READ ME FIRST

All computer software is subject to change, correction, or improvement as the manufacturer receives customer comments and experiences. Radio Shack has established a system to keep you immediately informed of any reported problems with this software, and the solutions. We have a customer service network including representatives in many Radio Shack Computer Centers, and a large group in Fort Worth, Texas, to help with any specific errors you may find in your use of the programs. We will also furnish information on any improvements or changes that are "cut in" on later production versions.

To take advantage of these services, you must do three things:

(1) Send in the postage-paid software registration card included in this manual immediately. (Postage must be affixed in Canada.)

(2) If you change your address, you must send us a change of address card (enclosed), listing your old address exactly as it is currently on file with us.

(3) As we furnish updates or "patches", and you update your software, you must keep an accurate record of the current version numbers on the logs below. (The version number will be furnished with each update.)

Keep this card in your manual at all times, and refer to the current version numbers when requesting information or help from us. Thank you.

APPLICATIONS SOFTWARE VERSION LOG

01.00.00			

OP. SYSTEM VERSION LOG

875-9242/2/28/83

Software Registration Card

Cat. No. 2604550

Version 01.00.00

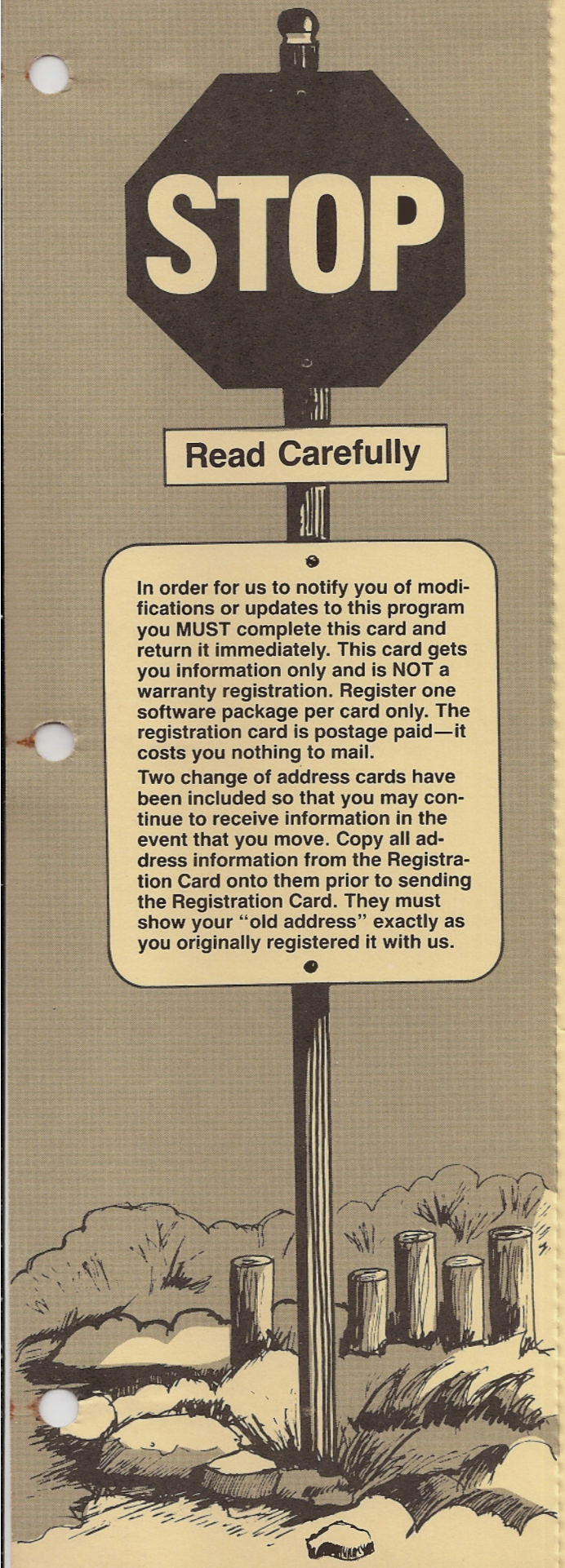
Name _____

Company _____

Address _____

City _____ Phone (___) ___ - ____

State _____ Zip _____



In order for us to notify you of modifications or updates to this program you MUST complete this card and return it immediately. This card gets you information only and is NOT a warranty registration. Register one software package per card only. The registration card is postage paid—it costs you nothing to mail.

Two change of address cards have been included so that you may continue to receive information in the event that you move. Copy all address information from the Registration Card onto them prior to sending the Registration Card. They must show your "old address" exactly as you originally registered it with us.

Change of address

NEW ADDRESS

Name _____

Company _____

Address _____

City _____ Phone (___) ___ - ____

State _____ Zip _____

OLD ADDRESS

Name _____

Company _____

Address _____

City _____ Phone (___) ___ - ____

State _____ Zip _____

Change of address

NEW ADDRESS

Name _____

Company _____

Address _____

City _____

State _____ Zip _____

OLD ADDRESS

Name _____

Company _____

Address _____

City _____

State _____ Zip _____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 138 FORT WORTH, TEXAS

POSTAGE WILL BE PAID BY ADDRESSEE

Software Registration
Data Processing Dept.
P.O. Box 2910
Fort Worth, Texas 76113-9965

PLACE
STAMP
HERE

Software Registration
Data Processing Dept.
P.O. Box 2910
Fort Worth, Texas 76113-2910

PLACE
STAMP
HERE

Software Registration
Data Processing Dept.
P.O. Box 2910
Fort Worth, Texas 76113-2910

BUSINESS GRAPHICS ANALYSIS PAK (26-4550)

ADDENDUM

ATTENTION! This product supports three new color devices and three additional printers that are not described in the manual:

Color Ink-Jet Printer CGP-220 (Catalog Number 26-1268)
Color Graphics Printer CGP-115 (Catalog 26-1192)
Single-Pen Flatbed Color Plotter FP-215 (Catalog 26-1193)
DMP-120 Dot Matrix Printer (Catalog Number 26-1255)
DMP-420 Dot Matrix Printer (Catalog Number 26-1267)
DWP-210 Daisy Wheel Printer (Catalog Number 26-1257)

To accommodate the additional color devices, two Setup Diskettes (rather than one) are included. Configuration programs for all color devices (the Multi-Pen Plotter and the three new devices) are on Setup Diskette 2. All other configuration and data conversion programs are on Setup Diskette 1. The following printers use the same configuration programs as printers described in this manual: Use the DMP200 program for the DMP-120, the DMP400 program for the DMP-420, and the DAISYII program for the DWP-210. See Chapter 4 for instructions on configuring the Processing Diskette for your output device.

INK-JET PRINTER CGP-220

This high-resolution printer provides seven colors—black, orange, green, yellow, violet, pink and blue—and a choice of dark or light solid-color shading. Unlike other devices that fill each curve to the bottom axis or grid line, shading with the Ink-Jet Printer is never overlapped. The first curve you specify is shaded to the grid line. For curves 2 and 3, shading is drawn only from the curve line down to the next shaded curve.

To configure your Processing Diskette for the Ink-Jet Printer, use the program CGP220.

COLOR GRAPHICS PRINTER CGP-115

This compact printer/plotter has four pens (black, red, blue and green) and produces charts on a paper roll 4½" wide. The charts are half the height and width of standard Business Graphics charts. This device can print data as well as charts.

To configure your Processing Diskette for the Color Graphics Printer, use the program CGP115HZ for horizontal format or CGP115VT for vertical format.

SINGLE-PEN FLATBED PLOTTER FP-215

This plotter uses hard-nib pens in black, red, blue and green. In most respects, output is identical to that produced by the Multi-Pen Plotter. When you draw a chart, the program prompts you to insert the needed pen. After drawing all parts of the chart that use that pen, the program pauses and asks you to insert the next pen. This process is continued until the chart is completed.

Manual pen changes make it possible to draw bar charts in which positive and negative bars are different colors, which can be particularly useful for variance bar charts. Select the color you want to use for the positive bars. Then, when a negative bar is encountered, the program pauses and gives you a chance to change pens. Another pause lets you switch back to the original color for positive bars.

To configure your Processing Diskette for the Flatbed Plotter, use the program FP215HZ for horizontal format or FP215VT for vertical format.

CONFIGURATION FILES

The following programs on Setup Diskette 2 are needed for the new devices (see Appendix D for details):

INK-JET	COLOR GRAPHICS PRINTER		FLATBED PLOTTER	
PRINTER	HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL
CGP220	CGP115HZ	CGP115VT	FP215HZ	FP215VT
DEV18LIN	DEV17LIN	DEV16LIN	DEV15LIN	DEV14LIN
DEV18BAR	DEV17BAR	DEV16BAR	DEV15BAR	DEV14BAR
DEV18PIE	DEV17PIE	DEV16PIE	DEV15PIE	DEV14PIE
DEV18SCT	DEV17SCT	DEV16SCT	DEV15SCT	DEV14SCT
DRIVR220	DRIVRPLT	DRIVRPLT	DRIVRPLT	DRIVRPLT

PAGE SIZE

The minimum, maximum, and default settings for page width, height and margins are shown for the Color Graphics Printer and the Ink-Jet Printer.

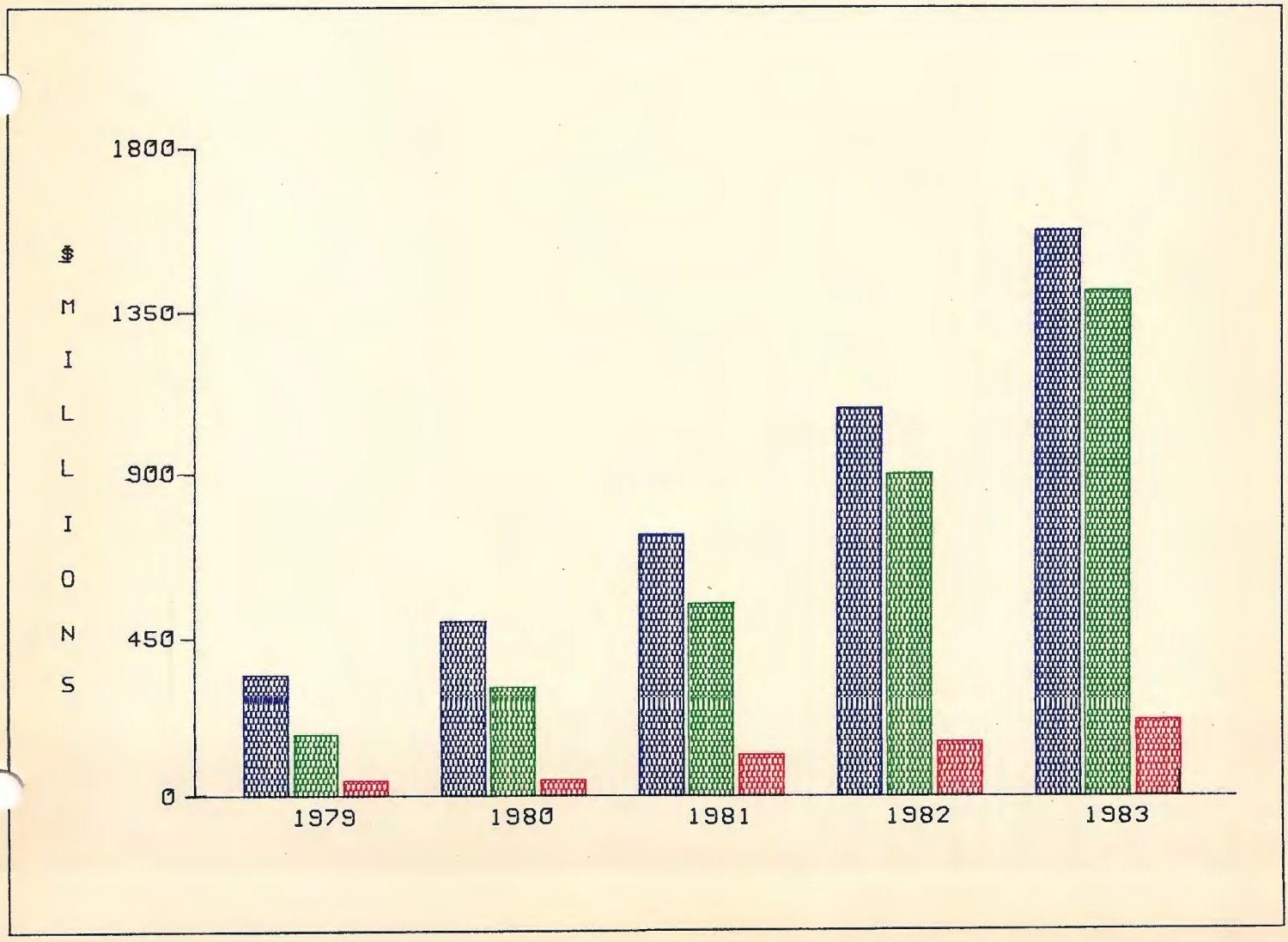
	Color Graphics Printer CGP-115		**Ink-Jet Printer**
	Vertical	Horizontal	CGP-220
Width (Chars)			
default	76	110	76
minimum	35	35	35
maximum	76	90	76
Height (Lines)			
default	66	44	66
minimum	30	60	30
maximum	66	44	66
Margins			
default	AUTO	AUTO	AUTO
left/right (chars)	0	0	0
minimum	50	60	51
Top/Bottom (Lines)			
minimum	0	0	0
maximum	40	20	40

Settings for the Flatbed Plotter are the same as those for the Multi-Pen Plotter.

Radio Shack®

BUSINESS GRAPHICS

Analysis Pak



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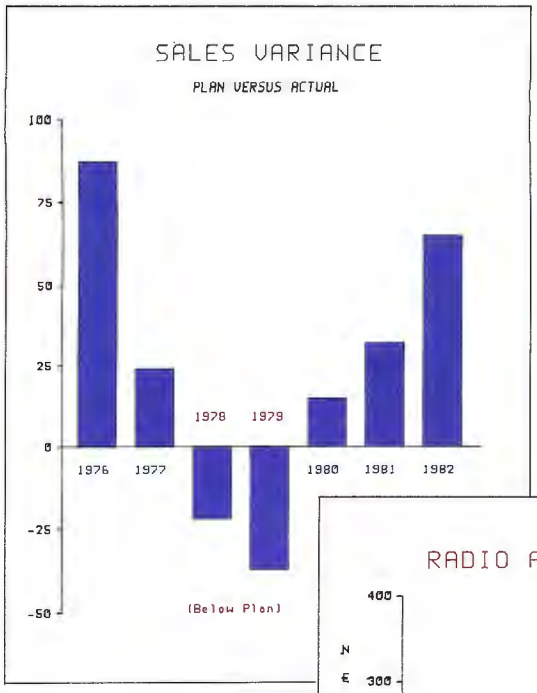
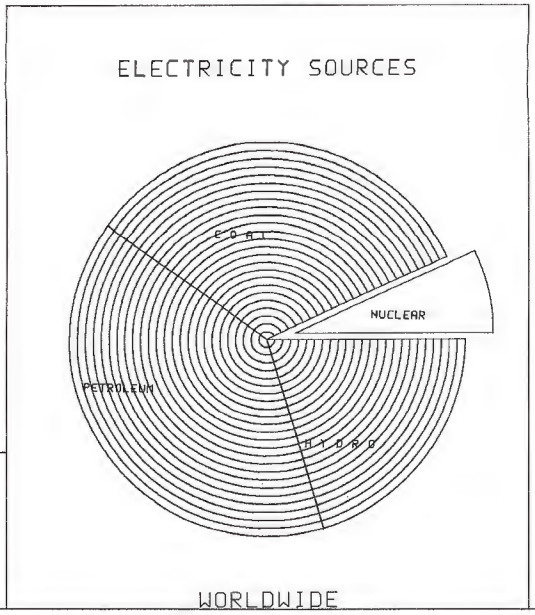

SALES VARIANCE
PLAN VERSUS ACTUAL
100
75
50
25
0
-25
-50
1976
1977
1978
1979
1980
1981
1982
(Below Plan)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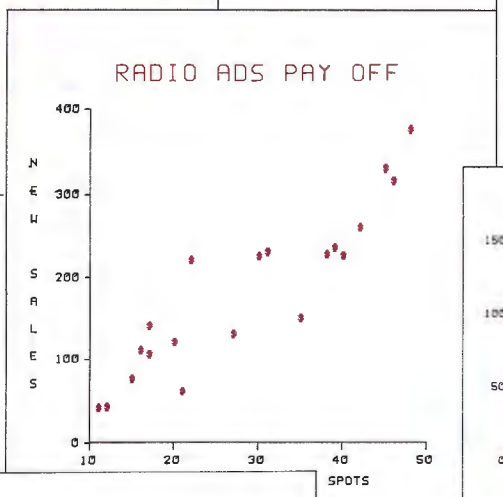
COAL
NUCLEAR
PETROLEUM
HYDRO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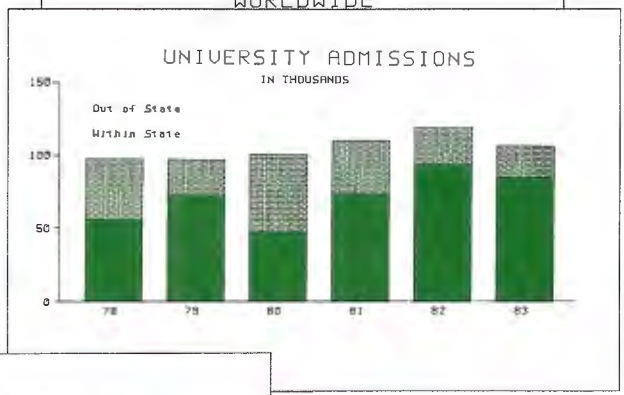
SALES
400
300
200
100
0
10
20
30
40
50
SPOTS


WORLDWIDE
UNIVERSITY ADMISSIONS
IN THOUSANDS
Out of State
Within State
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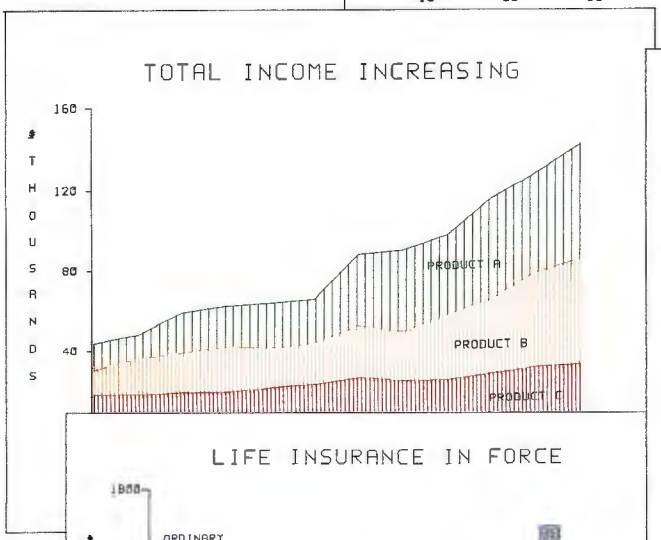
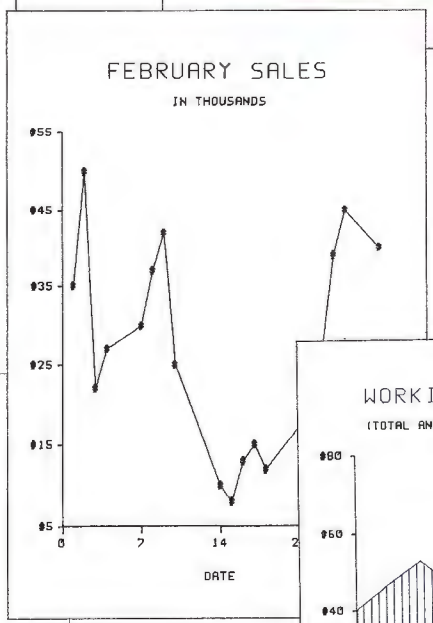
100
50
0
78
79
80
81
82
83


TOTAL INCOME INCREASING
$ THOUSANDS
160
120
80
40
PRODUCT A
PRODUCT B
PRODUCT C


FEBRUARY SALES
IN THOUSANDS
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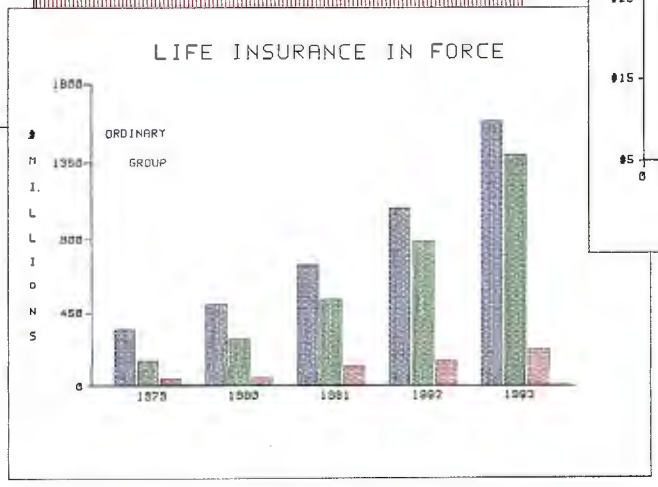
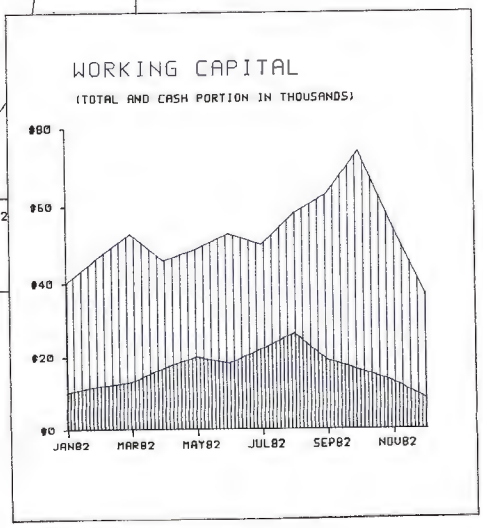
$45
$35
$25
$15
$5
0
7
14
DATE


LIFE INSURANCE IN FORCE
$ MILLIONS
1800
1350
900
450
0
ORDINARY
GROUP
1979
1980
1981
1982
1983


WORKING CAPITAL
(TOTAL AND CASH PORTION IN THOUSANDS)
$80
$60
$40
$20
$0
JAN82
MAR82
MAY82
JUL82
SEP82
NOV82

TRS-80®
Business Graphics Analysis Pak

Radio Shack®
A DIVISION OF TANDY CORPORATION
FORT WORTH, TEXAS 76102

10 9 8 7 6 5 4 3 2 1

How To Use This Manual

This manual is both a reference tool and a learning aid. Its several sections give you a thorough knowledge of the Business Graphics Analysis Pak. Some sections are for those starting out with Business Graphics Analysis Pak, while other sections are for those who are familiar with the package.

About the Sections

Getting Started contains an overview of the package and how to use it. A sample session gets you started right away. There are also instructions on how to adapt the program for your Radio Shack® printer or plotter.

Charts explains how to create and change data for use in charts; how to create line charts, bar charts, pie charts, and scatter charts; and how to create or change the text in charts.

Sample Sessions lets you try out the Business Graphics Analysis Pak in five separate sessions that build on one another.

Appendices include detailed instructions on making backups, on using TRSDOS®-II, and on adapting other data files for use with Business Graphics Analysis Pak. It also contains a section listing all the program error and warning messages and their solutions.

A detailed index is at the back of the manual.

Special Terminology

Throughout this manual, "output device" refers to a printer or plotter. It does not refer to the screen display.

Table Of Contents

FEATURES

In today's business world, there is no shortage of information — most of us receive more reports than we have time to read. Yet significant facts, buried in pages of figures, are sometimes overlooked.

Charts make data come alive, revealing the trends, comparisons, and distribution patterns that often are hidden in columns of figures. A few charts can convey the significant facts in pages of computer reports, emphasizing key points, highlighting trends and comparisons, and summarizing your conclusions.

