is damaged. It's also possible that a non-DOS disk or a non-VisiTrend/Plot disk is in the drive.

Can't access program diskette!
You tried to load the VisiTrend/Plot program from the wrong disk, or the drive A door is open, or the disk is damaged. Program Disk #2 should be in Drive A at this time.

Can't! Bad data for pie chart
You attempted to plot a pie chart that had negative data points mixed with positive data points, or all the data points are zero value. Re-specify the data series to be plotted, making sure that all series are either positive or negative, and that there is at least one data point other than zero.

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 the series has more than 250 data points. Use the Edit function to check the series, and make sure it contains at least two data points.

Several conditions can cause this message to be issued:

- There is no data in the range you specified with the Range function.
- There are more than 250 points in the range. For example, you tried to plot two series and the combined ranges of the two series exceed 250 points.
- You attempted to draw a scatter chart with two series that have no common values at any date.
- You attempted to draw a pie chart with one or more series that have no data at the date specified for the pie chart.

Can't! File already exists
You typed a new file name that is the same as a file name already on the disk.

Can't! File not found
The file you selected is not on the disk. You probably changed the disk drive name so the program is looking for the file you selected on the wrong disk drive, or you have the wrong disk in the drive, or the disk is damaged, or the disk is write protected. Change the disk drive name and try again.

Can't! Font file read error!
The VisiTrend/Plot file that contains the font you requested cannot be accessed. Make sure the Program Disk #2 is in drive A and make sure the disk drive door is firmly closed. If this message recurs, contact your dealer.

Can't! Formatting error
You are trying to initialize a defective disk or a program disk, or the data disk drive door is open.

Can't! Graphics hardware not present
The Plot subprogram cannot be used because the computer is not hooked up to a graphics video monitor or a color video controller card has not been installed in the computer. Review the computer requirements in the Introduction to this manual, and make sure your computer is set up accordingly, then load the Plot subprogram. Be sure to save your data before exiting the program or turning the computer off.

Can't! Incompatible file type
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 load printer driver!
The driver you requested is not on the disk, or disk drive A door is open, or the disk is damaged.

Can't load subprogram
You attempted to load the Main, Plot, or Trend subprogram, but the disk drive door is open or Program Disk #2 is not in the drive. If this message recurs, contact your dealer.

Can't mix XY with other chart types!
You attempted to mix an XY chart with another chart type during an overlay.

Can't! Must plot first
You attempted to use the Overlay function when there was no chart displayed. Another possible cause of this message is trying to mix an XY chart with another chart type during an overlay. This message also appears if you attempt to select the Grids, Titles, or Unlabel function without first having a chart displayed. Select Background, then Plot, then Overlay another series; or make sure you're not mixing an XY chart with another chart type, then retry the overlay.

Can't! No active series!
You attempted to invoke a function that cannot be invoked until you have loaded a file or created one with Edit.

Can't! No more room!
Memory capacity has been reached. Memory can hold a maximum of 16 series or 2000 data points, whichever is reached first. Clear some series from memory with the Clear function, then try function again.

Can't! No options available at this time
You attempted to select the Options menu without selecting a chart type first. From the Plot menu, choose the Select function and select a chart type, then try again.

Can't! No option for this chart type
Certain options are not applicable in all instances. When you see this error message, you tried to apply a function that is not legal in the current circumstances. Usually, an option can be applied wherever it is meaningful and useful.

Can't! No printer driver loaded
You must create a new configuration file with the Configuration function in the Print menu.

Can't perform operation on loaded screen image
You attempted to select an operation that is illegal on a display loaded from a screen image file. Only these functions can be selected when a screen image loaded from disk is displayed: Text, Save, Title, and Print.

Can't! Please select first
You selected the Plot or Options function wihout first selecting a series or a graph type. You may have switched windows; you must use the Select function to select a series after switching windows, even if you want to plot the same series. Select a series and then return to the Options function.

Can't! Printer not found
The printer is not hooked up to the computer, or not turned on, or the printer was not turned on at the time the program was loaded, or the printer switches are not correctly set. If the printer was turned off, turn it on and select the printer with the Device option in the Print menu.

Can't! Series too large to insert
You attempted a Fill operation that would have resulted in a series exceeding the 250-data-point limit. The series you specified for inserting or the factor you specified for computing the fill was too large. Use a shorter series or smaller fill factor then try again.

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. The independent series are linearly dependent.

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 keep these facts in mind when creating regression variables using the Xform function.

Can't! Title too long
You attempted to create a side title longer than 19 characters. The maximum length of a side title is 19 characters. Shorten the title; then try again.