Get your point across with charts created with the Business Graphics Analysis Pak. It is easy to learn and use. After entering your data and selecting a chart type, you can let the program do the rest for you, or you can format the chart yourself by making selections from a series of menus. Emphasize your conclusions or highlight salient points with titles, notes, and labels. When you are satisfied with the appearance of the screen, print the chart.

Note: You can use the Business Graphics Analysis Pak with ARCNET™.

You can generate four basic chart types with many variations:

- Line charts containing up to 3 curves, each based on up to 100 data values.
- Bar charts containing single bars, stacked bars, or bars grouped in clusters of 2 or 3.
- Pie charts containing up to 12 slices.
- Scatter charts (X-Y plots) based on up to 100 pairs of data values (coordinate points) for each of 3 curves, with or without connecting lines.

You can let the program do automatic scaling, formatting, and labeling based on your data. Or you can specify all aspects of the chart format:

- Depending on your printer, you can set the chart width from 2" to 10" (20 to 100 character positions) and the height from 3" to 8" (18 to 48 lines). Actual chart size can range up to 11" square.
- Use solid, dashed, or dotted lines for curves and any character for the plot points.
- Choose from three to six types (depending on your output device) of shading for each curve, bar, bar segment, and pie slice.
- Frame your chart.
- Control the scaling, by specifying the range to be used.
- Control the format of the numeric scale labels.

- Provide your own labels for plot points or bars.
- If you have a color output device, select colors for the curves, plot points, bars, slices, and text.

You can supply data for your chart in the following ways:

- Enter or generate data through the Business Graphics Analysis Pak.
- Select a row or column from a VisiCalc® (Radio Shack Catalog Number 26-4511) DIF file.
- Convert a SCRIPSIT® (Catalog Number 26-4531) file into an acceptable format.
- Convert a BASIC or FORTRAN data file into an acceptable format.

Your Business Graphics Analysis Pak has extensive data handling capabilities. You can:

- Generate an arithmetic or geometric series of up to 100 values by supplying a starting value and a constant.
- Change, insert, or delete data values.
- Transform data by supplying a constant for addition, subtraction, multiplication, or division.
- Fit a linear, quadratic, or exponential curve to the data and, if you wish, project the curve.
- Compute an arithmetic or geometric growth projection.
- Smooth data with a moving average.
- Consolidate data.
- Compute the logarithm of each data value.

You can save charts or the settings you used to create them in disk files. Then, you can reproduce each chart any time you wish by recalling the file that contains it. You can update your data files and reuse the saved chart settings to produce new charts in the same format. The Business Graphics Analysis Pak makes it easy.

REQUIRED EQUIPMENT

To use this package, you need one of the following computers:

- TRS-80® Model II (Catalog Number 26-4002)
- TRS-80® Model 12 (Catalog Number 26-4004)
- TRS-80® Model 16 (Catalog Number 26-6001)

Your computer must have at least one disk drive and 64K of RAM (Random Access Memory). The high-resolution graphics board (Catalog Number 26-4104) is optional.

One of the following Radio Shack printers/plotters is required for producing hard copies of charts you create.

Wide Carriage Printers:

- DMP 400 (Catalog Number 26-1251)
- DMP 500 (Catalog Number 26-1252)
- DMP 2100 (Catalog Number 26-1256)
- Line Printer V (Catalog Number 26-1165)
- Line Printer VI (Catalog Number 26-1166)
- Daisy Wheel II (Catalog Number 26-1158)
- DWP 410 (Catalog Number 26-1250)

Narrow Carriage Printers:

- DMP 100 (Catalog Number 26-1253)
- DMP 200 (Catalog Number 26-1254)
- Line Printer VII (Catalog Number 27-1167)
- Line Printer VIII (Catalog Number 26-1168)

Plotters:

- Multi-Pen Plotter (Catalog Number 26-1191)

The design of this package allows for support of future Radio Shack printers and output devices. This support will let you take advantage of new graphics features as they are developed.

Throughout the rest of this manual, the Business Graphics Analysis Pak is referred to as Business Graphics.

BACKUPS

Business Graphics is on two TRSDOS program diskettes: a Processing Diskette and a Setup Diskette. Before using Business Graphics for the first time, make backups (copies) of these diskettes. For specific instructions on backing up diskettes, see Appendix A, "Backup, Format, Save, and Restore Procedures." If you have a computer that uses TRSDOS-II (consult your computer owner's manual if you're not sure), you should FCOPY Business Graphics to TRSDOS-II diskettes (or to your hard disk). Appendix B explains how to FCOPY Business Graphics to TRSDOS-II.

USING THE PROGRAM

Use the Setup Diskette to adapt Business Graphics for use with your output device and/or high-resolution screen, and also to change data files created through SCRIPSIT, BASIC, or FORTRAN into an acceptable form for use with Business Graphics.

The Processing Diskette lets you create the various charts. You can store your data on this diskette or on a formatted diskette in a drive other than Drive 0 (formatting instructions are in Appendix A).

Starting and Stopping the Program

Loading the Program

The Business Graphics Processing Diskette is set up for use with the Radio Shack DMP 400. You can adapt the diskette for any supported device as described in Chapter 4. Configure the Processing Diskette for the printer or plotter you intend to use.

To begin using Business Graphics, follow these steps:

1. Install and turn on your computer as instructed in your computer owner's manual.
2. Insert a backup of the Processing Diskette into Drive 0.
3. Enter the date in the format displayed at the bottom of your screen. For example, if the current date is August 4, 1984, type **08/04/1984** (ENTER).
4. Enter the time in the HH.MM.SS., 24-hour format for simply press (ENTER) to bypass the prompt. For example, if it is now 2:30 in the afternoon, type **14.30.00** (ENTER) or simply press (ENTER).
5. When TRSDOS READY appears, type **TRSCHART** (ENTER). The Main Menu appears, and you can begin using Business Graphics.

You must type all responses in capitals when starting and also when using the program. Lowercase letters can be used when entering text that will appear on a chart.

Note: The numbers that appear on the copyright screen when you start up Business Graphics represent the version number. Refer to it when requesting information or help from Radio Shack. Do not be concerned if the number on the screen is not identical to the one in the manual.

If you wish, use the TRSDOS AUTO feature to cause the program to automatically load whenever you power-up or reset the computer. With a backup of the Processing Diskette in Drive 0, at TRSDOS READY, type **AUTO TRSCHART** (ENTER).

Reset the computer and answer the date and time prompts. The Business Graphics Main Menu appears. Whenever you start up with this diskette, the Main Menu will appear without your entering TRSCHART. To cancel the automatic loading of Business Graphics, type, at TRSDOS READY **AUTO** (ENTER).

Ending the Session

To end the session, return to TRSDOS READY. To do this, return to the Main Menu and choose Selection 7, "Stop." When TRSDOS READY appears, remove the diskettes and place them in their protective sleeves. Turn off the computer and the attached peripherals.

Changing Diskettes

If you do certain procedures using only Drive 0, Business Graphics prompts you to change diskettes. When this happens, follow the program's prompts and the instructions in this manual that apply to that function. (See Chapter 4, "Output Devices and Screen Displays.")

To change diskettes at any other time, return to TRSDOS READY (as instructed in "Ending the Session"). Remove the diskette(s) and insert the new diskette(s). If you're changing diskettes in Drive 0, reset the computer. If you're changing diskettes in a drive other than 0, type **I** (ENTER). Then restart the program.

Screen Displays

Business Graphics is a menu-driven program. When you start the program, a menu appears. By making various menu selections, you create charts. Each menu lists tasks the computer can perform for you, or prompts you for specific information. Figure 2-1 shows the pathways between the menus of the Processing Diskette.

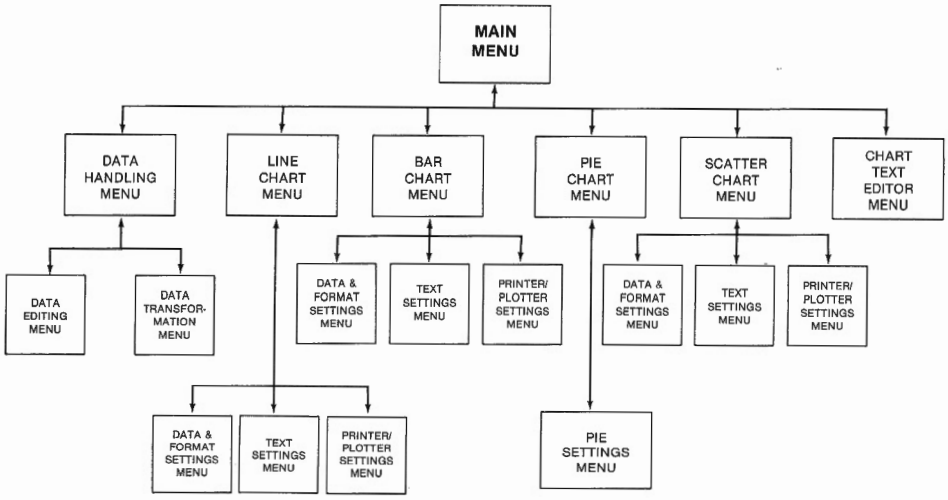


Figure 2-1: Menu Pathways. All menus are accessed through the Main Menu. To move to a previous menu in the same pathway (for example, to move from a data and Format Settings Menu to the Chart Menu), press (ESC).

Whenever a menu appears on the screen, one selection is flashing. A brief explanation of that selection appears at the bottom of the screen. To choose the flashing selection, press (ENTER). To choose another selection, move to that selection either by pressing the corresponding number key or by using (↑) or (↓). When the desired selection is flashing, press (ENTER) to choose it.

Displaying Data and Charts

The screen can display only 17 data values at a time. The total number of values in current memory is displayed at the top of the screen. To see data that is not displayed, scroll through the data by pressing (↑) or (↓) until the desired portion of the data is displayed.

When a chart is displayed on the standard low-resolution screen, only a portion of the chart may be visible. To display the rest of the chart, use ↑, ↓, ←, or → to move the cursor to the edge of the screen. The chart window scrolls to let you view another part of the chart. If the page size is less than 11" by 11", the top and right page boundaries are marked by dashed lines on the screen. The page begins at the bottom left corner of the screen, and the cursor is first positioned there.

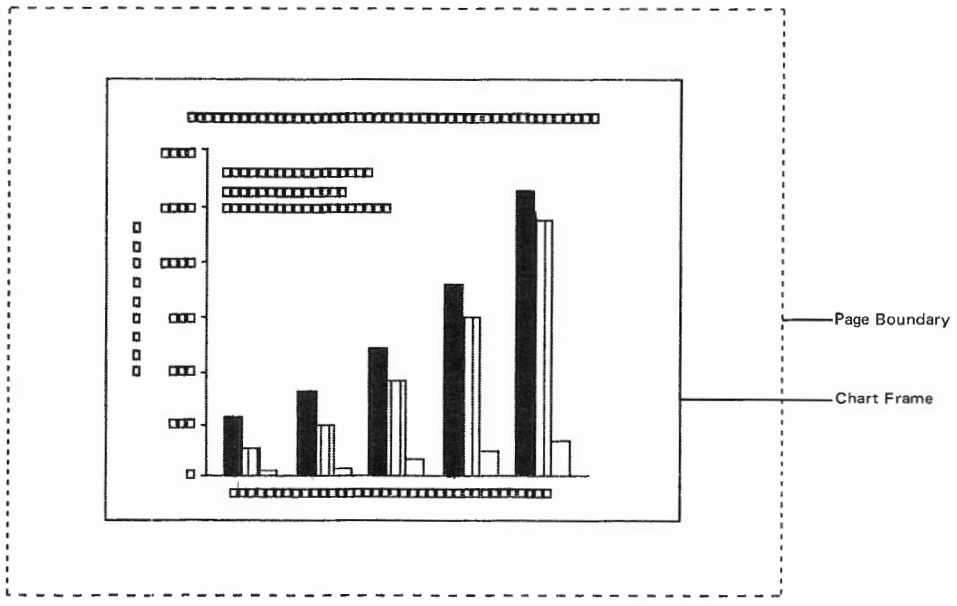


Figure 2-2: Chart displayed on the standard low-resolution screen.

If your computer has been upgraded with the high-resolution graphics board (and if your Processing Diskette has been modified as explained in Chapter 4), charts are reduced to fit the display area and are always displayed in their entirety with all four page boundaries. Text is represented by boxes that show the label's size and location. If you move the cursor onto any text, the actual text appears in the text window at the bottom of the screen.

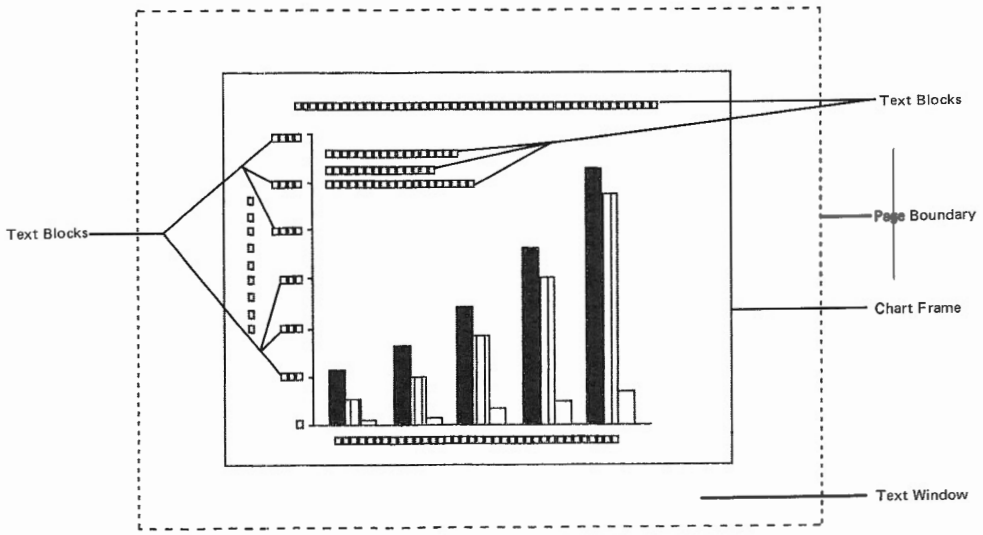


Figure 2-3: Chart displayed on a high-resolution screen.

Correcting Typing Errors

If you discover a typing error before you press (ENTER), you can easily correct it. Use (BACK SPACE) or (←) to erase incorrect characters and then type the correct characters.

If you discover a typing error after you press (ENTER), you can generally correct it by choosing the same menu selection again. To correct data, choose Data Handling Menu Selection 4, "Edit Data."

Error and Warning Messages

If a flashing message appears at the bottom of the screen, it is a warning or error indicator. These messages are listed in alphabetical order in Appendix E. Also listed are explanations of possible causes and remedies for each message.

Chronological Steps

Business Graphics makes it easy to create charts, but you must do a few things in this specific order:

1. If you plan to use the DMP 400 and the standard low-resolution screen, go to Step 2. Otherwise, modify the program for use with your output device and/or for use with a high-resolution screen. Instructions are in Chapter 4, "Output Devices and Screen Displays."

2. Obtain data for the chart. You can create and save new data, use data from a previously saved Business Graphics data file, or use a row or column from a VisiCalc DIF file. Do this through the Data Handling Menu. Instructions are in Chapter 5, "Chart Data."

   If you wish to use a data file created by BASIC, SCRIPSIT, or FORTRAN, first convert it to an acceptable format. Conversion instructions are in Appendix C, "Using Other Data Files."

3. Obtain chart settings for the chart. Either create and save new settings or use settings from a previously saved chart settings file. Do this through the particular chart menu. Chapters 6-9 contain instructions for the specific chart types.

4. If you wish, create additional text for the chart through the Chart Text Editor Menu. Instructions are in Chapter 10, "Chart Text."

5. Save and print the chart. Do this through the chart menu or the Chart Text Editor Menu.

6. If you wish to access a previously saved chart, do so through the Chart Text Editor Menu. Instructions are in Chapter 10 "Chart Text."

SAMPLE SESSION: CREATING A PIE CHART

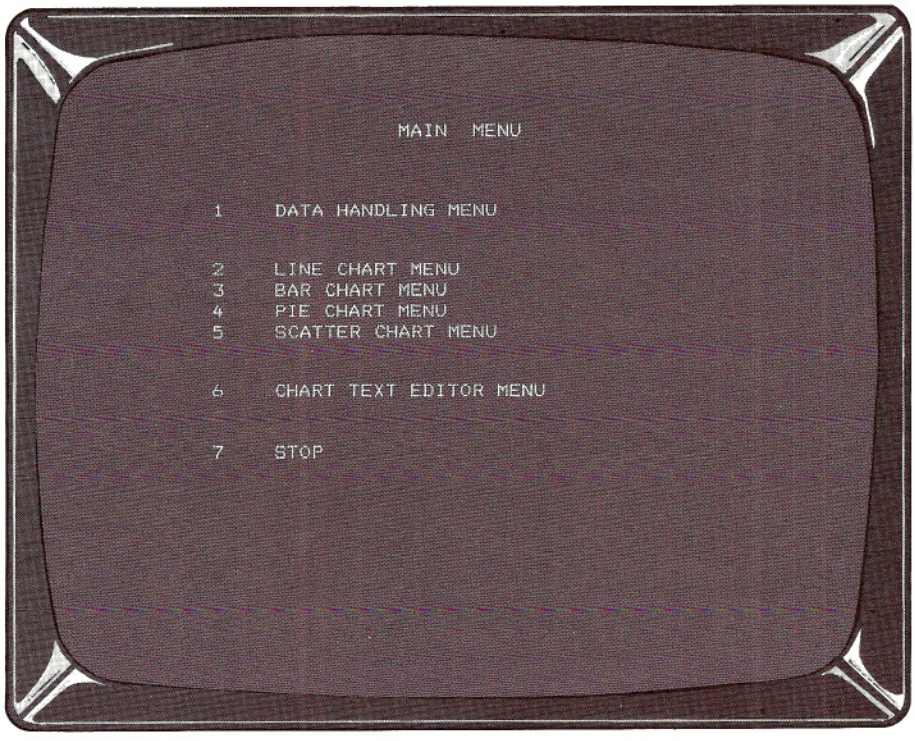
This short sample session is an introduction to Business Graphics. Additional sample sessions are in Part III of the manual.

A company that uses five approaches to gain customer queries about its products conducted a study evaluating the amount of response from each approach. The following data was obtained:

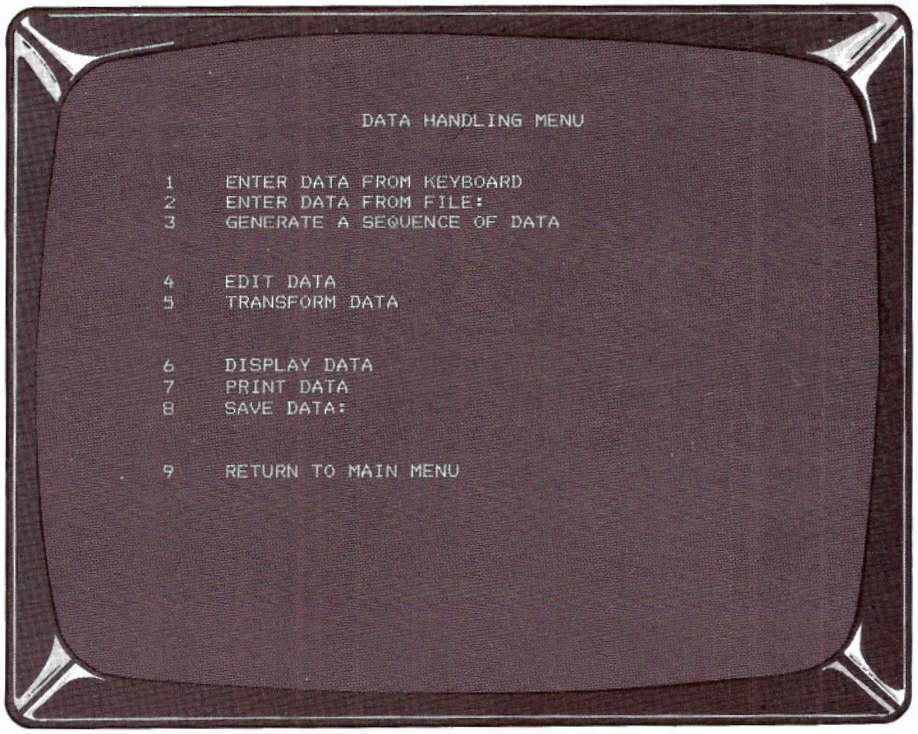
Approach 1: 53
Approach 2: 37
Approach 3: 34
Approach 4: 75
Approach 5: 29

To visually show the proportion of responses generated by each approach, create a pie chart. First, start Business Graphics by following these steps:

1. Turn on your computer as instructed in your computer owner's manual.
2. Insert a backup of the Processing Diskette into Drive **0**.
3. Enter the date in the format displayed at the bottom of your screen. For example, if the current date is August 4, 1984, type **08/04/1984** (ENTER).
4. Enter the time in the HH.MM.SS 24-hour format or simply press (ENTER) to bypass the prompt. For example, if it is now 2:30 in the afternoon, type **14.30.00** (ENTER) or simply press (ENTER).
5. When TRSDOS READY appears, type **TRSCHART** (ENTER). The Main Menu appears:



Selection 1, "Data Handling Menu," is flashing; choose it by pressing (ENTER). The following screen appears:



Entering and Saving Chart Data

To enter data, choose Data Handling Menu Selection 1, "Enter Data from Keyboard."

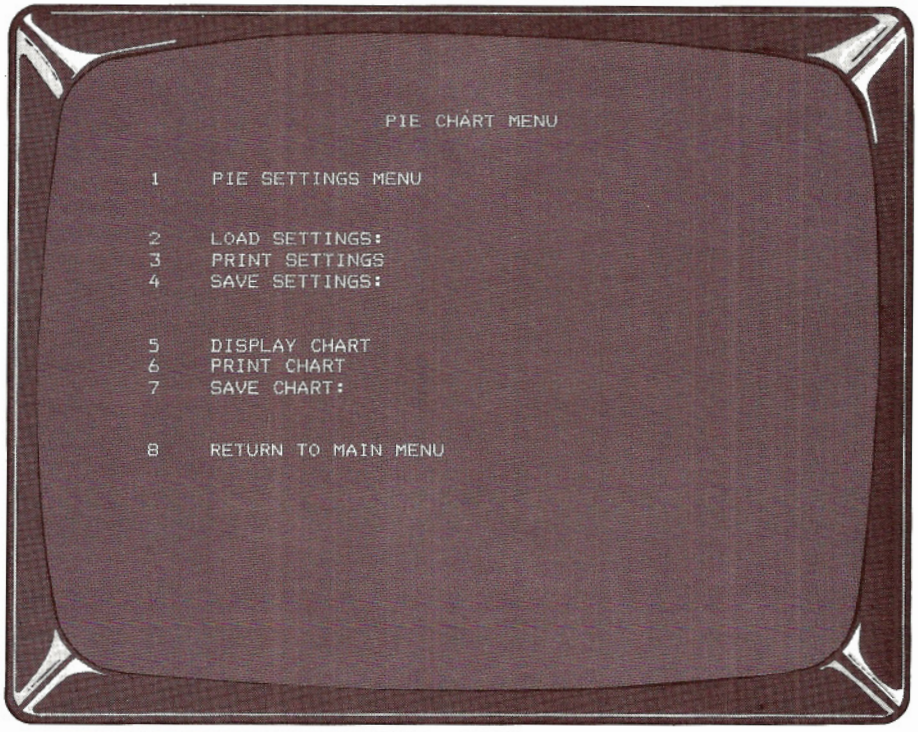
The screen shows:	**Your response:**
VALUE # 1:	Type **53** (ENTER)
VALUE # 2:	Type **37** (ENTER)
VALUE # 3:	Type **34** (ENTER)
VALUE # 4:	Type **75** (ENTER)
VALUE # 5:	Type **29** (ENTER)
VALUE # 6:	Press (ESC)

When you press (ESC), the Data Handling Menu reappears, with Selection 6, "Display Data," flashing. Choose this selection to display the data you entered. If the data is not the same as the values listed above, you probably made a typing error, and your chart will be a little different from Figure 2-4. When you finish examining the data, press (ESC) to return to the Data Handling Menu.