Can't transform! Bad expression
You entered an Xform expression that contains an illegal operator, unbalanced parentheses, or you typed a series name instead of selecting it with the cursor and ↵.

Can't transform! Expression too complex!
You have created a transform equation that is too complex for the VisiTrend/Plot program. Possibly there are too many layers of parentheses. One solution is to split the complex equation into several simpler ones and process them individually.

Can't transform! Invalid operators
There are invalid operators or misspelled function names in your transform, or values in your transform are not in the correct location. Make sure you are using the operators listed in the Reference section, then try again.

Can't transform! No series referenced
At least one data series must be referenced in a transform equation to establish a range for the resultant series. Add the appropriate series, then try again.

Data off scale, choose action
You rescaled the chart and in the new scale, some data points fall outside the specified scale. Redraw causes the chart to be redrawn using a new Y-axis. Cancel cancels the entire plot operation. When overlays are involved, Proceed is a third choice of action. 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 canceled when the first off-scale data point is encountered.

Can't! Data read error
The file you requested is not on the disk, the disk drive door is open, or the disk is damaged.

Can't! Data write error
Either the disk is full, or it is write-protected. If a write-protect tab is on the data disk, remove it; then try again. If this message recurs, the disk is full; put the material on another disk.

No room for regression values!
The fitted and error series resulting from a regression operation are too large to fit in memory. The result table will display, but the fitted and error series cannot be saved.

Transform error: Division by zero
You specified a division by zero in an Xform operation. Reenter the formula after correcting the division-by-zero error. If you selected Union of ranges, the series are zero-filled.

Transform error: LOG of zero or negative
You wrote a transform equation that contains a logical operator on zero or a negative value. Logical operators are not allowed with zero or a negative number, so rewrite the equation and try again. If you selected Union of ranges, the function used zero for all missing data values—this can easily cause division by zero or log of zero.

Transform error: Number too large
Computing of the transform expression resulted in a number which is too large for floating point representation on your computer. The largest positive number allowed is 3.402823e+38.

Transform error: Number too small
Computing of the transform expression resulted in a number which is too small for floating point representation on your computer. The smallest number allowed is 1.75494e−38.

Transform error: Parameters out of range
Certain Xform functions such as sine, cos, and tan have limitations on the size of argument they can handle. Where sine is used, for example, you should avoid using any value as large as 1.0e37. The limitations are listed under "Xform" in the Reference chapter.

Transform error: SQR of negative
A transform equation attempts to calculate the square root of a negative value, which is not allowed. Rewrite the equation.

Transform error: Undefined value
The transform equation you attempted to process contains a meaningless value or operation, such as 0/0.

Warning! Intermediate series lost
You did a Plot and then an Overlay successfully. You then attempted one or more additional Overlays, got an off-scale indication, and selected Redraw. Redraw only draws the original series and the last overlay.

Warning! Number too large or too small
You performed an operation that caused an excessively large or small floating point number to be computed. In this program an excessively large or small number is anything near 3.4e38 or −3.4e38. If the operation that caused this warning is a statistical computation, *DO NOT TRUST THE COMPUTED RESULTS*. When this happens the program changes infinities to representable, large numbers and undefined numbers (such as 0/0) to 0.

PRINTER SUPPORT

The VisiTrend/Plot program can be used with several different graphic printers. This appendix contains a list of the supported printers with the required options and switch settings where applicable. It also contains a list of the drivers needed to use non-graphic printers.

If you have a printer other than the supported graphic printers, you can print listings and tables but not charts. No drivers are necessary for printing listings or tables.

Each printer requires a printer driver to correctly print your charts and screen images. A printer driver is a program that the VisiTrend/Plot program uses to communicate graphic information to a printer. There are several printer drivers on your VisiTrend/Plot Program Disk # 2. The names of the printer drivers and their purpose are listed later in this Appendix.

The VisiTrend/Plot Program Disks you received are already set up to print on the IBM 80-Character-Per-Second Matrix Printer (with Graftrax).

If you use this printer or do not have a printer connected to the computer, you do not have to make any changes.

If you use one of the other supported printers, you'll need to change drivers.

CHANGING THE PRINTER DRIVER

1. Load the Plot subprogram and display the Plot menu.
2. Select Print. The Print menu replaces the Plot menu.
3. Move the cursor to Configuration and press ↵. The program displays a list of the printer drivers.
4. The status area tells you what printer driver is currently selected. To change the selection, move the cursor to the desired driver and press ↵
5. The program asks if you want automatic line feeds. If your printer generates a line feed for every carriage return, select Yes, otherwise, select No. See your printer manual for this information.