Before you can use the data to produce a chart, you must save the data. Choose Data Handling Menu Selection 8, "Save Data." Type **SAMPLE/DAT** (ENTER). The data is saved. Return to the Main Menu by choosing Selection 9, "Return to Main Menu."

Creating Pie Chart Settings

Choose Main Menu Selection 4, "Pie Chart Menu." The following screen is displayed:



Choose Selection 1, "Pie Settings Menu." The Menu with Selection 1 ("Data File for Slice Values") flashing, appears. Press (ENTER) to choose Selection 1. The cursor moves into position for your response. Type **SAMPLE/DAT** (ENTER). Press (ESC) to return to the Pie Chart Menu.

Displaying and Saving the Chart

To display the chart on your screen, choose Pie Chart Menu Selection 5, "Display Chart." Your screen displays a chart similar to the pie chart in Figure 2-4.

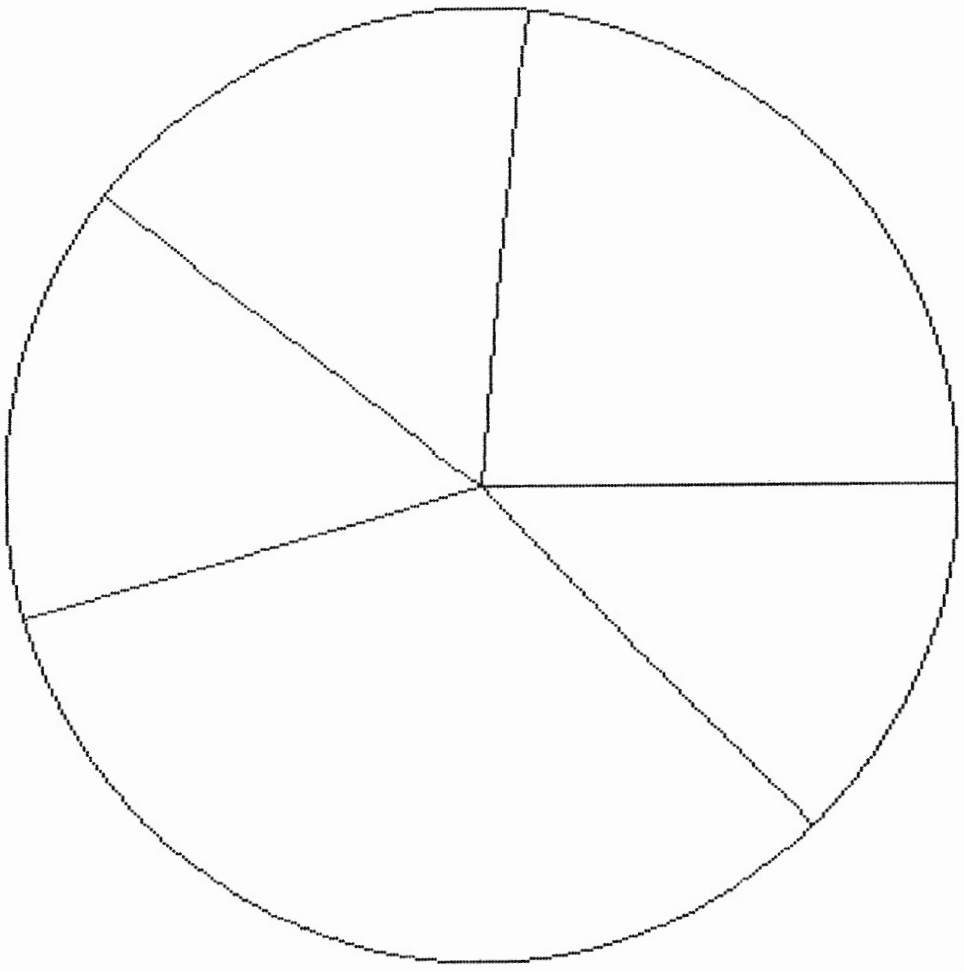


Figure 2-4: Pie Chart Created from Sample Data.

Use ↑ to move the cursor to the top of the screen. Continue pressing ↑, and the chart scrolls downward. To return to the Pie Chart Menu, press ESC.

If you wish to save the chart, choose Pie Chart Menu Selection 7, "Save Chart." When the cursor moves into position, type **SAMPLE/PIE** ENTER. The chart is saved under the name SAMPLE/PIE. You can display or print the chart at any time through the Chart Text Editor Menu.

Choose Selection 8, "Return to Main Menu."

Continuing or Ending the Session

Before creating your own charts, refer to Chapter 4, "Output Devices and Screen Displays," to see if you need to reconfigure your Processing Diskette. Then begin creating charts, following the program's explanatory messages and referring to the manual as needed. Read Chapter 3, "Using

Charts Effectively," to find out about chart types, scales, text, and quality output.

If you want more guidance before creating your own charts, try the sample sessions in Chapter 11.

If you prefer to end the session now, choose Main Menu Selection 7, "Stop." When TRSDOS READY appears, remove the diskette and turn off the computer.

The quality and impact of the charts you create depend on your choice of chart type, scale, and text, in addition to the care you take when producing them with a printer or plotter.

When you create a series of charts for comparison, the comparison is most accurate when you use the same chart type and size for each. Be sure to use a numeric scale range that includes all the data values.

SELECTING A CHART TYPE

Business Graphics creates four basic types of charts:

- Line charts
- Bar charts
- Pie charts
- Scatter charts

Some charts show trends, some stress the relationship of parts to the whole, and others highlight differences between sets of data. To determine which chart type is the best choice for your purpose, examine your data and decide what you want to illustrate. The following illustrations and captions differentiate between the chart types.

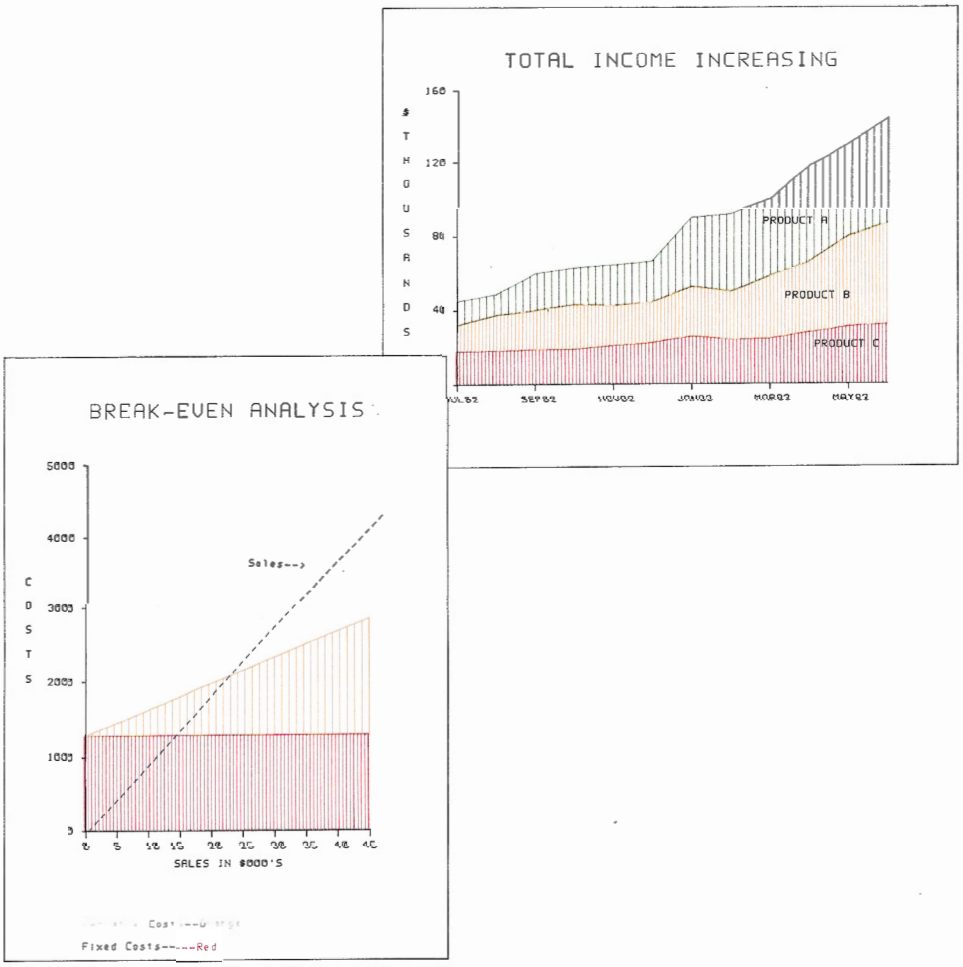


Figure 3-1: Line Charts. Line charts show how data changes over time and illustrate the continuous flow of change. Because they emphasize trends over a period of time, line charts are an effective way to show overall patterns formed by many values. Each data point value is measured on the chart's vertical scale and is associated with a point (usually a specific time period) on the chart's horizontal scale.

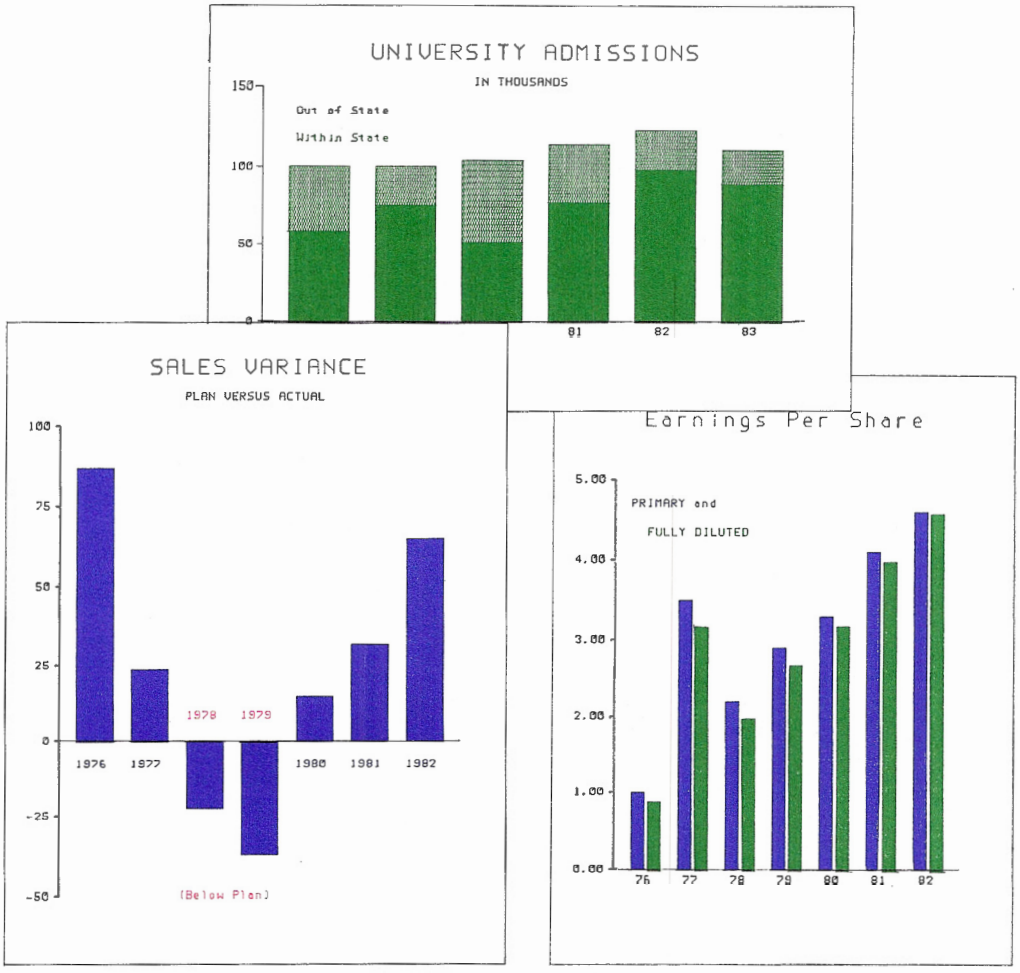
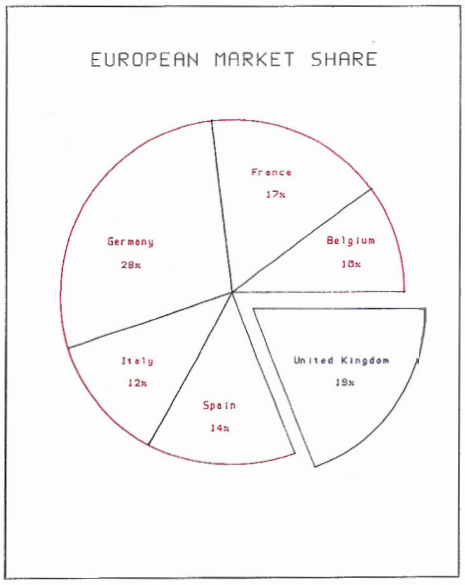


Figure 3-2: Bar Charts. Bar charts pinpoint individual values rather than trends. They are an effective means of comparing and contrasting specific data values. The length of each bar, measured against a vertical scale, indicates the size of each data value.



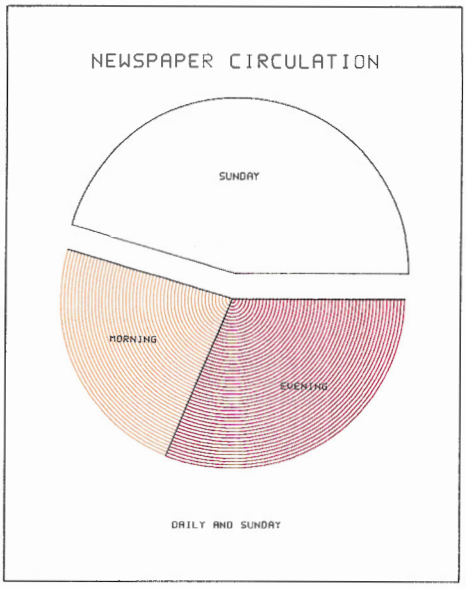
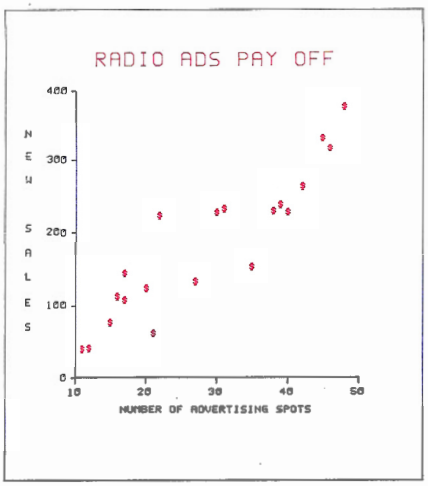


Figure 3-3: Pie Charts. Pie charts compare parts to a whole and show the relative size of each part. Each "slice" represents a percentage of the total pie. Pie charts are effective in comparing a small number of items.



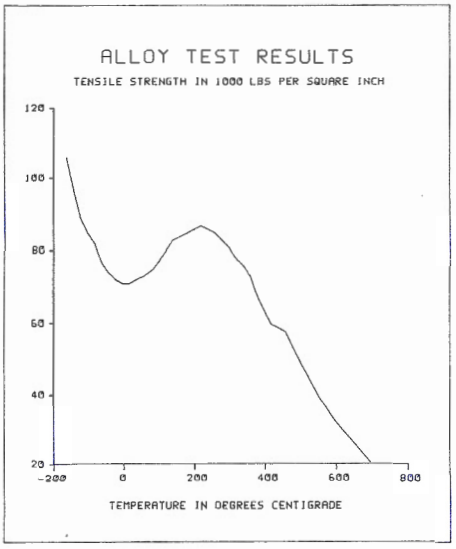


Figure 3-4: Scatter Charts. Scatter charts (X-Y plots) show relationships between data. Use scatter charts to reveal a cause-and-effect relationship or to demonstrate that no such relationship exists. You can also use scatter charts to plot data with different or irregular time intervals (such as comparing monthly and weekly data or plotting daily data that omits weekends and holidays), or to create designs by connecting the dots.

SCALING THE CHART

To communicate the significance of data, in addition to the data itself, scale your charts so that they reflect what you want to emphasize.

Scale is the size and relationship of chart elements. It can have a dramatic impact on the message a chart conveys. Consider the four line charts in Figure 3-5. These charts use the same data values, but have different axis lengths of different numeric scale ranges.

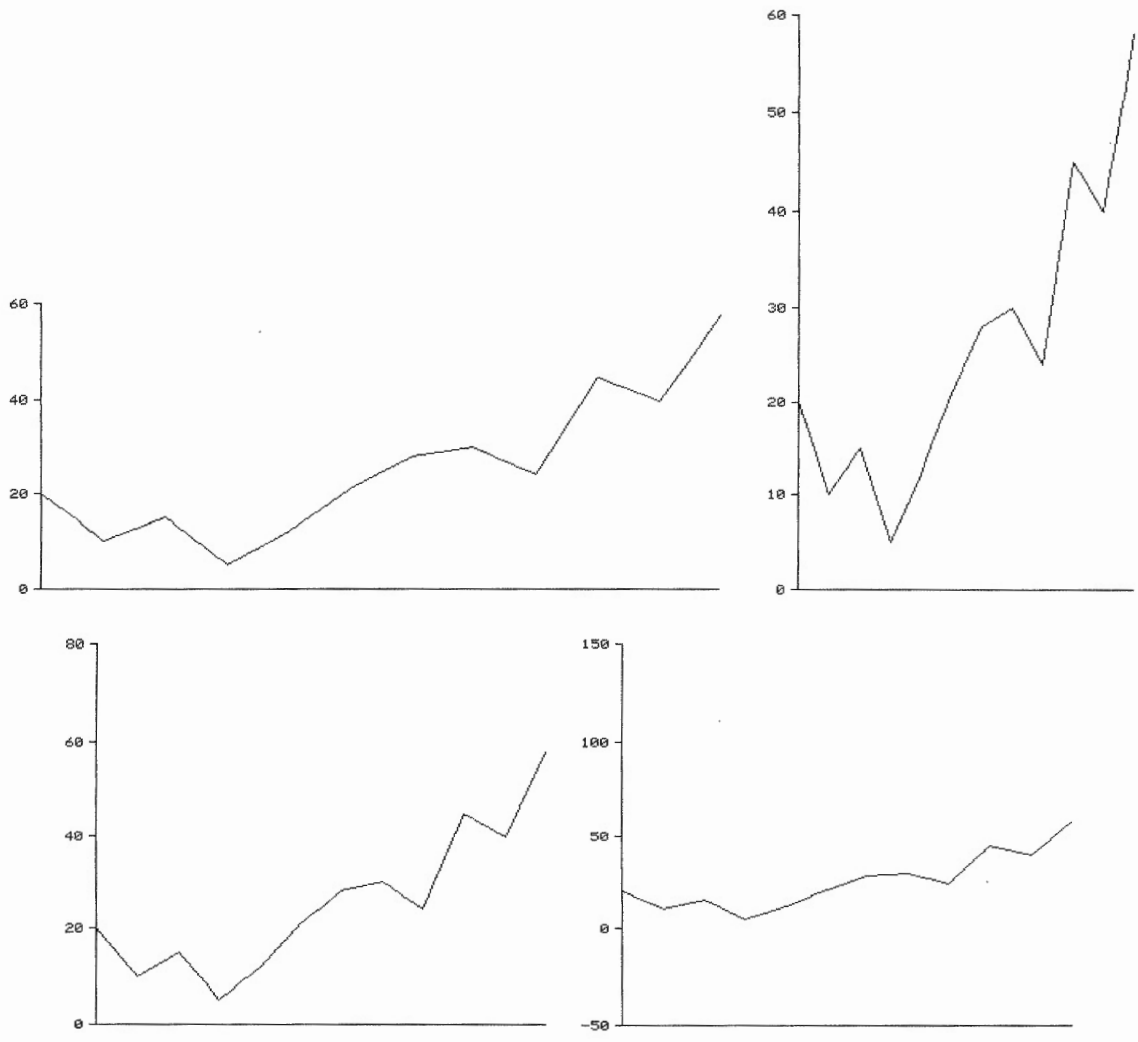


Figure 3-5: Chart Scaling.

The upper two charts have the same numeric scale range but different dimensions. The longer vertical axis length and shorter horizontal axis length of the chart on the upper left emphasize the fluctuations and the growth trend in the data. The shorter vertical axis length and longer horizontal axis length of the chart on the upper right make the changes seem more gradual and the growth trend less dramatic.

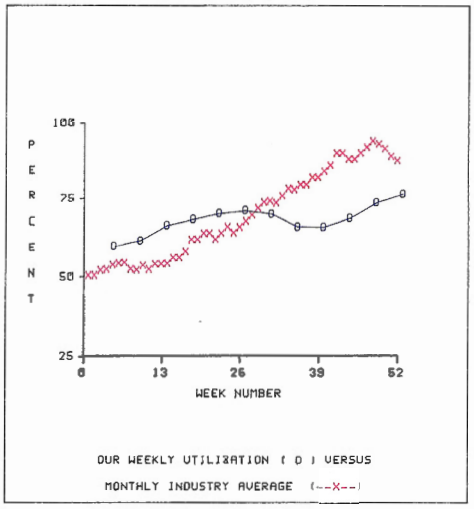
The lower charts have the same dimensions but different numeric scale ranges. In the chart on the lower left, the numeric scale range extends far above and below the actual range of the data values. In the chart on the lower right, the numeric scale range is fitted closely to the data. The two charts give quite different impressions.

In addition to adjusting the size of the horizontal and vertical axes, you can adjust the size of your data values. For example, if your data values are large, you can divide them by 100, 1000, or some other factor before using them to create a chart.

INCLUDING TEXT

Make your charts even more effective by highlighting them with text. Use titles, labels, and notes that will help focus the viewer's attention. For example, if you want to emphasize a 20 percent increase in monthly sales revenue over the year, the title SALES UP 20% is more effective than MONTHLY SALES.

Also use titles to supply essential information to the viewer. For example, if your data values were large and you divided all the values by 100 (as suggested in "Scaling the Chart"), label the chart as representing hundreds so that the viewer knows the actual data values.



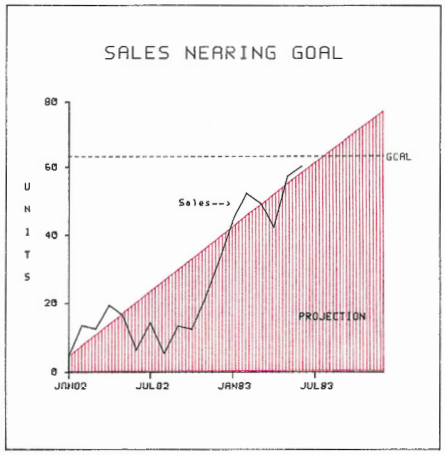


Figure 3-6: Highlighting Charts with Text.

USING FILL AND COLOR

Use fill under a curve, in a bar, or in a slice to emphasize that part of the chart or to more clearly differentiate between that part and the rest of the chart. Business Graphics offers three to six types of fill, depending on your output device. The fill types are illustrated in Figure 3-7.

It is generally best to use darker fill for bottom curves or bars and lighter (or no) fill for top curves or bars. Be careful when specifying fill for two or more curves — if the curves cross, the chart might be hard to decipher.

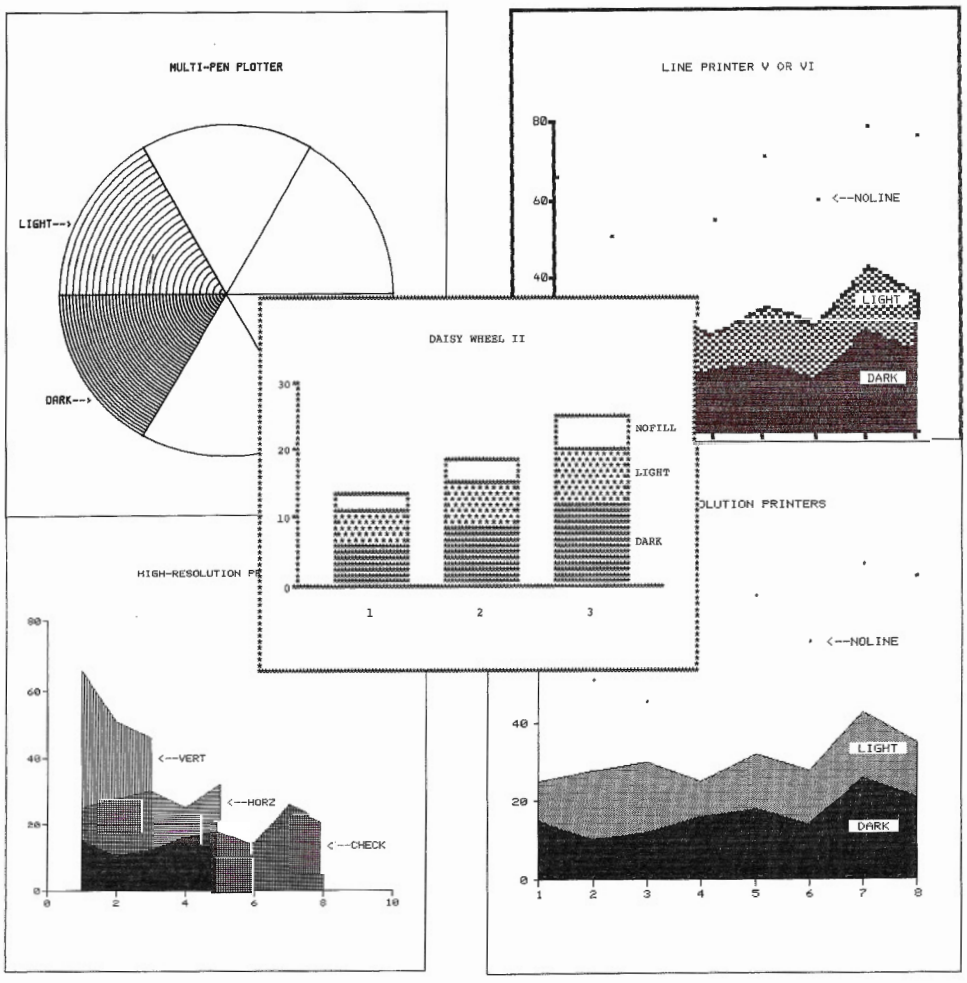


Figure 3-7: Fill Types. The appearance of the fill and the number of available fill types varies with your output device and screen. See Chapter 4 for more information.

If you have a color output device such as the Multi-Pen Plotter, you can also use color to add impact to charts and focus the viewers' attention on key points. When choosing colors, consider these facts:

- In line charts and scatter charts, fill lines are drawn from the curve line to the horizontal axis. Consider the effect of this overlaying when selecting colors for the fill.
- Text is easiest to read when drawn in a dark color over a light background. If you insert text over fill, be sure the fill is a light enough color for the label to stand out. Orange, the lightest color, provides the best background, although red and green are generally acceptable. Labels drawn over blue or violet shading may be illegible.

IMPROVING PRINT QUALITY

The appearance of your charts is affected by the ribbon or pens and by the paper or film used with your printer or plotter.

When producing charts on paper, use heavy-weight coated paper. When drawing charts on transparency film (with the Multi-Pen Plotter), handle the film only by the edges. Fingerprints cause the pen to skip and are visible when the chart is projected onto a screen.

Replace printer ribbons before they begin to fade. If you have a Daisy Wheel II or a DWP 410 Printer, use carbon ribbons to produce better quality printouts.

If you use a color output device, use the appropriate ball-point pens to draw charts on paper and felt-tipped pens to draw charts on transparency film. Keep the pens capped when not in use so that they do not dry out. Test each pen before using it for charts.

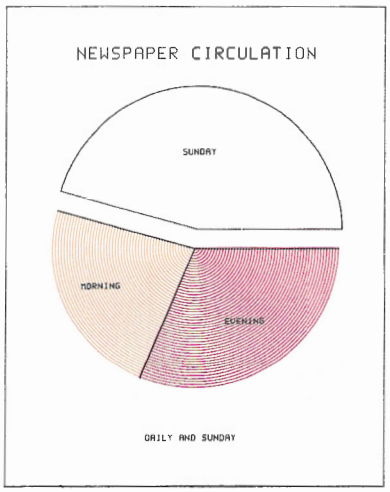
When a chart is drawn on a color output device, all parts that use a particular pen are drawn before the next pen is accessed. The Multi-Pen Plotter accesses pens in reverse order, starting with the pen in Stall 6 and ending with the pen in Stall 1. To produce color separations, insert only one pen in the plotter and draw the chart. Then remove the pen and insert it in the next stall. Repeat this process until you have a separate sheet for each color.

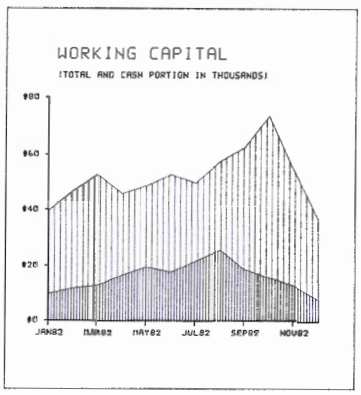
OUTPUT DEVICES

Selecting an Output Device

Radio Shack offers many output devices which you can use with Business Graphics. The printer or plotter that is best for you depends on the size, color variation, and quality printout you desire. To help you decide, this chapter includes illustrations of charts produced on different output devices. For more information, consult the representatives at your local Radio Shack Computer Center.

The Business Graphics Processing Diskette is configured for use with the DMP 400, a high-resolution printer. Other high-resolution printers include the DMP 100, DMP 200, DMP 500, DMP 2100, Line Printer VII, and Line Printer VIII. High-resolution printers offer excellent quality graphics and permit a wider selection of fill types than other devices. With the additional fill types you can shade under curves that intersect without obscuring the curves.





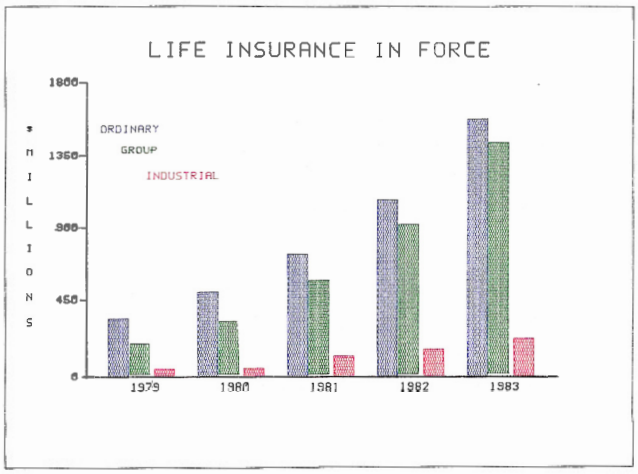


Figure 4-1: Charts Produced on a DMP 400.

The Multi-Pen Plotter provides high resolution and the added interest of color. With this device, you can select a color for each curve, set of bars or bar segments, pie slice, and text entry. Charts can be drawn on paper or on transparency film for use with an overhead projector.

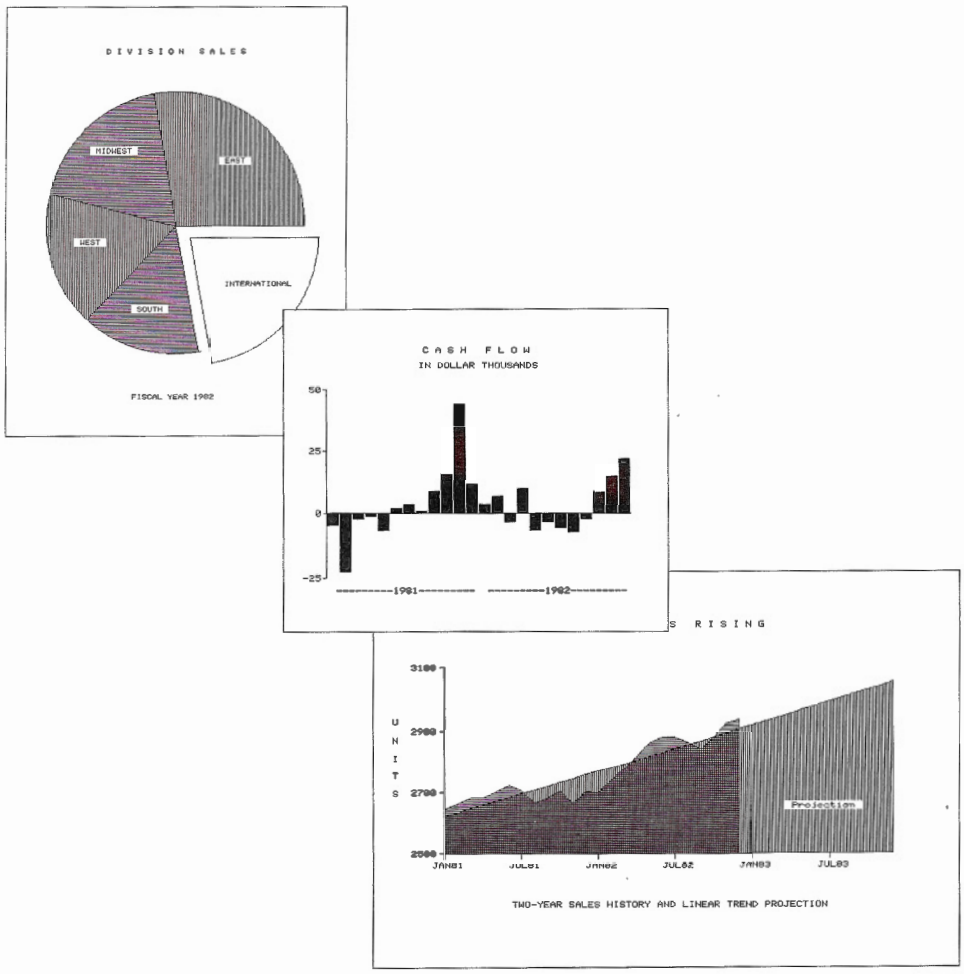


Figure 4-2: Charts Produced on a Multi-Pen Plotter.

Low resolution printers include the Daisy Wheel II and DWP 410 and Line Printers V and VI. While the graphic representation on such printers is less precise than on high resolution devices, you can obtain useful, attractive charts.

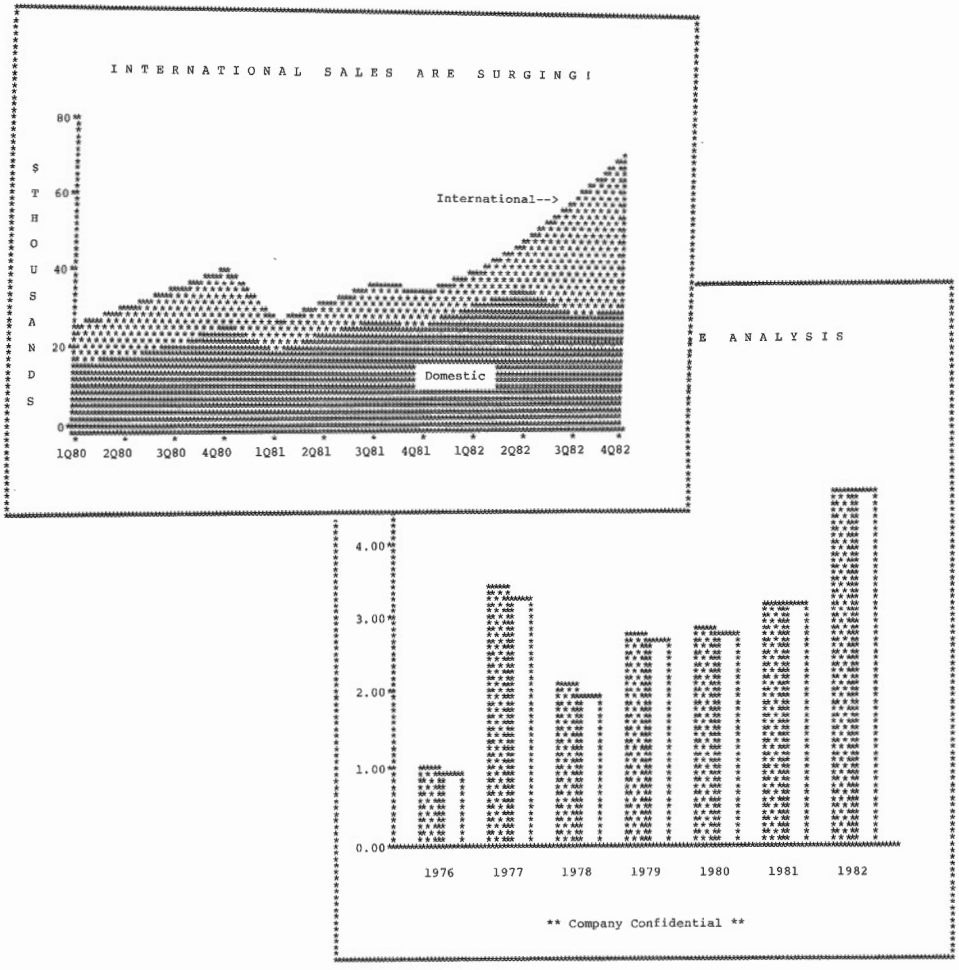


Figure 4-3: Charts Produced on a Daisy Wheel II Printer.

Modifying the Program For Your Output Device and Screen

The Business Graphics Processing Diskette is set up to produce charts on a DMP 400. Before using any other output device, reconfigure at least one backup Processing Diskette for your printer or plotter. (While in some cases charts created for one output device can be produced on another, best results are achieved by using the correct configuration. The configuration can also affect the screen display.) If you have more than one printer or plotter, reconfigure at least one backup Processing Diskette for each device. If you have the Multi-Pen Plotter, reconfigure one backup for horizontal format and one for vertical format.

Warning: Be sure to make backups of the Processing and Setup Diskettes before proceeding. The backup procedure is described in Appendix A of this manual.

To reconfigure the diskettes, follow these instructions:

1. Power up your computer system as instructed in your computer owner's manual.
2. If you have a single-drive system, insert a backup Setup Diskette into Drive 0. If your system has more than one floppy disk drive, insert a backup Processing Diskette into Drive 0 and a backup Setup Diskette into Drive 1.
3. Enter the date and time. (Because Business Graphics does not use the time, you can simply press (ENTER) for the time if you wish.)
4. When TRSDOS READY appears, enter the program name that corresponds to your output device in the following chart.

Output Device	Program Name To Be Entered
Daisy Wheel II	DAISYII
DWP 410	DWP410
DMP 100	DMP100
DMP 200	DMP200
DMP 400	DMP400
DMP 500	DMP500
DMP 2100	DMP2100
Line Printer V	LPV
Line Printer VI	LPVI
Line Printer VII	LPVII
Line Printer VIII	LPVIII
Multi-Pen Plotter	
Horizontal format (11" wide x 8.5" high)	MULTIPHZ
Vertical format (8.5" wide x 11" high)	MULTIPVT

5. If you have a single-drive system, the following message appears after a few moments:

```
MODIFYING PROGRAM DISK FOR YOUR OUTPUT DEVICE.
PLEASE INSERT PROGRAM DISK.
PROGRAM DISK MUST BE WRITE ENABLED.
PRESS ENTER TO CONTINUE.
```

   Remove the Setup Diskette from Drive 0, insert a backup Processing Diskette, and press (ENTER). This step is omitted with multi-drive systems.

When TRSDOS READY appears, the diskette has been reconfigured.

You can now type **TRSCHART** (ENTER) and start using Business Graphics. If the reconfiguration is interrupted, or if you want to reconfigure another backup Processing Diskette, remove the diskette from Drive 0, reset the computer system, and continue from Step 2.

Checking the Device Configuration

If you are not certain for which device your Processing Diskette is configured, take the following steps:

1. Turn on your computer system.
2. Insert the backup Processing Diskette.
3. Answer the date and time prompts.
4. When TRSDOS READY appears, type **TRSCHART** (ENTER).
5. When the Main Menu is displayed, choose Selection 2, "Line Charts."
6. When the Line Chart Menu is displayed, choose Selection 3, "Printer/Plotter Settings."

The Printer/Plotter Settings Menu identifies the printer or plotter for which the Processing Diskette is configured. If the device shown is not the device you wish to use, return to TRSDOS READY and follow the configuration procedures outlined in this chapter.

Using Color Output Devices

Color output devices (such as the Multi-Pen Plotter) can draw charts in several colors. The program asks you to select the color you want for each part of the chart:

```
COLOR:

    1   BLACK          4   GREEN
    2   RED            5   VIOLET
    3   BLUE           6   ORANGE
```

When you select one of the above colors, you're really selecting a pen stall on the output device. If you select 3 BLUE, that part of the chart is drawn by the pen in Stall 3. If a black pen is in Stall 3, that part of the chart is black.

To ensure that the chart is drawn in the color(s) you intend, make sure the pens are in the appropriate stalls. Any shading is drawn with the same pen that draws curves, bars, bar segments, and slices.

Warning: If you turn the Multi-Pen Plotter off before the chart is finished, be sure that the pen that was in use is in its stall before you turn the plotter back on. Failure to do this might damage the plotter.

Horizontal or Vertical Format

The Multi-Pen Plotter can produce charts in two formats: horizontal and vertical.

Horizontal format is useful if you are drawing on transparency film for use with an overhead projector. (With vertical transparencies, some viewers may not be able to see the bottom portion of certain charts.) Horizontal format also allows you to fit more bars into a bar chart, and to deemphasize fluctuations in the data.

When creating charts that are to accompany text printed on a vertical page, use the vertical format to avoid "twist" pages. Vertical format is also preferable if you want to emphasize fluctuations in your data.

SCREEN DISPLAYS

If your computer has been upgraded for high-resolution graphics, take advantage of this feature by modifying your backup Processing Diskette as instructed below.

1. Power up your computer system as instructed in your computer owner's manual.
2. Insert a backup Setup Diskette in Drive 0. Enter the date and time. (Because Business Graphics does not use the time, you can simply press (ENTER) for the time if you wish.)
3. When TRSDOS READY appears, type **HISCREEN** (ENTER). In a few moments, the following message appears:

```
MODIFYING PROGRAM DISK FOR HIGH RESOLUTION SCREEN.
PLEASE INSERT PROGRAM DISK.
PROGRAM DISK MUST BE WRITE ENABLED.
PRESS ENTER TO CONTINUE.
```

4. Remove the Setup Diskette from Drive 0, insert the backup Processing Diskette, and press (ENTER).
5. When TRSDOS READY appears, the diskette has been reconfigured.

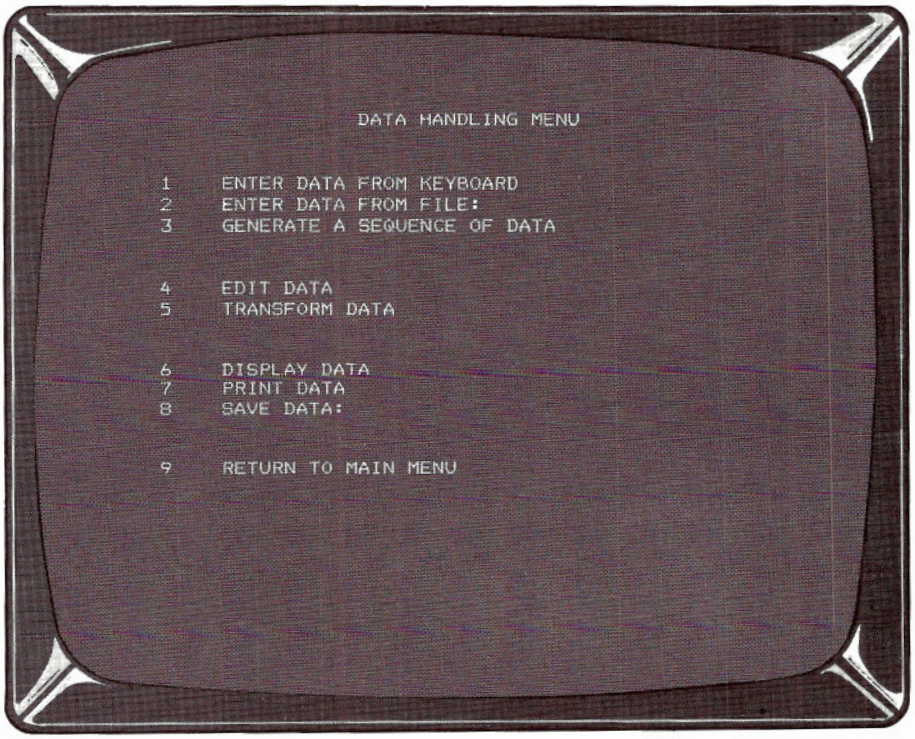
To restore low-resolution screen operation, follow the steps above, typing **LOSCREEN** in Step 3 instead of HISCREEN.

Note: A Processing Diskette configured for the low-resolution screen can be used on computers with or without high-resolution capability. If you modify the diskette for use with high-resolution screens, it cannot display charts on the screen of a computer that lacks this feature. If you use a high-resolution screen with a low-resolution printer, character positions are shifted when printed.

CHARTS

Business Graphics creates charts from data stored in files on diskettes. This chapter explains how to create, update, and save a data file.

To enter, change, display, print, or store data, choose Main Menu Selection 1, "Data Handling Menu."



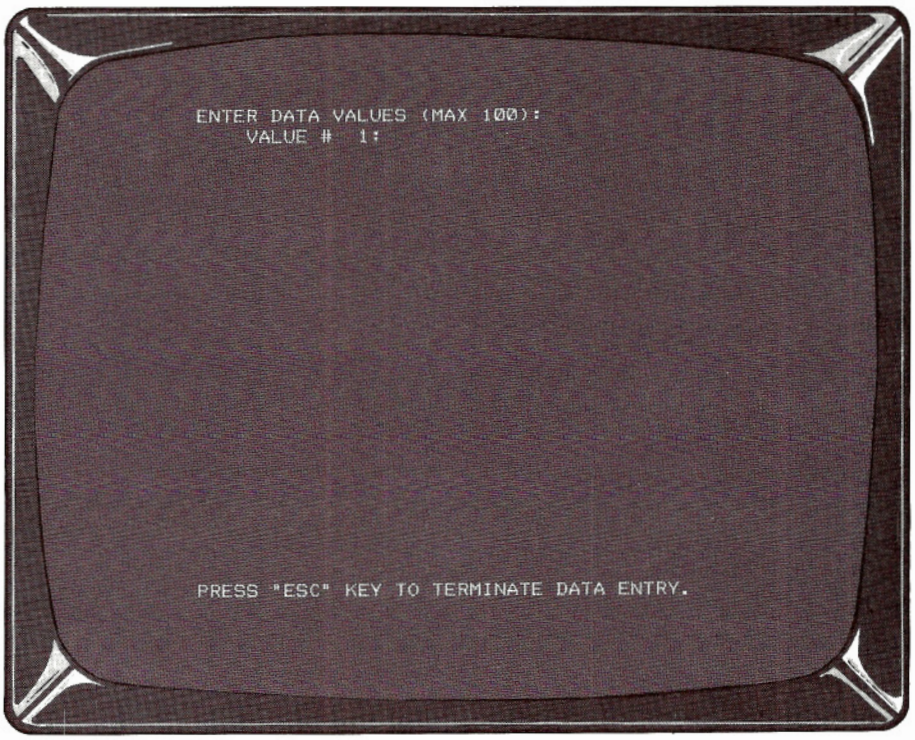
ENTERING AND GENERATING DATA

You can provide data for the file by:

- Entering values from the keyboard
- Accessing a file that previously was created and stored on a diskette
- Letting the program generate a series of values

Entering Data from the Keyboard

To enter data from the keyboard, choose Selection 1, "Enter Data from Keyboard," from the Data Handling Menu. The screen shows:



Warning: When you enter the first value, any data that existed in memory when you chose Selection 1 is lost.