6. The program lists the names of the printer and communication cards that are installed in the system. Move the cursor to the descired name and press ↵. The program returns to the Print menu and your program is configured for the selected printer and printer driver.

You can change the printer driver or printer for the duration of a VisiTrend/Plot session with the Driver and Device functions. The next time you load the program, it will use the printer driver and printer selected with the Configuration option.

SUPPORTED GRAPHIC PRINTERS

The standard printer is the IBM 80 CPS Matrix Printer (with Graftrax-Plus or Graftrax-80). The installation instructions, packed with the printer, describe how to unpack, install, and check out the printer.

Follow the installation and checkout procedures in the printer manual. This appendix does not tell you how to install and operate your printer. See your computer dealer if you have trouble. This appendix only tells you which switches to set so you can print the graphic output from the program.

When using the printer drivers, position the paper in the printer before you request the printing of listings or charts. The program does not issue a top-of-form command.

The VisiTrend/Plot program supports the graphic printers listed in Table B-1. Any printer and model not specifically mentioned is not tested for graphics printing nor does the program supply a printer driver. The table lists the drivers associated with each printer. In high density mode, the printer prints twice as many dots per inch as it does in low density.

Table B-1. Drivers for the Supported Printers

Printer	Driver Description
IBM 80 CPS Matrix	Small size; high-density; no rotation
	Normal size; low-density; 90 – degree rotation
	Normal size; high-density; 90 – degree rotation
EPSON MX-80	Small size; high-density; no rotation
	Normal size; low-density; 90 – degree rotation
	Normal size; high-density; 90 – degree rotation

Table B-1. Drivers for the Supported Printers (Continued)

Printer	Driver Description
EPSON MX-100	Small size; high-density; no rotation
	Normal size; low-density; no rotation
	Normal size; low-density; 90 – degree rotation
	Normal size; high-density; 90 – degree rotation
	Normal size; high-density; no rotation
NEC 3530 Spinwriter	Normal size; low-density; no rotation
NEC 5530 Spinwriter	Normal size; low-density; no rotation
NEC 7730 Spinwriter	Normal size; low-density; no rotation
OKIDATA Microline 83A	Normal size; low-density; no rotation
	Normal size; low-density; 90 – degree rotation

USE OF NON-GRAPHICS PRINTERS

If you have a printer other than the supported graphic printers, you can print listings and tables, but not charts. A driver is not needed to print text.

PRINTER SET UP AND SWITCH SETTINGS

The following sections describe the preparation of the individual supported printers and interface cards for use with the program. These sections are intended only as an aid in preparing the printers and interface cards for use with this program. They are not exhaustive directions on setting up the printers. For that information, see the documentation that the manufacturer ships with the printer or contact your local dealer.

You must turn your printer off before setting the switches.

Only those switch settings that are necessary to print graphics are listed. Because the other switches may depend upon your configuration or are meaningless in this application, no switch position is suggested.

Note that there may be as many as three different sets of switches involved with a specific printer set up. The printer may have internal and/or external switches. Make sure you are setting the correct switches.

IBM 80-CPS MATRIX PRINTER

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 printer literature or dealer for complete details. Table B-2 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 printer must be on-line. There are no other external switches to set.

Table B-2. IBM 80-CPS Matrix Printer Internal DIP Switch Settings

DIP	Switch	Setting
DIPS1	2	On (CR = print)
	3	On (Buffer full = print)

NEC 3530 SERIAL SPINWRITER

The DIP switches on the left side of the front panel should be set according to Table B-3. The switches within this cluster are numbered from the left to the right.

Table B-3. NEC 3530 Front Panel Switch Settings

DIP	Switch	Setting
2	1	Off—6 Lines per inch
	2 and 3	Off—10 Characters per inch
	4	Off—Constant spacing
3	2	Off—Single line feed
	3	Off—Normal operation

NEC 5530 PARALLEL SPINWRITER

The switches on the front panel should be set according to Table B-4. The switches are listed from the left to the right.

Table B-4. NEC 5530 Front Panel Switch Settings

Name	Setting
LPI	6 Lines per inch
Spacing	Single
Local/Remote	Remote

NEC 7730 PARALLEL SPINWRITER

The DIP switches on the left side of the front panel should be set according to Table B-5. The switches within this cluster are numbered from the left to the right.