Type any value containing up to 10 characters (including any leading plus or minus sign of decimal point) and press (ENTER). You can enter up to 99 more values in the same way.

To end the data entry and return to the Data Handling Menu, press (ESC). (If you enter 100 values, you return to the Data Handling Menu automatically.)

To display or save the data you just entered, see "Displaying, Printing, and Saving Data" later in this chapter.

Entering Data from a File

You can recall data (up to 100 values per file) from files created through the Data Handling Menu, from files in the same format created by other programs, and from VisiCalc DIF files. Several other types of files can be converted into an acceptable format through the file conversion program

on the Setup Diskette. Appendix C explains how to use data from files that were not created with Business Graphics.

To enter data from a disk file previously created with Business Graphics, choose Selection 2, "Enter Data from File," from the Data Handling Menu. Type the name of the file you want to load and press (ENTER).

Warning: When you enter a filename, any data that existed in memory when you chose Selection 2 is lost.

To display the data, see "Displaying, Printing, and Saving Data" later in this chapter.

Generating a Sequence of Data

To create a series of data values, choose Data Handling Menu Selection 3, "Generating a Sequence of Data." You can select one of the following types of sequences:

```
1    ARITHMETIC
2    GEOMETRIC
```

In an arithmetic sequence, each value of the series equals the previous value plus a constant. In a geometric sequence, each value of the series equals the previous value times a constant. You'll need to enter three values:

- Initial value
- Constant (increment or factor)
- Number of values to be generated

The initial value is any positive or negative number that you want to use as the first number of the series. The constant is any positive or negative number. It is added to each value in an arithmetic sequence. In a geometric sequence it is multiplied by each value. The number of values to be generated can be any number between 1 and 100. After you enter the number of values to be generated, the Data Handling Menu appears.

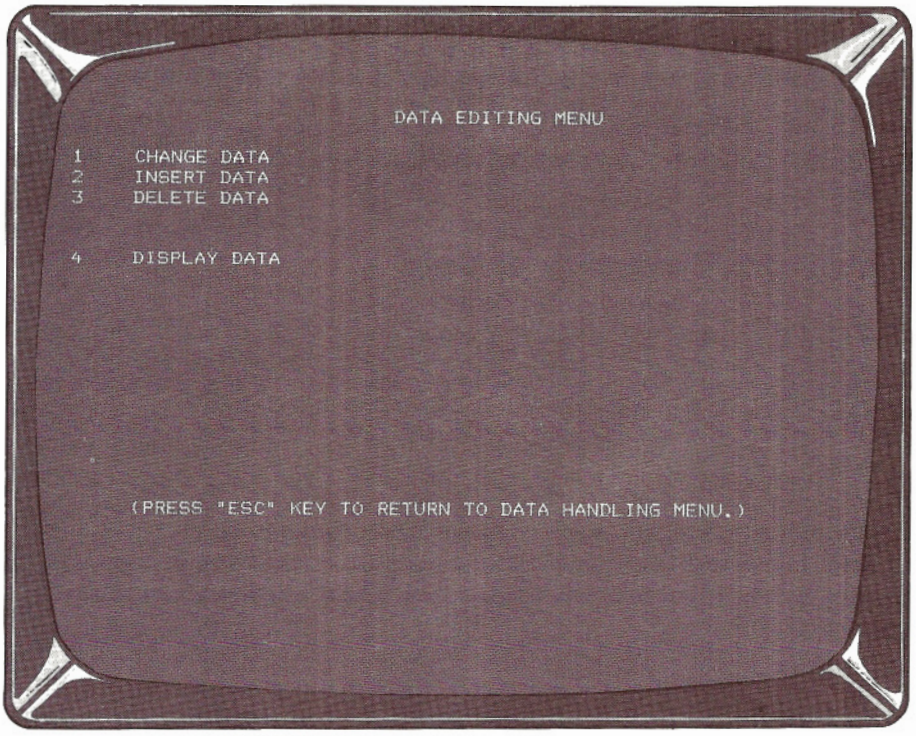
Warning: After you enter the number of values to be generated, any data that existed in memory is lost.

For example, an initial value of 1, a constant of 2, and a total number of values of 10 generates the following arithmetic sequence: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19. The same values generate the following geometric sequence: 1, 2, 4, 8, 16, 32, 64, 128, 256, 512.

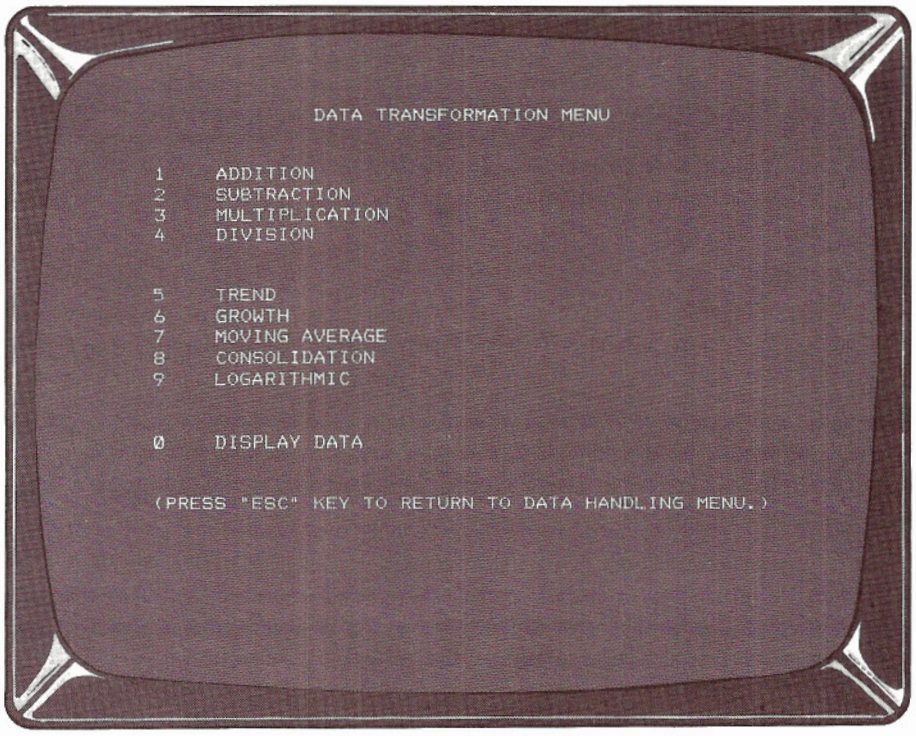
REVISING DATA

With Business Graphics, you can easily edit or transform data that is currently in memory.

If you wish to edit (insert, delete, or replace) data currently in memory choose Data Handling Menu Selection 4, "Edit Data." The Data Editing Menu is displayed:



If you wish to transform data values currently in memory by using one of nine mathematical functions, choose Data Handling Menu Selection 5, "Transform Data." The following screen is displayed:



Always display the data before attempting to revise it.

Displaying the Data

If you are editing data and you wish to display the data currently in memory without leaving the Data Editing Menu, choose Selection 4, "Display Data." Always use this selection to check the sequence numbers of the data values before attempting to edit data. Return to the Data Editing Menu by pressing (ESC).

If you are transforming data and you wish to display the data currently in memory without leaving the Data Transformation Menu, choose Selection 0, "Display Data." This function is useful for viewing data before transforming it.

Accepting or Rejecting Revised Data

Instructions for editing and transforming data are on the next few pages. When the revised data is displayed, decide whether you wish to keep the revised data and press (ESC).

To discard the revised data and keep the original data, type **NO** (ENTER) or **N** (ENTER) when the prompt DO YOU WISH TO KEEP EDITED RESULTS appears on the screen. The revised data is discarded and the original data is still available in memory. The Data Editing Menu or Data Transformation Menu reappears.

To keep the revised data, type **YES** (ENTER) or **Y** (ENTER). The edited data replaces the original data, which is discarded from current memory. The Data Editing Menu or Data Transformation Menu reappears.

To store the changes on a diskette, return to the Data Handling Menu by pressing (ESC) and save the data.

Editing Data

Changing Data

To replace one or more current data values with other data values, choose Data Editing Menu Selection 1, "Change Data." Enter the sequence number of the first value to be changed, then enter the new value(s), up to ten characters per value.

When you have entered all your new values, press (ESC). The revised contents of the data file are displayed. (The revised data is automatically displayed when the end of the data in memory is reached.) Go to "Accepting or Rejecting Revised Data," earlier in this section.

Inserting Data

Use Data Editing Menu Selection 2, "Insert Data," to insert one or more values into the current data. After choosing "Insert Data," enter the sequence number at which the insertion is to begin. (The number can range from 1 to the sequence number following the last current data value.) Any data values at that sequence number and beyond shift to accommodate the inserted values. Enter the new value(s) one at a time, up to ten characters per value.

When you have entered all the values you wish to insert at that sequence number, press (ESC). The revised data is displayed. (The revised data is automatically displayed when there are 100 data values.) Go to "Accepting or Rejecting Revised Data" earlier in this chapter.

Deleting Data

To delete one or more data values from your current data, choose Data Editing Menu Selection 3, "Delete Data." Enter the sequence numbers of the first and last data values you wish to delete. (To delete only one value, enter that sequence number twice.) The specified values and all values within that range of sequence numbers are deleted. Any subsequent values are moved up to close the gap in the sequence.

The revised data is displayed immediately. Go to "Accepting or Rejecting Revised Data" earlier in this chapter.

Transforming Data

Addition, Subtraction, Multiplication, and Division

To add a constant to each data value, subtract a constant from each data value or multiply or divide each data value by a constant, choose the appropriate Data Transformation Menu Selection (1, 2, 3, or 4). Enter the constant. The transformed data is then displayed. Go to "Accepting or Rejecting Revised Data" earlier in this chapter.

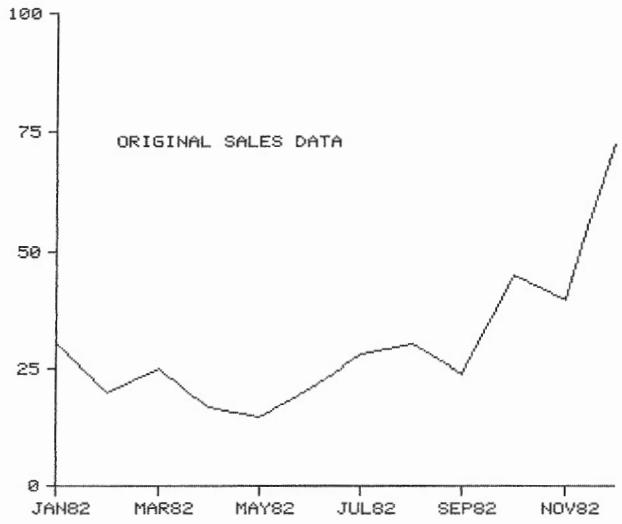
Trends

Use Data Transformation Menu Selection 5, "Trend," to calculate a trend fitted to the current data. Trends are a good way to illustrate the overall picture, instead of emphasizing individual data points. When calculating a trend, the program uses the principle of least squares, computing values that minimize the sum of the squares of the differences between the original data values and the corresponding values of the fitted trend. If the data file contains less than 100 values, you can project the trend for a total of up to 100 values.

After choosing "Trend," you can select from three trend types:

```
1   LINEAR
2   QUADRATIC
3   EXPONENTIAL
```

After selecting a trend type, enter the number of projected values you want to be included, from zero to the maximum allowable. The calculated values are then displayed. Go to "Accepting or Rejecting Revised Data" earlier in this chapter.

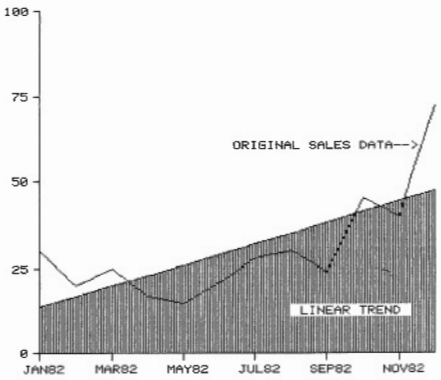


NUMBER OF VALUES = 12

VALUE # 1	30.00
VALUE # 2	20.00
VALUE # 3	25.00
VALUE # 4	17.00
VALUE # 5	15.00
VALUE # 6	21.00
VALUE # 7	28.00
VALUE # 8	30.00
VALUE # 9	24.00
VALUE # 10	45.00
VALUE # 11	40.00
VALUE # 12	72.00

Figure 5-1. Base Data for Trend Examples. This sample sales data is used to illustrate the trend types.

In Figures 5-2, 5-3, and 5-4, two line charts are shown for each trend type. In the first chart of each set, a trend (depicted by a shaded curve) is fitted to the original data, which is shown as a solid line connecting the data points. In the second chart, the trend is projected six months.



NUMBER OF VALUES = 12

VALUE # 1	13.87
VALUE # 2	16.91
VALUE # 3	19.95
VALUE # 4	22.99
VALUE # 5	26.03
VALUE # 6	29.06
VALUE # 7	32.10
VALUE # 8	35.14
VALUE # 9	38.18
VALUE # 10	41.22
VALUE # 11	44.26
VALUE # 12	47.29

NUMBER OF VALUES = 18

VALUE # 1	13.87
VALUE # 2	16.91
VALUE # 3	19.95
VALUE # 4	22.99
VALUE # 5	26.03
VALUE # 6	29.06
VALUE # 7	32.10
VALUE # 8	35.14
VALUE # 9	38.18
VALUE # 10	41.22
VALUE # 11	44.26
VALUE # 12	47.29
VALUE # 13	50.33
VALUE # 14	53.37
VALUE # 15	56.41
VALUE # 16	59.45
VALUE # 17	62.49
VALUE # 18	65.53

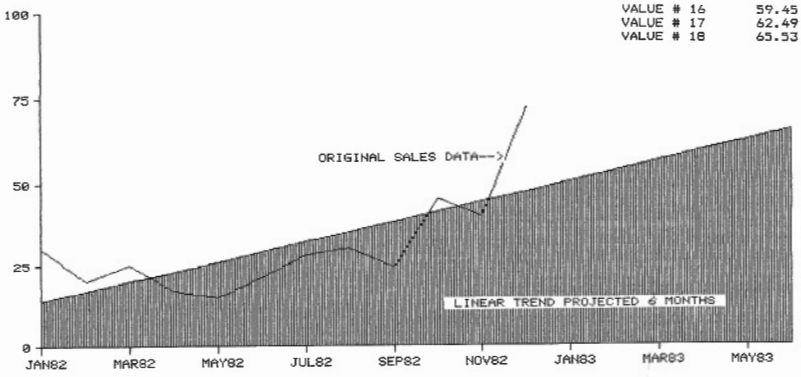
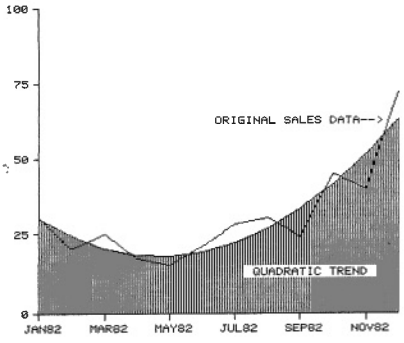


Figure 5-2. Linear (straight line) Trends. The data for these charts were obtained by applying a linear trend to the sample sales data in Figure 5-1.



NUMBER OF VALUES = 12

VALUE # 1	29.73
VALUE # 2	24.12
VALUE # 3	20.24
VALUE # 4	18.09
VALUE # 5	17.67
VALUE # 6	18.98
VALUE # 7	22.01
VALUE # 8	26.78
VALUE # 9	33.28
VALUE # 10	41.51
VALUE # 11	51.46
VALUE # 12	63.15

29.73
24.12
20.24
18.09
17.67
18.98
22.01
26.78
33.28

VALUE # 10	41.51
VALUE # 11	51.46
VALUE # 12	63.15
VALUE # 13	76.57
VALUE # 14	91.71
VALUE # 15	108.59
VALUE # 16	127.20
VALUE # 17	147.53
VALUE # 18	169.60

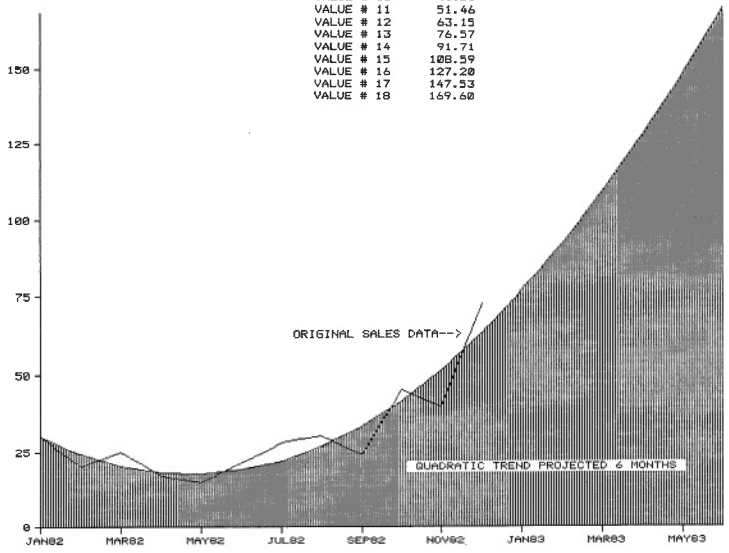
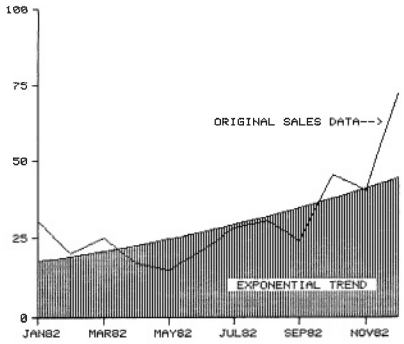


Figure 5-3. Quadratic (parabolic curve) Trends. These two charts are the result of applying a quadratic trend to the same sales data in Figure 5-1.



NUMBER OF VALUES = 12

VALUE # 1	17.48
VALUE # 2	19.01
VALUE # 3	20.68
VALUE # 4	22.50
VALUE # 5	24.47
VALUE # 6	26.62
VALUE # 7	28.96
VALUE # 8	31.50
VALUE # 9	34.27
VALUE # 10	37.28
VALUE # 11	40.55
VALUE # 12	44.11

NUMBER OF VALUES = 18

VALUE # 1	17.48
VALUE # 2	19.01
VALUE # 3	20.68
VALUE # 4	22.50
VALUE # 5	24.47
VALUE # 6	26.62
VALUE # 7	28.96
VALUE # 8	31.50
VALUE # 9	34.27
VALUE # 10	37.28
VALUE # 11	40.55
VALUE # 12	44.11
VALUE # 13	47.99
VALUE # 14	52.20
VALUE # 15	56.78
VALUE # 16	61.77
VALUE # 17	67.20
VALUE # 18	73.10

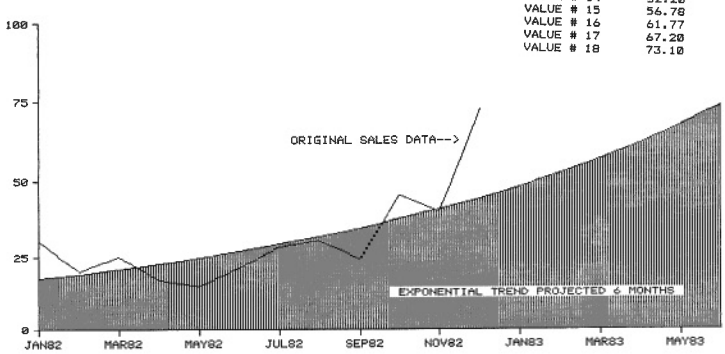


Figure 5-4. Exponential (exponential curve) Trends. The data for these charts were obtained by applying an exponential trend to the sample sales data.

Growth

Data Transformation Menu Selection 6, "Growth," projects data values after the end of the current data file. You can choose from the following growth types:

1 ARITHMETIC
2 GEOMETRIC

Arithmetic growth projects values that equal the previous value plus a constant. Geometric growth projects values that equal the previous value multiplied by a constant.

After selecting the growth type, enter the constant and the number of values to be projected. The number of projected values plus the number of existing values cannot exceed 100. The values are then displayed. Go to "Accepting or Rejecting Revised Data" earlier in this chapter.

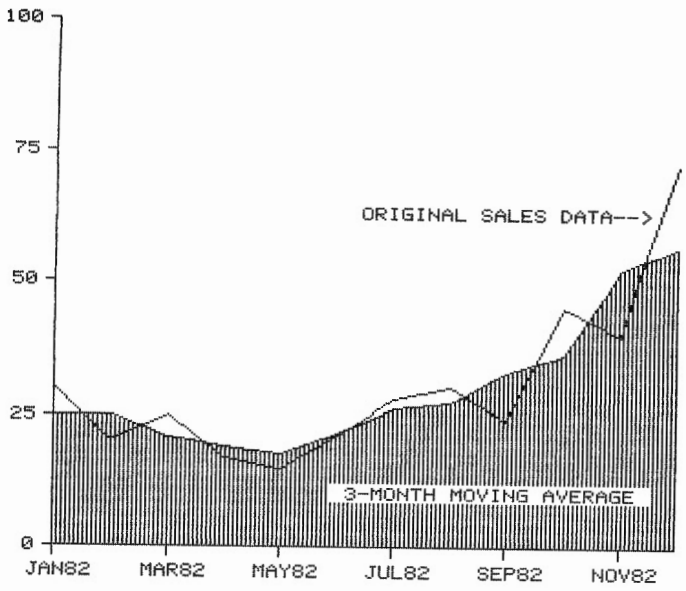
For example, if the current data values are 10, 20, 30, 50, and 40 and you enter 2 as the constant and 5 as the number of values to be projected, arithmetic growth produces the following values 10, 20, 30, 50, 40, 42, 44, 46, 48, and 50. Geometric growth produces these values: 10, 20, 30, 50, 40, 80, 160, 320, 640, and 1280.

Moving Average

Data Transformation Menu Selection 7, "Moving Average," averages each data value with the value(s) before and/or after it. This reduces the effect of fluctuations in data and shows the overall trend.

Select "Moving Average" and then enter the number of values to be averaged. The higher the number of values averaged, the greater the smoothing effect. The number should be high enough to smooth out fluctuations in the data, but not so high as to suppress significant changes. For example, if you enter 3, each value is averaged with the values immediately preceding and following it. If you enter 4, each value is averaged with the two values just before it and one value following it.

The transformed data is displayed after you enter the number of values to be averaged. Go to "Accepting or Rejecting Revised Data" earlier in this chapter.



30.00	25.00
20.00	25.00
25.00	20.67
17.00	19.00
15.00	17.67
21.00	21.33
28.00	26.33
30.00	27.33
24.00	33.00
45.00	36.33
40.00	52.33
72.00	56.00

Figure 5-5: Moving Average. The sample sales data used for the trend examples is smoothed with a moving average over three time periods.

Consolidation

Data Transformation Menu Selection 8, "Consolidation," compresses data by breaking it into consecutive sets and then summing each set. It is typically used to consolidate monthly data into quarterly data, quarterly data into annual data, and so on.

Enter the number of values to be consolidated into each set. The transformed data is then displayed. Go to "Accepting or Rejecting Revised Data" earlier in this chapter.

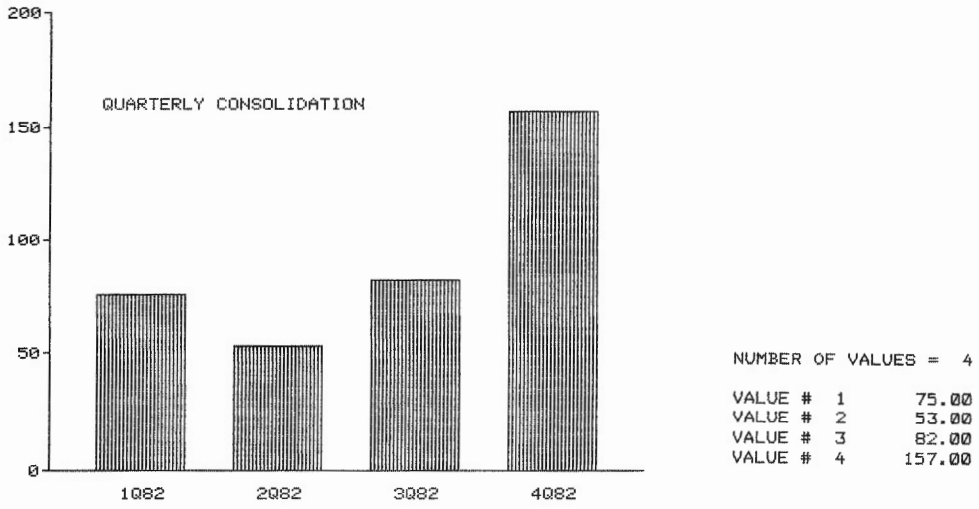
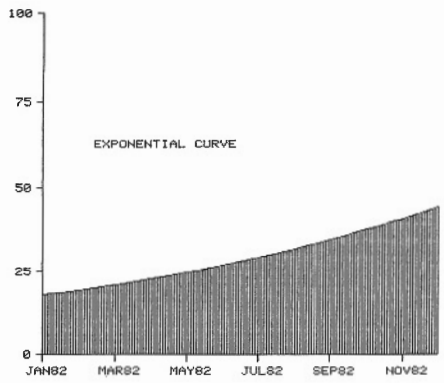


Figure 5-6: Consolidation. The original data from the moving average example was consolidated with a factor of 3 to produce this bar chart.

Logarithmic

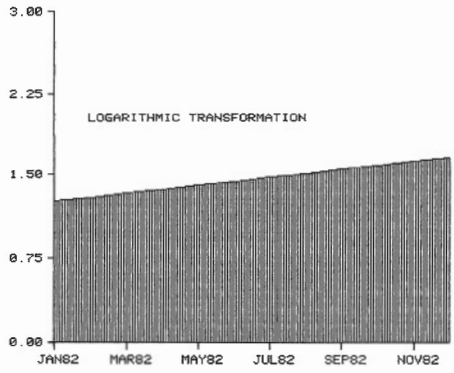
Data Transformation Menu Selection 9, "Logarithmic," calculates the common logarithm (base 10) of each data value. You can use it to convert exponential growth in a series of data values to straight-line growth. The transformed data is displayed at once. Go to "Accepting or Rejecting Revised Data" earlier in this chapter.

To convert your logarithmic (base 10) results to natural logarithm (base e) results, multiply by the constant 2.30259. Use Data Transformation Menu Selection 3, "Multiplication," for this purpose.



NUMBER OF VALUES = 12

VALUE # 1	17.48
VALUE # 2	19.01
VALUE # 3	20.68
VALUE # 4	22.50
VALUE # 5	24.47
VALUE # 6	26.62
VALUE # 7	28.96
VALUE # 8	31.50
VALUE # 9	34.27
VALUE # 10	37.28
VALUE # 11	40.55
VALUE # 12	44.11



NUMBER OF VALUES = 12

VALUE # 1	1.24
VALUE # 2	1.28
VALUE # 3	1.32
VALUE # 4	1.35
VALUE # 5	1.39
VALUE # 6	1.43
VALUE # 7	1.46
VALUE # 8	1.50
VALUE # 9	1.53
VALUE # 10	1.57
VALUE # 11	1.61
VALUE # 12	1.64

Figure 5-7: Logarithmic Transformation of an Exponential Trend. These line charts show the effect of applying the logarithmic transformation to the data produced in the example of an exponential trend.

DISPLAYING, PRINTING, AND SAVING DATA

Through the Data Handling Menu, you can display, print, and save the data currently in memory.

Displaying Data

To display the data currently in memory, choose Data Handling Menu Selection 6, "Display Data."

Values are displayed with a decimal point, a leading minus sign if negative, and zero, two, or four decimal places. Positive numbers with

more than 10 digits to the left of the decimal point and negative numbers with more than nine digits to the left of the decimal point are replaced in the display with the message TOO LARGE; a number too small appears as zero. If the value contains more than six or seven digits, there may be some loss of precision.

Printing Data

Use Data Handling Menu Selection 7, "Print Data," to print the current data on your printer. The Multi-Pen Plotter cannot print data.

After selecting "Print Data," position the paper, make sure the printer is on-line, and press (ENTER). The data is printed. To stop printing, press (ESC); printing stops within a few lines.

Saving Data

Selection 8 on the Data Handling Menu, "Save Data," lets you save the current data by storing it in a file on a diskette. You must save data in a file before it can be used to produce a chart.

Select "Save Data," type the file specification (including any extension, password, or drive specification) to be assigned to the data, and press (ENTER). If you wish to cancel the save function, press (ESC) instead of (ENTER). For information about acceptable file specifications, see "File Specifications."

The save process takes several seconds. After the file is written to the diskette, Selection 6 flashes.

Warning: If you made any changes to your data since the file was saved, SAVE the changed data (Selection 8) before returning to the Main Menu or the changes will be lost.

File Specifications

A TRSDOS file specification can have from one to four parts:

filename/ext.password:d

Numbers and upper-case letters are permitted.

Only the first part (*filename*) is required. It consists of one to eight characters, and must begin with a letter.

Following the filename is an optional name extension of up to three characters (*ext*). The first character in an extension must be a letter. The extension is separated from the filename by a slash. In Business Graphics, you can use extensions to distinguish between data files, chart settings files, and charts (for example, SALES/DAT, SALES/SET, and SALES/CHT.)

You can restrict access to a file by adding an optional password of up to eight characters. The password follows the optional extension and must be preceded by a period.

The last part of a TRSDOS file specification is an optional drive number (*d*). The drive specification must be preceded by a colon.

Note: TRSDOS terminates the file specification at the first blank space or invalid character (such as a symbol or a lowercase letter). For example, if you attempted to save a file under the name SLS$NEW, the file would be saved as SLS.

Using the TRSDOS Directory

If you forget the name of a file or if you can't remember on which diskette a certain file is stored, use the TRSDOS DIR command to view the diskette's directory.

To use the DIR command, first go to TRSDOS READY. (If you are using Business Graphics and you stop the program to return to TRSDOS READY, the data, settings, or chart currently in memory will be lost unless you save it.) To view the directory of the diskette in Drive 0, type **DIR** (ENTER) or **DIR 0** (ENTER). To view the directory of a diskette in a drive other than 0, type **DIR**, space, the number of the drive, and (ENTER). For example, to view the directory of a diskette in Drive 1, type **DIR 1** (ENTER).

For more information about the DIR command, see your *TRSDOS Disk Operating System Reference Manual.*

Line charts plot sequential values against numeric scales. Line charts show the flow of change, usually from one time period to the next. They are most effective when used to illustrate an overall pattern. Each value along the horizontal scale is associated with a data point whose value is indicated on the vertical scale.

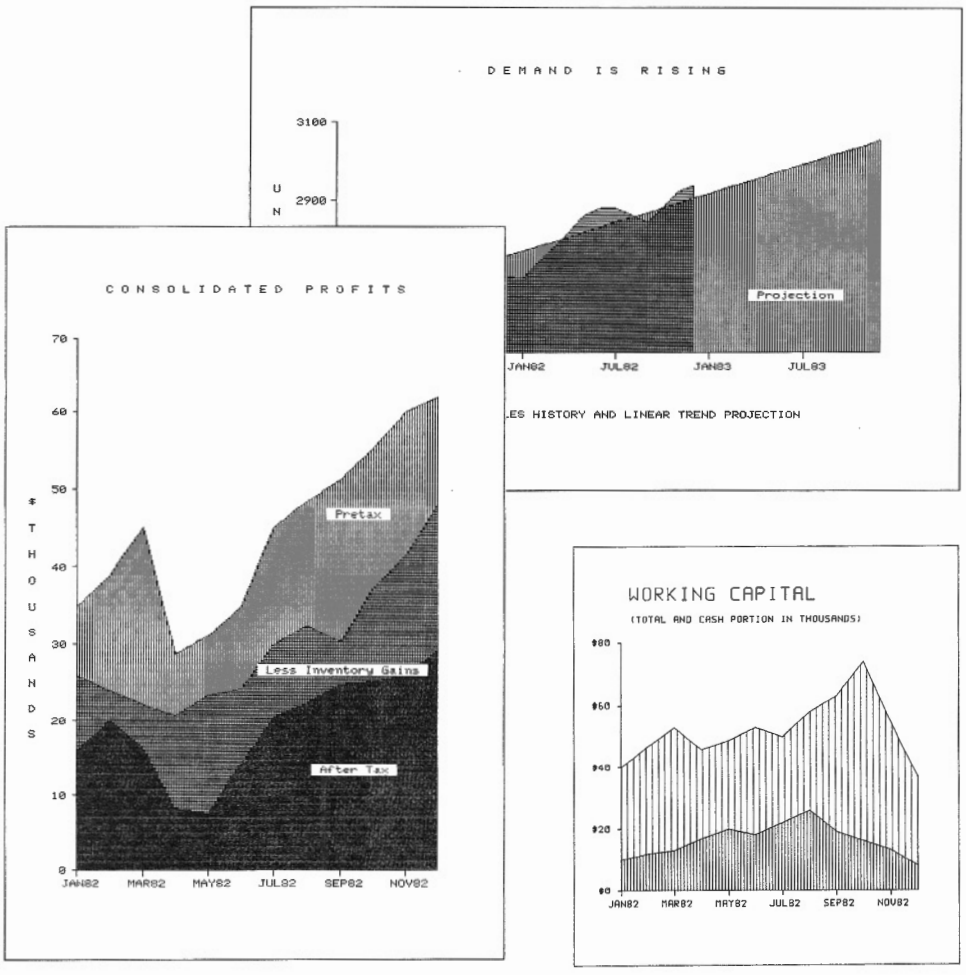


Figure 6-1: Line Charts.

Line charts that you create with Business Graphics can contain up to three curves. Each curve is based on the data from one file. The files do not have to contain the same number of values.

If a file contains more than 100 values, only the first 100 values are used. The scale settings are based on all values read from the files.

The values in each file are charted as a series of data points, beginning at the vertical axis and usually connected by a solid, dashed, or dotted line. You can also shade the area beneath the curves.

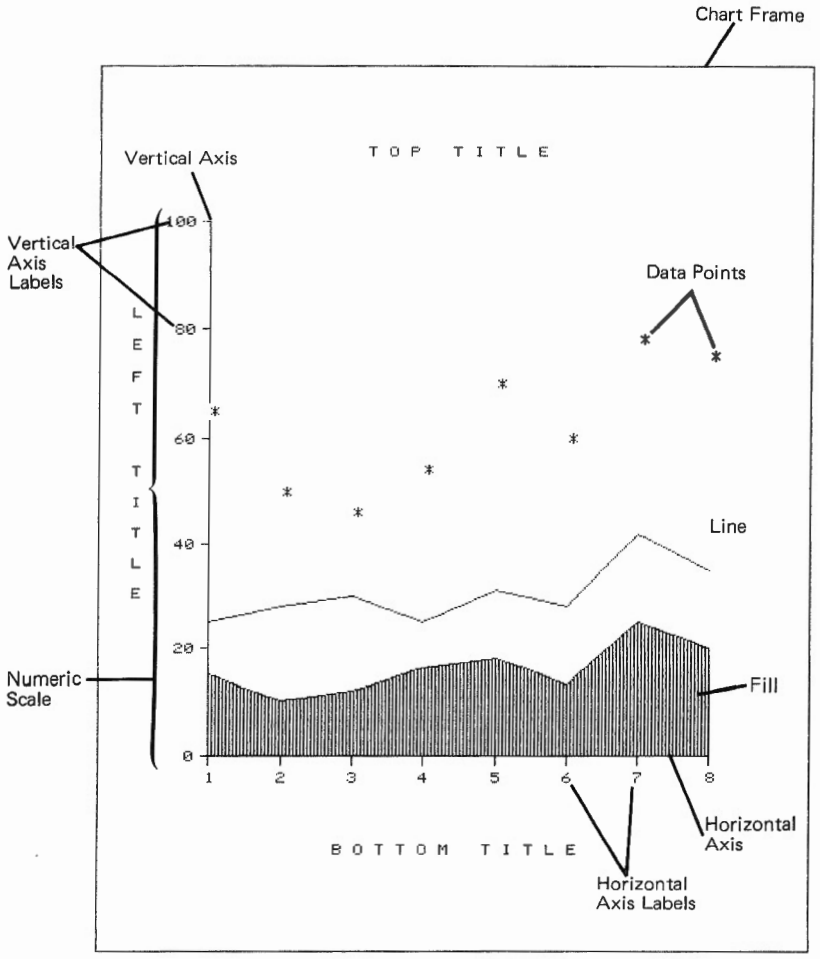
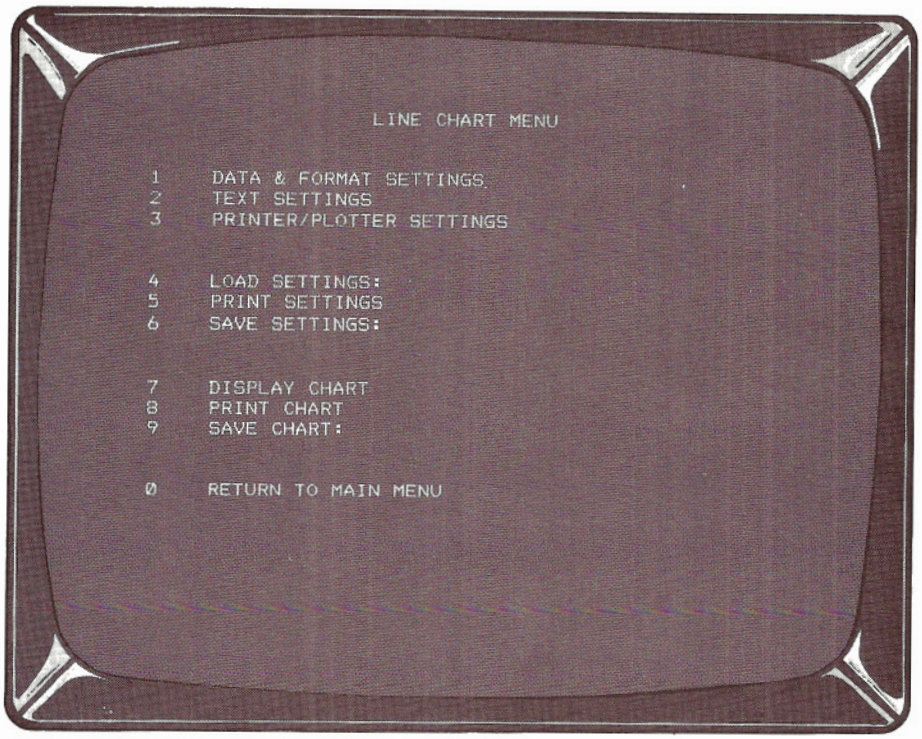


Figure 6-2: Elements of a Line Chart.

To access the Line Chart Menu, choose Main Menu Selection 2, "Line Chart Menu." The following screen appears.



The chart and chart settings you create or change through the Line Chart Menu affect only the data currently in the computer's memory. If you do not save the settings or the chart, both are lost when you return to the Main Menu.

CREATING LINE CHART SETTINGS

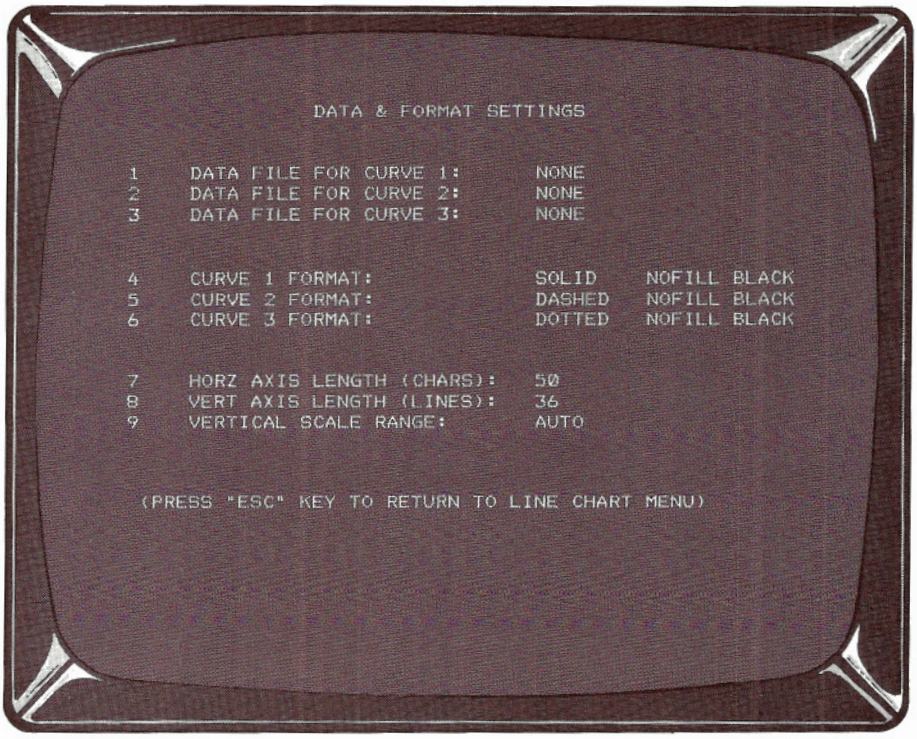
Line chart settings (data and format settings, text settings, and printer/plotter settings) are all the information, other than data values, required to create a line chart. You create the settings through Line Chart Menu Selections 1, 2, and 3.

Data and Format Settings

Use Line Chart Menu Selection 1, "Data & Format Settings," to:

- Load the data file(s) that are the basis of your line chart
- Select the format of the curve(s) and any shading
- Enter the scale and dimensions of the chart

When you choose Selection 1, "Data & Format Settings," the following screen appears:



Data Files

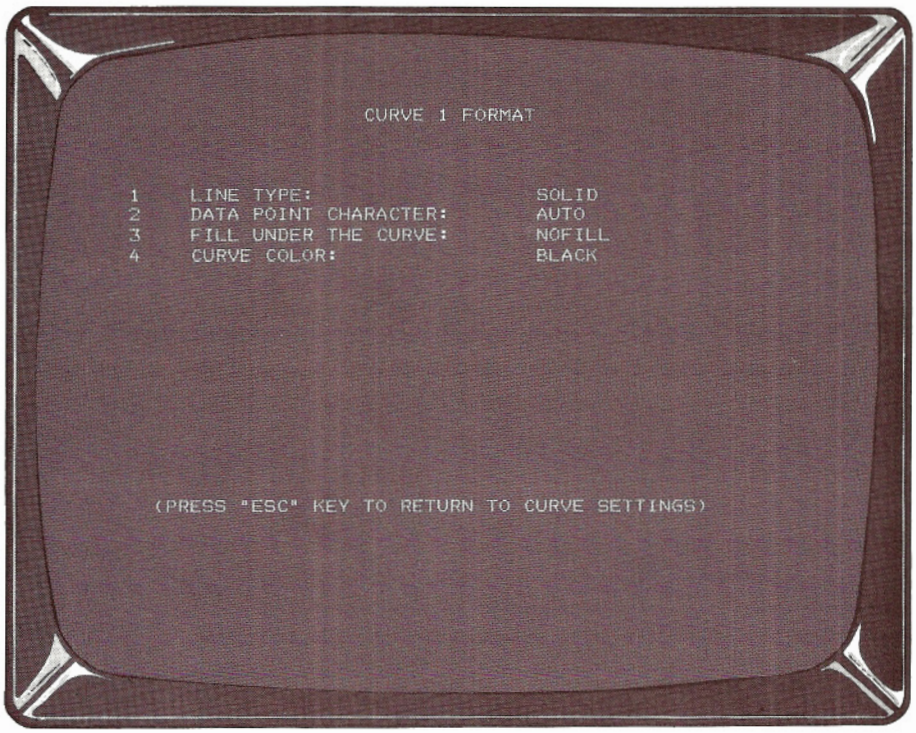
A line chart can be based on up the three data files, each represented by a curve. Enter the names of these data files using Data & Format Settings Menu Selections 1, 2, and 3.

To indicate which of your saved data files you wish to use, choose Selection 1, "Data File for Curve 1," type the name of the file and press (ENTER). If the chart is based on more than one data file, enter a file specification for Curve 2 (through Selection 2) and, if necessary, for Curve 3 (through Selection 3) in the same way.

To delete a file specification, choose the appropriate selection (1, 2, or 3) and type **NONE** (ENTER).

Curve Formats

Use Data & Format Settings Menu Selections 4, 5, and 6 to control how the curves look. When you choose one of these selections, the Curve Format Menu (with default settings) is displayed. The Curve 1 Format Menu is shown below:



Line Type specifies the type of line that is to connect the data points in the curve. Select one of the following line types for each curve:

1 SOLID
2 DASHED
3 DOTTED
4 NOLINE

The solid, dashed, and dotted line types are illustrated in Figure 6-3. Only the solid line type allows shading under the curve. With the noline type (illustrated in Figure 6-4), the first data point is undetectable (except on low-resolution printers) unless you specify a data point character.

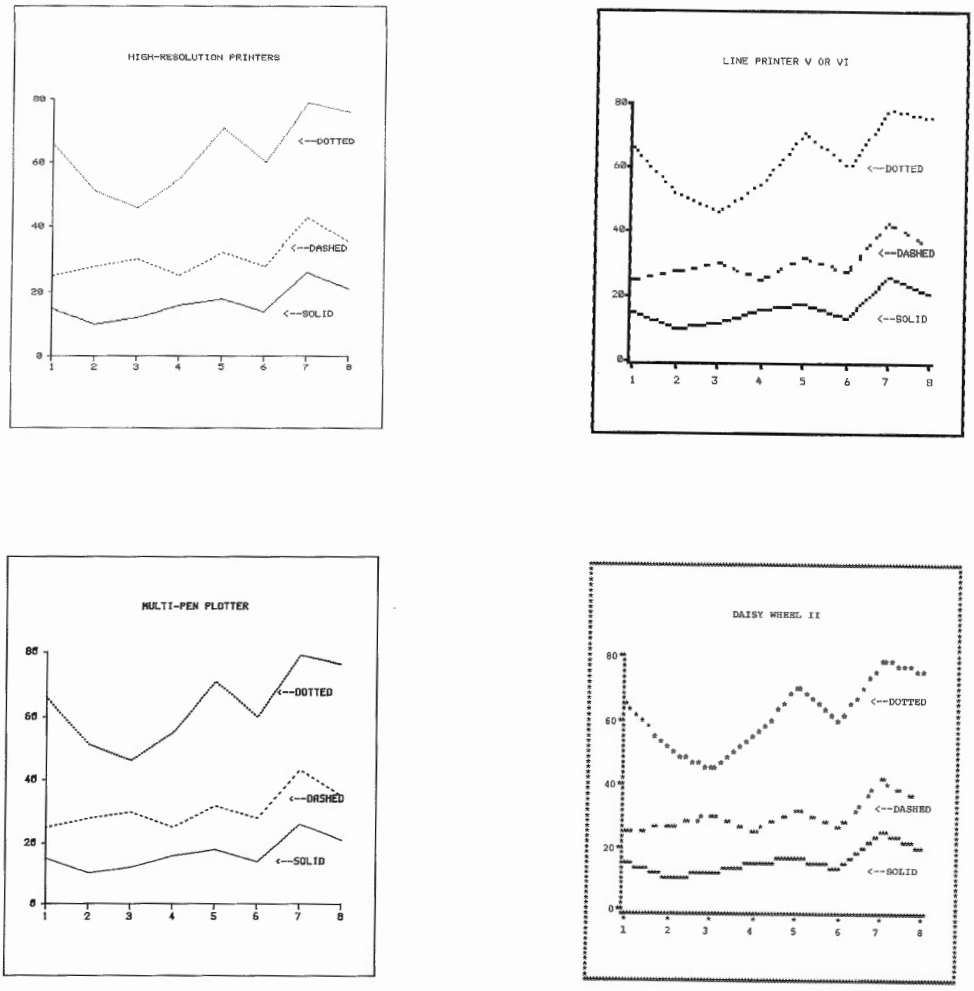


Figure 6-3: Solid, Dashed, and Dotted Line Types.