Table B-5. NEC 7730 Front Panel Switch Settings

DIP	Switch	Setting
SW1	6 and 7	Off—Buffer length 163 characters
SW2	6	Off—Normal operation
SW3	1	Off—Normal operation
	2	Off—Constant spacing
	3	Off—6 lines per inch
	4	Off—Single line spacing

THE VISITREND/PLOT™ INTERNAL DATA FORMAT

VisiTrend/Plot data series can be stored in either of two formats: the VisiTrend/Plot data format or 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 briefly in Appendix D. The DIF format is covered in more detail in the *Programmer's Guide to the Data Interchange Format*, number SATN-18 which is available from the DIF Clearinghouse, P.O. Box 527, Cambridge, MA 02139.

A VisiTrend/Plot data file is a sequential text file. The fields are variable length and each field is terminated with a linefeed. 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 (1-250)
Periodicity (1-99)
Start year (0-2499)
Start period (1-periodicity)
End year (1-periodicity) (must be consistent with
End period (1-periodicity) the start year and period,
Data point 1 the periodicity, and
Data point 2 number 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 of 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 date
1                   Start period
5                   End date
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

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.

Further information is available through the DIF Clearinghouse, which has been set up to coordinate and distribute information about the DIF format. The Clearinghouse maintains and distributes the DIF Technical Specification, which is a detailed technical description of the DIF format, and information about the commercially available programs that support the format. To obtain this information, please send your name, address, and a note requesting this information to: DIF Clearinghouse, P.O. Box 527, Cambridge, MA 02139.

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

End-Of-Data Records

The End-Of-Data records mark the end of the file:

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, press ESC ↵; to end the worksheet, press ESC.

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 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)) > 0 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, 0; ","; 1
1430 PRINT #1, NUL$
1440 PRINT #1, "VECTORS"
1450 PRINT #1, 0; ","; DEPTH
1460 PRINT #1, NUL$
1470 PRINT #1, "TUPLES"
1480 PRINT #1, 0; ","; WDTH
1490 PRINT #1, NUL$
1500 PRINT #1, "DATA"
1510 PRINT #1, 0; ","; 0
1520 PRINT #1, NUL$
1540 '
1550 ' -----------------------
1560 '      DATA RECORDS
1570 ' -----------------------
1580 FOR COL = 1 TO WDTH
1590      PRINT #1, -1; ","; 0
1600      PRINT #1, "BOT"
1610      FOR ROW = 1 TO DEPTH
1620           IF VAL(WORKSHEET$(ROW,COL)) > 0 THEN
                    PRINT #1, 0; ","; VAL(WORKSHEET$(ROW,COL)): PRINT #1, "V":GOTO 1
660
1630           IF LEFT$(WORKSHEET$(ROW,COL),1) = QUOTE$ THEN
                    WORKSHEET$(ROW,COL) = MID$(WORKSHEET$(ROW,COL),2)
1640           PRINT #1, 1; ","; 0
1650           PRINT #1, QUOTE$; WORKSHEET$(ROW,COL); QUOTE$
1660           NEXT ROW
1670      NEXT COL
1680 '
1690 ' -----------------------
1700 '       END-OF-DATA
1710 ' -----------------------
1720 PRINT #1, -1; ","; 0
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:

- You should use VisiCalc version 177 or later.
- 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 use in a different way. This glossary will help you to get acquainted with the precise meaning of these important terms.

Chart: The output of the plotting program. The graphic representation of one or more data series.

Command: An order given to the computer program. In the VisiTrend/Plot program, commands are issued by selecting one of the choices displayed in a menu.

Cursor: A white area on the screen used to point to items in menus and lists. The cursor is controlled with the four arrow keys and the space bar in menus and by just the ↑ and ↓ keys in lists. When the cursor is pointing to an item, the item is displayed in dark letters against a white background.

Data Point: A numeric value that is associated with a date or reference point. In most charts, the value is plotted against the Y-axis and the time against the X-axis. Data points, along with 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.

DIF: Acronym for Data Interchange Format, a method for storing data on diskettes in a format that is readily acceptable to different computers and different computer programs.

Exponential Smoothing: A forecasting technique to show trends in a data series by generating a new series by 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.

Function: The operation or processing the program does in response to a command.

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 standard 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., which should explain 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 ↵ key.

Menu: A display that offers two or more command choices. The choices in a menu are selected with the cursor and the ↵ key. A choice can also be selected by typing the first two letters of the command.

Menu Item: A command choice that is offered in a menu. A menu item is selected with the cursor and the ↵ key, or by typing the first two characters of the command.

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.

Period or Periodicity: The frequency at which data points occur within a year. A period of one 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.

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).

Scale: The scope of values 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.

Smoothing: A trending enhancement that performs a 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 more 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 date 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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