Data Point Character is the symbol printed at each data point. You can enter any character, such as $, to make the data points more prominent or to identify individual curves. AUTO (the default setting) marks the data points with the character used for the connecting line, and as a result the points do not stand out. If you choose a line type of noline and your output device is a high-resolution printer or plotter, specify a data point character so that the first data point is detectable.

Fill Under the Curve is the appearance of the area between the curve and the horizontal axis. You can choose from at least three fill types:

1 NOFILL
2 LIGHT
3 DARK

If you have a high-resolution printer, you can choose from three additional fill types:

```
4    VERT
5    HORZ
6    CHECK
```

Light, horizontal, vertical, and checkered fills look the same on the low-resolution screen. Fill types are illustrated in Figure 6-4.

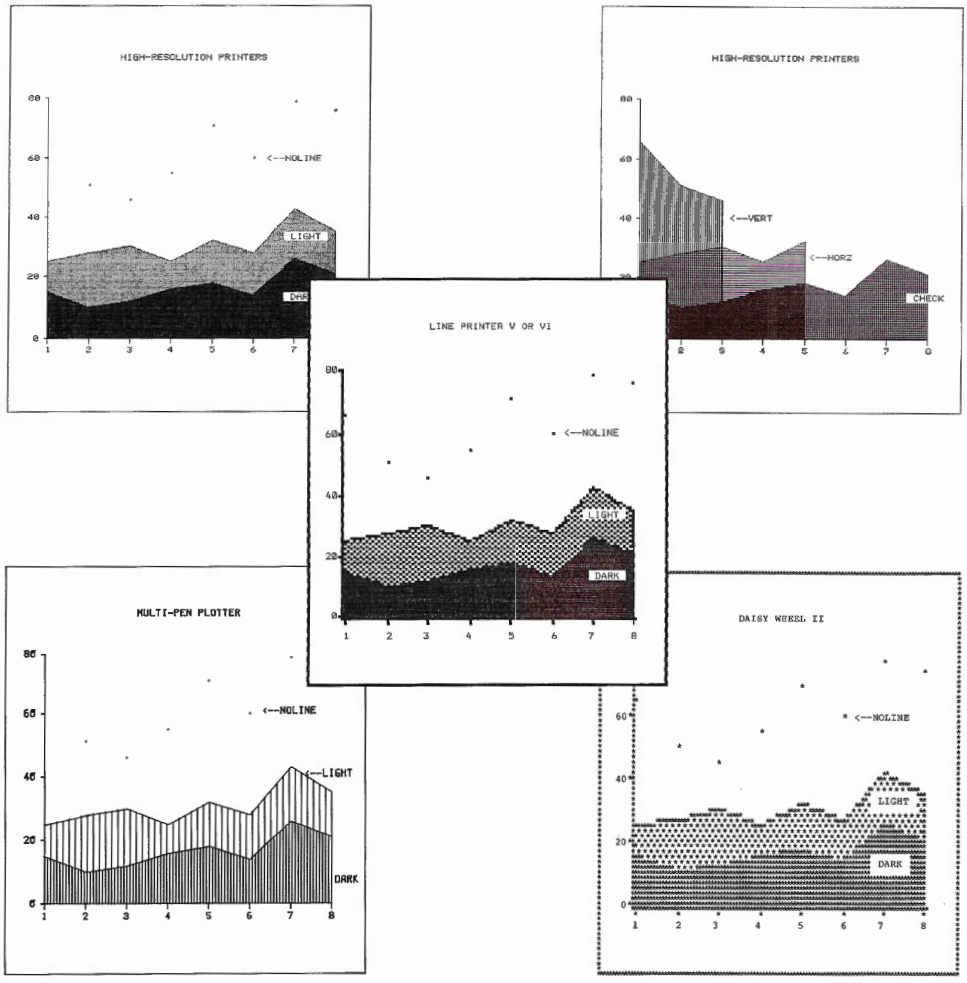


Figure 6-4: Fill Types and Noline Line Type.

The default setting is nofill (no shading beneath the curve). If you prefer to have the area beneath the curve shaded, make sure that the curve's line type (Selection 1) is solid.

Fill is most effective when darker fill is used for the bottom curve and lighter fill (or no fill) is used for the top curve(s). Colored fill should also go from dark to light.

If the line chart contains two or three curves, you can use fill effectively if the curves don't cross. If the line chart contains two intersecting curves and you have a high-resolution printer or screen, you can use fill effectively if you specify horizontal and vertical shading for the two intersecting curves. (If other shading types are used to fill under the curves that cross, the chart might be impossible to read.)

If a curve is filled, any special data point character changes back to the default setting (AUTO).

Curve Color refers to the pen stall to be used on color output devices.

1	BLACK	4	GREEN
2	RED	5	VIOLET
3	BLUE	6	ORANGE

If you do not specify a color, the pen in stall 1 is used. The correct pen must be in the appropriate stall for the chart to be drawn in the color you intend.

Axes and Scale Settings

Selections 7-9 on the Data & Format Settings Menu determine the length of the horizontal and vertical axes and the range of the numeric scale.

In most cases, you can either allow the program to select the axes and scale settings for you, or you can specify one or more of these items. You must specify the scale range if all the data values are nearly the same. Any time you specify your own settings, be aware that no chart can be generated if any data values are outside the specified range.

The program determines the numeric labels that appear on the vertical axis from the vertical axis length and the vertical scale range. If you do not specify the range, the program computes a range that incorporates all your values and produces reasonable scale labels. If you specify the range, the program simply divides that range by the number of intervals, rounding off the labels if necessary.

Numeric labels are printed along the vertical axis every six lines. The actual numbers are determined by the vertical axis length and the vertical scale range. For example, if your axis length is 24, four numeric labels are printed (24/6). If the numeric scale is 0 to 100, each of the four labels is a multiple of 25 (100/4).

Horizontal Axis Length (Chars) is the maximum width of the space in which the curves are drawn. The default setting is 50 character positions (5"). If your output device is a wide-carriage printer, you may enter any whole number from 20 to 100. If the chart is to be produced on a narrow-carriage printer or on the Multi-Pen Plotter, the horizontal axis length must be less than the maximum page width and should allow space for the scale labels printed alongside the vertical axis. (The maximum page width on narrow-carriage printers is 80 character positions; on the Multi-Pen Plotter, the maximum page width is 87

character positions with horizontal format and 67 character positions with vertical format.) If necessary, the program reduces the length to an even multiple of the number of data points (unless horizontal labels are suppressed).

Vertical Axis Length (Lines) specifies the height of the space in which the curves are drawn. Together with the vertical scale range, it also determines the numeric labels on the vertical axis.

The default setting is 36 lines (6″). If you prefer, you may enter any multiple of 6 from 18 to 48 (18 to 36 if you're using the Multi-Pen Plotter with horizontal format). Numeric labels are printed on every sixth line, marking off from three to eight intervals on the numeric scale.

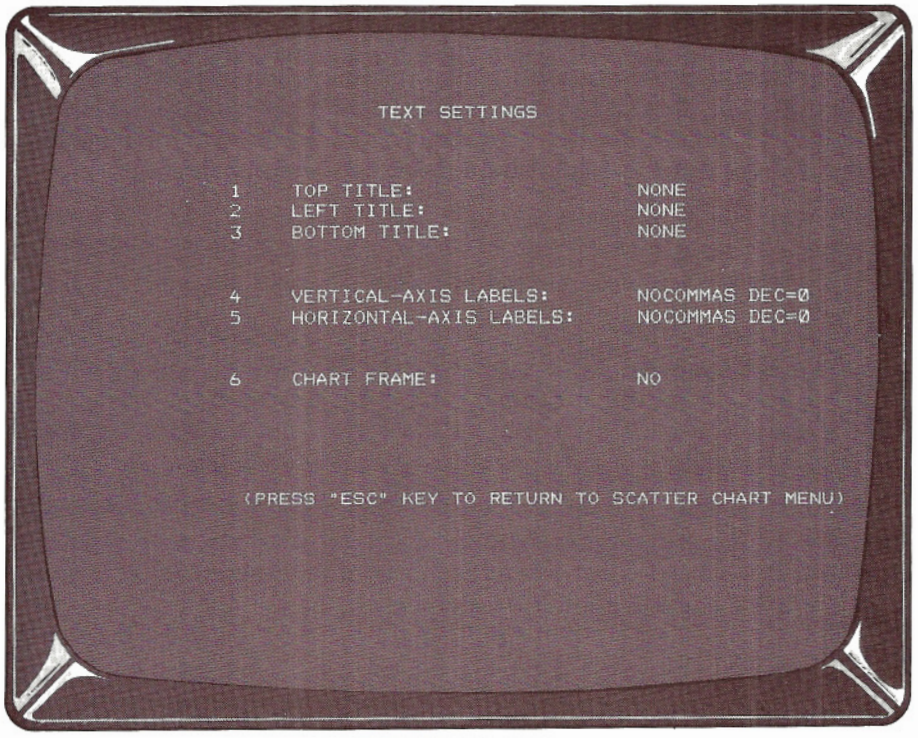
Vertical Scale Range specifies the lower and upper limits for the numeric scale along the vertical axis. Together with the vertical axis length, the vertical scale range determines the numeric labels on the vertical axis.

The default setting, AUTO, causes the program to compute a range based on the data in your files. If you prefer to specify a range, type the lower limit of the scale, a blank or comma, and the upper limit, and press (ENTER). Make sure that all the data values fall within the specified range. If you wish to restore automatic scaling, type **AUTO** (ENTER).

For best scale results, the vertical scale range should divide evenly by the number of intervals on the vertical axis. For example, if the vertical axis length is 30, there are 5 intervals. (Each interval consists of 6 lines.) The vertical scale range should be divisible by 5.

Text Settings

Use Line Chart Menu Selection 2, "Text Settings," to create titles, control the labels of the axes, and request a frame for the line chart. The Text Settings Menu and the default settings are shown below:



Titles

You can create up to three titles:

- A top title that is centered at the top of the chart
- A left title that is centered and printed vertically to the left of the vertical axis, using two lines per character
- A bottom title that is centered below the horizontal axis

To create a title, choose the appropriate selection (1, 2, or 3) from the Text Settings Menu.

Title is the text that will appear in one of the three areas described above. Type the title and press (ENTER). Top and bottom titles can contain up to 50 characters, but cannot exceed the chart width. Left titles can contain up to 25 characters, but cannot exceed the length of the vertical axis.

If you make an error while typing a title, backspace and erase the incorrect characters with (BACK SPACE) or (←). To delete a title after pressing (ENTER), choose the title selection again and type **NONE** (ENTER).

Color refers to the pen stall on color output devices that will be used to draw the title:

1	BLACK	4	GREEN
2	RED	5	VIOLET
3	BLUE	6	ORANGE

If you do not specify a color, the pen in stall 1 is used. The correct pen must be in the appropriate stall for the chart to be drawn in the color you intend.

Character Size/Spacing lets you enlarge the top and bottom titles. The default setting is NORMAL. DOUBLE inserts a space between the characters of the title on the printers and on the screen, and causes the Multi-Pen Plotter to draw the characters of the title twice as large as normal. Don't choose DOUBLE for a title longer than 32 characters.

Axis Labels

Use Selections 4 and 5 of the Text Settings Menu to indicate the format of the vertical axis labels and the type of horizontal axis labels to be supplied.

Vertical-Axis Labels lets you control the format of the numeric scale labels, which are printed to the left of the vertical axis. The following settings are available:

Commas Inserted — NO is the default setting. To insert commas in values of 1000 or more, type **YES** (ENTER).

Number of Decimal Places — The default setting is 0 (no decimals). If you want the vertical-axis labels to contain decimal numbers, enter the number of digits (1 or 2) to be printed to the right of the decimal point. If necessary, labels are rounded.

Leading Character — NONE is the default setting. You can enter one character, such as a dollar sign, to be printed immediately to the left of each vertical-axis label.

Horizontal-Axis Labels specifies the types of labels you want printed along the horizontal axis. If there is enough room, every data point or every other data pointed is ticked and labeled (unless NONE is selected). If there isn't enough room, the interval between labels (and tick marks) is determined by the type of label requested:

Label Type	Interval
Numeric	1, 2, 5, 10, 20, or 40
Weekly	1, 2, 4, 13, 26, or 52
Monthly	1, 2, 6, 12, 24, or 48
Quarterly	1, 2, 4, 8, 20, or 40
Yearly	1, 2, 5, 10, 20, or 40

You can choose from the following horizontal-axis labels:

```
1   NUMBERS, STARTING WITH 1
2   WEEKS, STARTING WITH:
3   MONTHS, STARTING WITH:
4   QUARTERS, STARTING WITH:
5   YEARS, STARTING WITH:
6   NONE (YOU CAN SUPPLY YOUR OWN LABELS
         BY USING THE CHART TEXT EDITOR)
```

Numbers, Starting With 1 — This is the default setting. It prints the sequence numbers of the data values below the horizontal axis.

Weeks, Starting With — Enter a starting week in the form nnWyy, where nn is the week number from 1 to 52, and yy is the last two digits of the year. (If more than two digits are entered for the year, the last two are used.) For example, enter **1W84** if the first data value is for the first week of 1984. The week number is increased by 1 for each data point. When week 52 is reached, the week number returns to 1 and the year number is increased by 1 for the next data point.

Months, Starting With — Enter a starting month in the form mmmyy, where mmm is the first three letters of the month and yy is the last two digits of the year. (If more than two digits are entered for the year, only the last two are used.) For example, enter **JAN84**, if the first data value is for January, 1984. Data points are labeled consecutively through December. For the next data point, the month is set back to January and the year is increased by 1.

Quarters, Starting With — Enter a starting quarter in the form nQyy, where n is the quarter number from 1 to 4, and yy is the last two digits of the year. (If more than two digits are entered for the year, only the last two are used.) For example, enter **2Q84** if the first data value is for the second quarter of 1984. The quarter number is increased by 1 for each data point. When quarter 4 is reached, the quarter number returns to 1 and the year number is increased by 1 for the next data point.

Years, Starting With — Enter a starting year in the form yy, where yy is the last two digits of the year. (If more than two digits are entered, only the last two are used.) For example, enter **86** if the first data value is for 1986. The number is increased by 1 for each data point. Yearly labels are simply sequence numbers with a specified starting point. You can use any 2-digit number (such as 05) to begin the sequence.

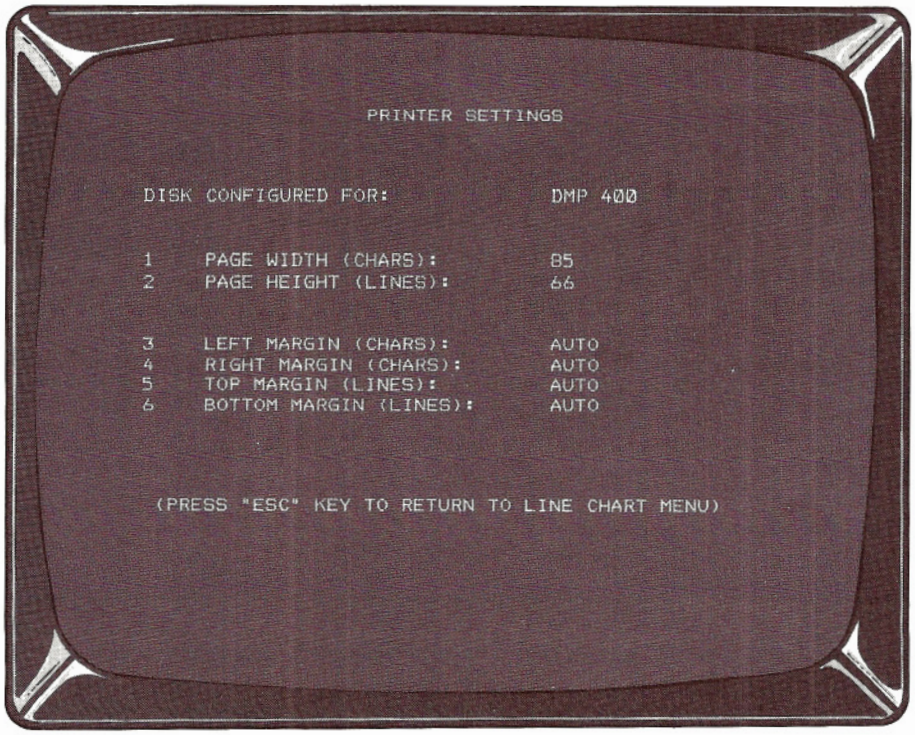
None — No tick marks or labels are printed along the horizontal axis. To create tick marks, select one of the standard horizontal label types described above. Then replace the labels the program supplies with labels created through the Chart Text Editor Menu. To create your own labels through the Chart Text Editor Menu, see Chapter 10, "Chart Text."

Chart Frame

Selection 6 of the Text Settings Menu, "Chart Frame," determines whether a box is drawn around your line chart to frame it. The default setting is NO — no frame is drawn. To frame the chart, type **YES** (ENTER).

Printer/Plotter Settings

Before printing a line chart, check the diskette/printer configuration and the current page size and margin settings. To do this, choose Line Chart Menu Selection 3, "Printer/Plotter Settings." The following screen (showing the default settings) is displayed:



If your screen shows that the diskette is configured for an output device other than the one you intend to use, refer to Chapter 4, "Output Devices and Screen Displays."

Page Size

You can adjust the page size for a line chart, but you cannot set the page height or width higher than the maximum for the printer or plotter you are using. The maximum, minimum, and default settings for each output device are listed in Chart 6-1.

Page Width (Chars) is the width of the page on which the chart is to be produced.

Page Height (Lines) is the height of the page on which the chart is to be produced. Reducing the page height causes the chart to be placed lower on the page.

Margins

Business Graphics automatically adjusts margins so that charts are centered on the page. If you prefer to set your own margins, refer to Chart 6-1.

If you specify both margins in a set (both left and right margins, or both top and bottom margins), the chart is centered between the margins. If you specify only one margin in a set, the chart is placed up against that margin. Whatever margins you specify, the chart must fit within the page size and margins.

	Wide-Carriage Printers	Narrow-Carriage Printers	Multi-Pen Plotter	
			Vertical	Horizontal
Width (Chars)				
default	85	80	67	87
minimum	35	35	35	35
maximum	110	80	67	87
Height (Lines)				
default	66	66	52	40
minimum	30	30	30	30
maximum	66	66	52	40
Margins				
default	AUTO	AUTO	AUTO	AUTO
maximum range				
left/right (chars)	0-80	0-55	0-40	0-60
top/bottom (lines)	0-40	0-40	0-30	0-18

Chart 6-1: Minimum, Maximum, and Default Settings for Page Width, Height, and Margins.

SAVING, PRINTING, AND LOADING LINE CHART SETTINGS

If you plan to print charts that have something in common — data files, margins, or curve formats, for example — save time by saving the chart settings (created with Line Chart Menu Selections 1, 2, and 3). When you are ready to create a similar chart, update or create the data files (if necessary), load the saved settings, make whatever changes are necessary, and then print the new chart. You can also print a copy of the current settings on your printer.

Saving Line Chart Settings

Use Line Chart Menu Selection 6, "Save Settings," to save the current data and format settings, text settings, and printer settings in a file on a diskette. Type a valid file specification (see "File Specifications" in Chapter 5) and press (ENTER). If you decide not to save the settings, press (ESC) instead of (ENTER).

The settings remain in memory even after they are written to the diskette. They are erased only when you return to the Main Menu or enter different settings.

Printing Line Chart Settings

Use Line Chart Menu Selection 5, "Print Settings," to print the current settings on your printer. Settings cannot be printed on the plotter.

After selecting "Print Settings," position the paper and turn on your printer. When the printer is ready, press (ENTER) to begin printing.

Loading Line Chart Settings

To use settings that you previously saved in a file on a diskette, use Line Chart Selection 4, "Load Settings." After selecting "Load Settings," type the name assigned to the setting file (the setting must be for the line charts) and press (ENTER).

If you change the settings, only the version in the computer's memory is affected. Unless you save the changed settings, they are erased when you return to the Main Menu.

DISPLAYING, PRINTING, AND SAVING LINE CHARTS

Displaying Charts

To display on the screen a line chart based on the current settings, choose Line Chart Menu Selection 7, "Display Chart." Several seconds elapse while the chart is prepared for display.

To return to the Line Chart Menu, press (ENTER) or (ESC).

Printing Charts

To print a line chart based on the current settings, choose Line Chart Menu Selection 8, "Print Chart." Several seconds elapse while the chart is prepared for printing. Position the paper and turn on the output device. When the output device is ready, press (ENTER).

To print another copy of the chart, press (ENTER) again after the chart is produced. To return to the Line Chart Menu, press (ESC).

To stop printing, press (ESC); printing stops within a few lines. This does not stop the plotter, because the buffer usually contains the instructions for the entire chart.

Warning: If you turn the Multi-Pen Plotter off before the picture is finished, make sure that the pen being used is in its stall before you turn the plotter back on. Failure to do this might damage the plotter.

Saving Charts

To save the line chart created by the current settings, choose Line Chart Menu Selection 9, "Save Chart." Type the chart's file specification (see "File Specifications" in Chapter 5) and press (ENTER). To cancel the save function, press (ESC) instead of (ENTER).

The save process takes several seconds. After the chart is written to the diskette, SAVE CHART begins flashing.

Bar charts emphasize individual data values and make it easy to compare one item to another. The length of each bar or bar segment represents the value of the corresponding data item as measured against the vertical scale.

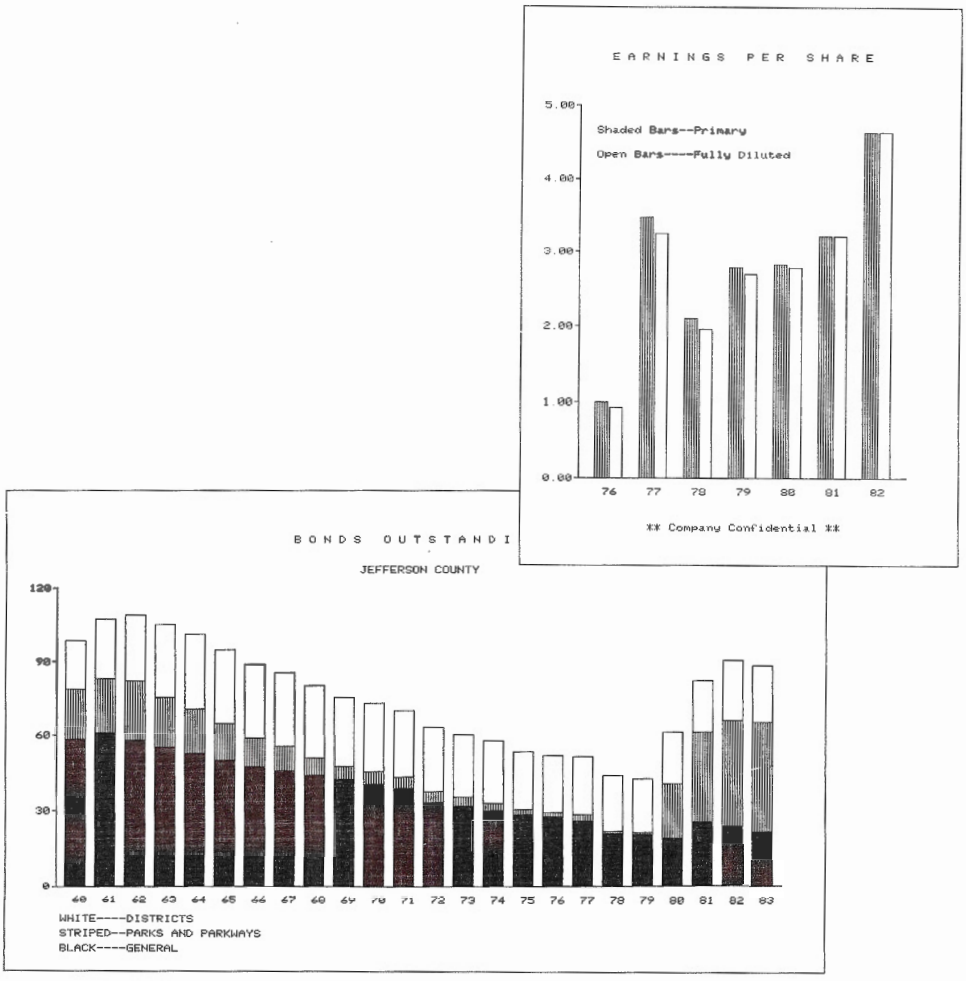


Figure 7-1: Bar Charts.

Bars that represent positive values extend upward from the horizontal axis; those that represent negative values extend downward. Bars or bar segments can be shaded.

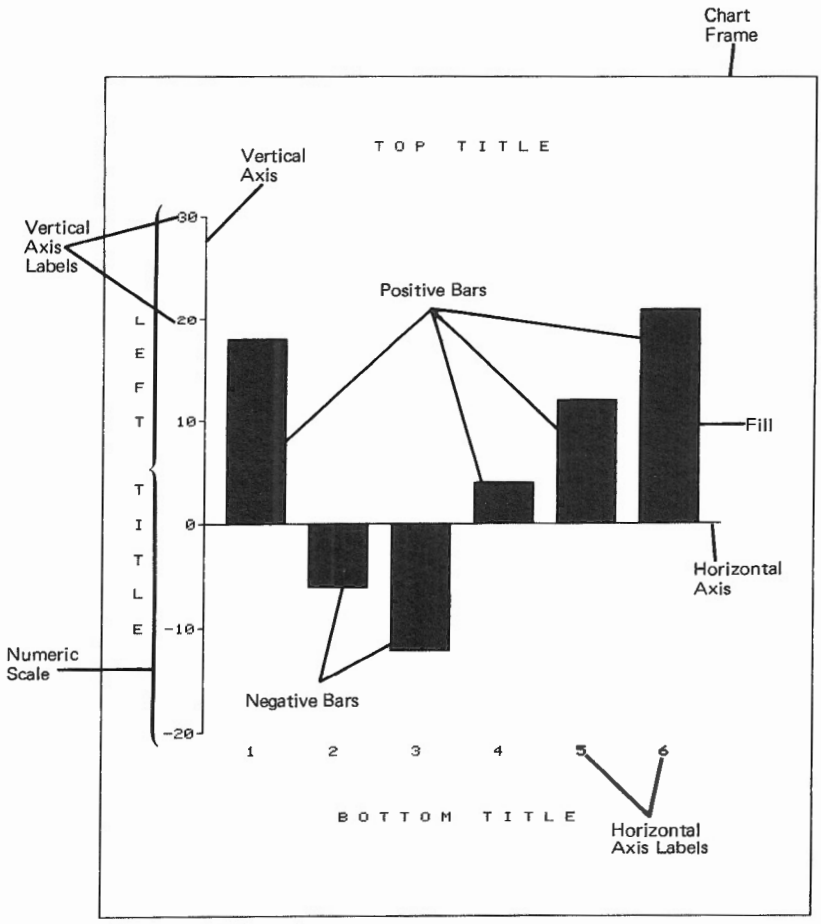
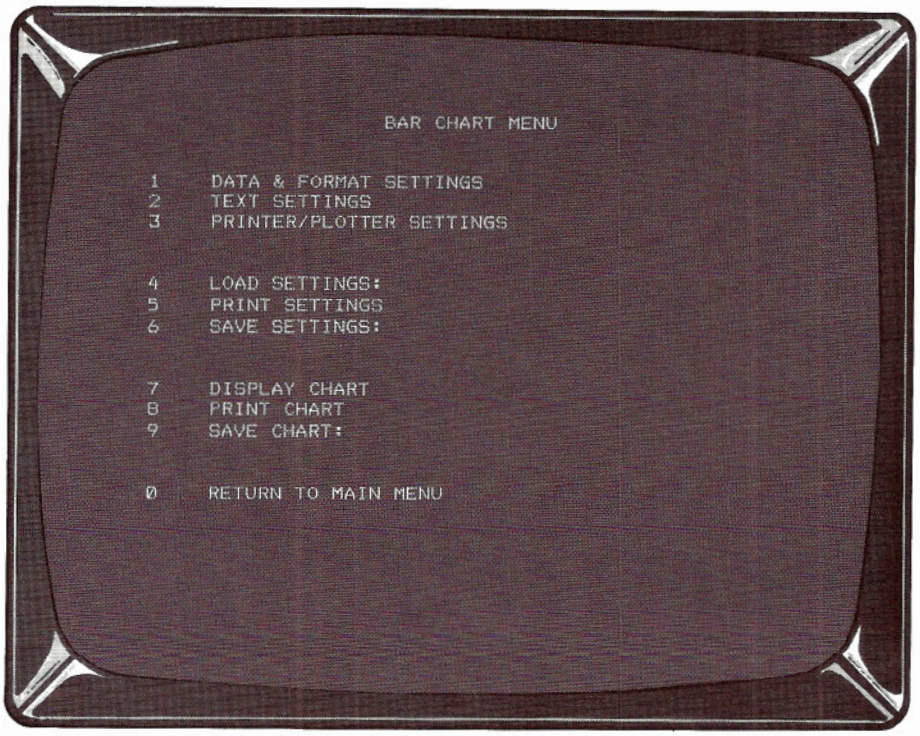


Figure 7-2: Elements of a Bar Chart.

Bar charts that you create with Business Graphics are based on data from up to three files. If a file contains more than 100 values, only the first 100 are plotted. The scale settings are based on all values read from the files.

Charts based on data from more than one file have stacked or grouped bars. If the files do not contain the same number of values, the program fills out the shorter files with zeros.

To access the Bar Chart Menu, choose Main Menu Selection 3, "Bar Chart Menu." The following screen is displayed:



The chart and chart settings you create or change through the Bar Chart Menu affect only the data currently in the computer's memory. If you do not save the settings or the chart, both are lost when you return to the Main Menu.

CREATING BAR CHART SETTINGS

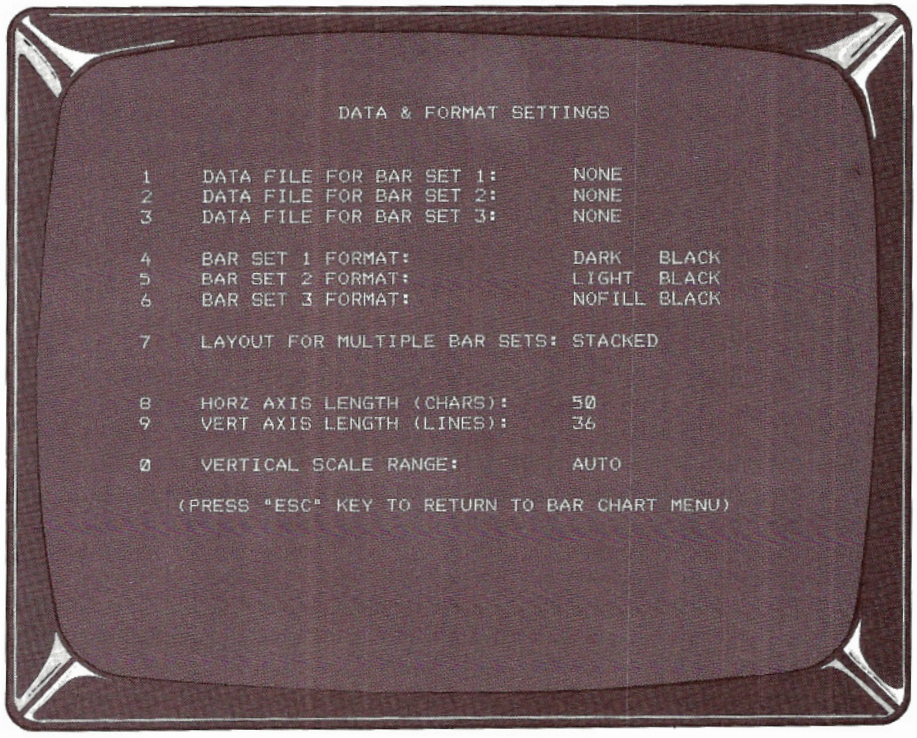
Bar chart settings (data and format settings, text settings, and printer/plotter settings) are all the information, other than data values, required to create a bar chart. You create these settings through Bar Chart Menu Selections 1, 2, and 3.

Data and Format Settings

Use Bar Chart Menu Selection 1, "Data & Format Settings," to:

- Load the data file(s) that are the basis of your bar chart
- Choose the format of the bars
- Enter the scale and dimensions of the chart

When you select "Data & Format Settings," the following menu appears:



Data Files

A bar chart can be based on up to three data files. The maximum number of data values that can be plotted varies. If you use only one data file, you can chart up to 100 values on a wide-carriage printer, 75 on a narrow-carriage printer, 82 in horizontal format on a Multi-Pen Plotter, or 62 in vertical format on a Multi-Pen Plotter. Chart 7-1 and Chart 7-2 list the maximum number of data values that can be plotted when you use more than one data file.

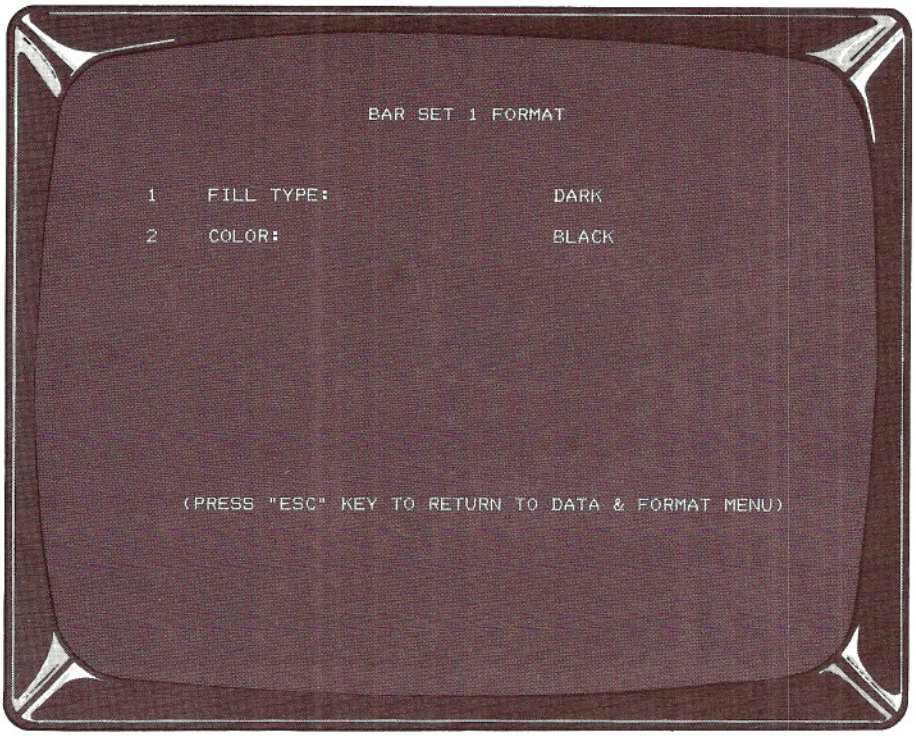
If one of the data values is small in proportion to the other values, the corresponding bar or bar segment might not be visible, particularly on the screen or a low resolution printer.

To indicate which of your saved data files you wish to use, choose Selection 1, "Data File for Bar Set 1," type the file specification, and press (ENTER). If the chart is based on more than one data file, enter a file specification for Bar Set 2 (through Selection 2) and, if necessary, for Bar Set 3 (through Selection 3) in the same way.

To delete a file specification, choose the appropriate selection (1, 2, or 3) and type **NONE** (ENTER).

Bar Formats

Use Data & Format Settings Menu Selections 4, 5, and 6 to control how you want the bars to look. When you choose one of these selections, the Bar Set Format Menu (with default settings for that Bar Set) is displayed. The Bar Set Format Menu for Bar Set 1 is shown below:



Fill Type is the type of shading inside the bar. You can choose from at least three fill types:

1 DARK
2 LIGHT
3 NOFILL

If you have a high-resolution output device, three additional fill types are available:

4 CHECK
5 HORZ
6 VERT

Light, horizontal, vertical, and checkered fills look the same on low-resolution screens.

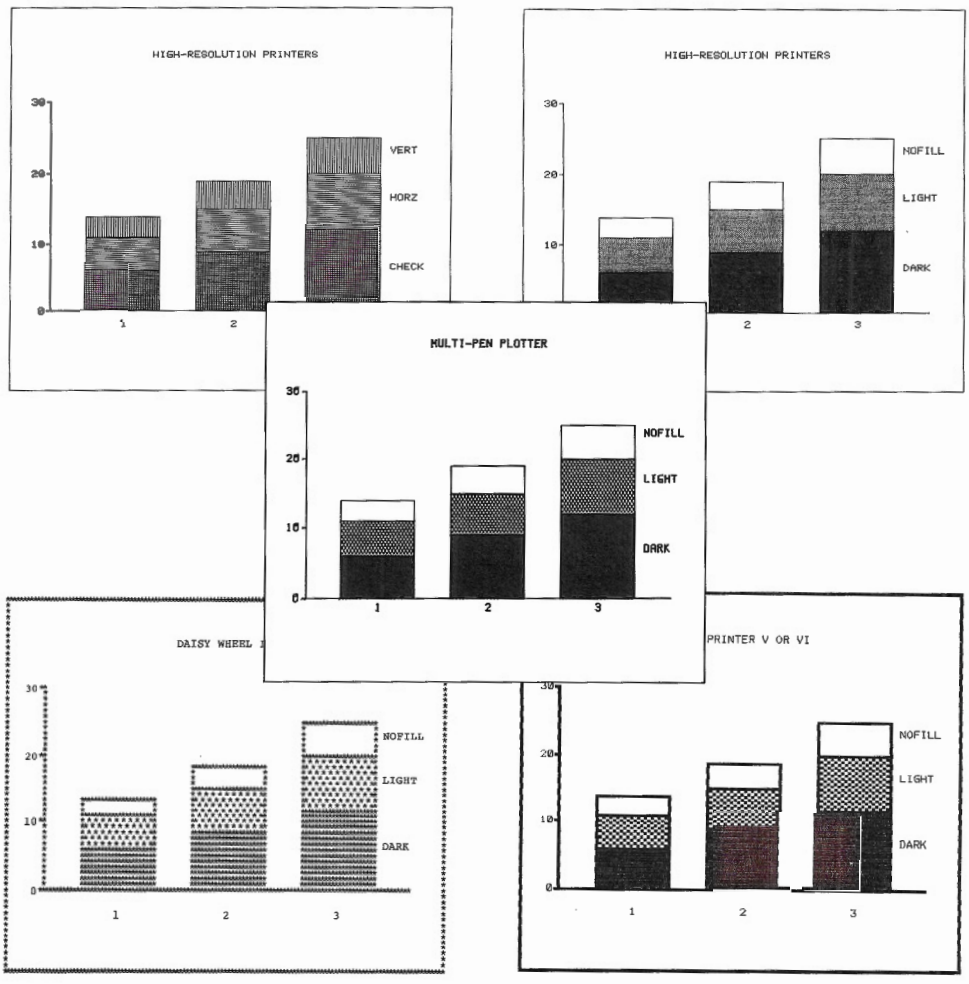


Figure 7-3: Fill Types.

When using dark or light fill on low-resolution printers, make sure the printed bars are at least two character positions wide. When fill is used for bars that are narrower than this, the bars appear solid and the shading is not visible. Also, avoid using light fill with small segments, because it can be hard to differentiate between the fill and the line between segments.

If a chart is to be drawn by a color output device, shading is recommended for stacked bars, grouped bars, and (if there is some space between the bars) individual bars.

Color refers to the pen stall to be used on color output devices:

1	BLACK	4	GREEN
2	RED	5	VIOLET
3	BLUE	6	ORANGE

If you do not specify a color, the pen in Stall 1 is used for the bar outline

and any shading. The correct pen must be in the appropriate stall for the chart to be drawn in the color you intend.

Layout For Multiple Bar Sets

If your chart is based on the data in two or three files, choose Data & Format Settings Menu Selection 7, "Layout For Multiple Bar Sets," to indicate whether you want the bar sets stacked or grouped. After you choose Selection 7, sample stacked and grouped charts are displayed. Figure 7-4 also illustrates stacked and grouped bar sets.

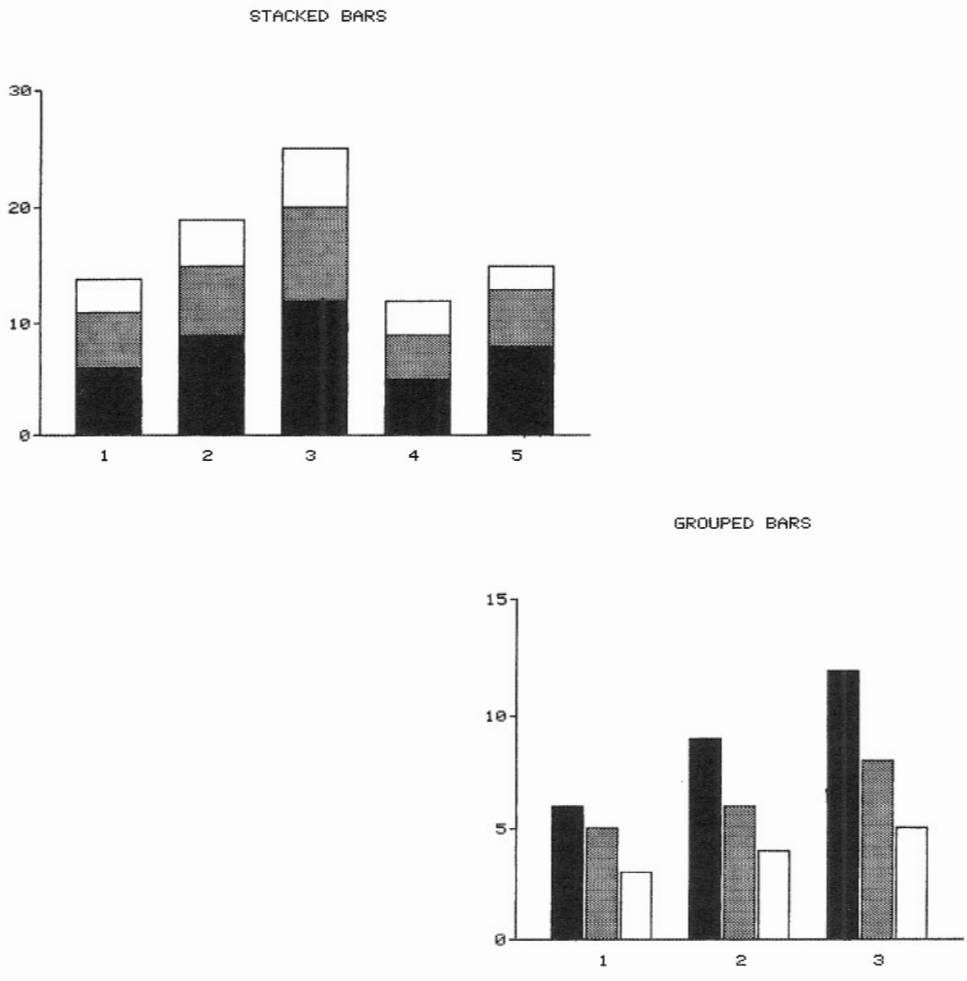


Figure 7-4: Stacked Bars and Grouped Bars.

Stacked bars represent the sum of the corresponding data values in the files. The bottom segment is Bar Set 1, the middle segment is Bar Set 2, and the top segment is Bar Set 3. Data values must be positive. The maximum number of data values that can be charted in stacked bar

format is listed in Chart 7-1. Stacked bars are at least three characters wide and are separated by at least one space.

Printer/Plotter	Maximum Number of Data Values per File
Wide-carriage printer	24
Narrow-carriage printer	18
Multi-Pen Plotter (horizontal)	20
Multi-Pen Plotter (vertical)	15

Chart 7-1: Maximum Number of Data Values Per File that Can Be Charted in Stacked Bar Format. To chart more than the maximum number of data values, split each data file into two or more data files and produce two or more charts. (The figures in this chart allow five character positions for the vertical axis and numeric scale labels.)

If the data values vary widely, only the bottom segment can be compared accurately across the bars. If all data is of equal importance, place the data with the least variation in the bottom segment and the data with the most variation in the top segment. If one of the sets of data is more important than the other(s), assign the most important data to Bar Set 1.

If the data value for a segment is small in comparison to the other values, the segment might be too small to appear on the screen.

Grouped bars are arranged in sets of two (two data files) or three (three data files). Each bar represents one data value. The first bar (left) in each group is Bar Set 1, the second is Bar Set 2, and the third is Bar Set 3. You can depict both positive and negative values using grouped bars. Because all bars start from the horizontal axis, the grouped format makes it easy to compare the bars.

Grouped bars are at least one character wide, and the space between groups is equal to to the bar width. No space is allowed between bars within a group. The maximum number of data values that can be charted in grouped bar format is listed in Chart 7-2.

Printer/Plotter and Number of Files	Maximum Number of Data Values per File
Wide-carriage printer	
Groups of 2 bars (2 files)	33
Groups of 3 bars (3 files)	24
Narrow-carriage printer	
Groups of 2 bars (2 files)	24
Groups of 3 bars (3 files)	18
Multi-Pen Plotter (horizontal)	
Groups of 2 bars (2 files)	27
Groups of 3 bars (3 files)	20
Multi-Pen Plotter (vertical)	
Groups of 2 bars (2 files)	20
Groups of 3 bars (3 files)	15

Chart 7-2: Maximum Number of Data Values Per File that Can Be Charted in Grouped Bar Format. To chart more than the maximum number of data values, split each data file into two or more data files and produce two or more charts. (The figures in this chart allow five character positions for the vertical axis and numeric scale labels.)

Axes and Scale Settings

Selections 8, 9, and 0 on the Data & Format Settings Menu determine the length of the horizontal and vertical axes and the range of the numeric scale.

You can either allow the program to select the axes and scale settings for you or you can specify one or more of these items. Any time you specify your own settings, be aware that no chart can be generated if all of the data values are not within the specified range.

The program determines the numeric labels that appear on the vertical axis from the vertical axis length and the vertical scale range. If you do not specify the range, the program computes a range that includes zero, incorporates all of your values, and produces reasonable scale labels. If you specify the range, the program simply divides the range by the number of intervals, rounding off the labels if necessary.

Numeric labels are printed along the vertical axis every six lines. The actual numbers are determined by the vertical axis length and the vertical scale range. For example, if your axis length is 24, four numeric labels are printed (24/6). If the numeric scale is 0 to 100, each of the four labels is a multiple of 25 (100/4).

Horizontal Axis Length (Chars) is the maximum width of the space in which the bars are to be drawn. The default horizontal axis length is 50 character spaces (5"). If you have a large number of stacked or grouped bars, you might need to extend the length of the horizontal axis.

If your output device is a wide-carriage printer, you can enter any whole number from 20 to 100. On a narrow-carriage printer or the Multi-Pen

Plotter, the horizontal axis length you specify must be less than the maximum page width and should allow space for the scale labels printed alongside the vertical axis. (The maximum page width on the narrow-carriage printer is 80 character spaces; on the Multi-Pen Plotter, the maximum page width is 87 in horizontal format or 67 in vertical format.)

Whether you use the default setting or specify a different horizontal axis length, the program adjusts bar width and spacing so that the charts fits within the horizontal axis length. You might find the following criteria, used by the program for determining width and spacing, helpful when manually determining the best horizontal axis for your chart:

- The minimum width for single bars is one character position
- The space between individual bars range from zero (if the bars otherwise would not fit within the horizontal axis) to one half the bar width
- Bars and the spaces between them are always a multiple of one character position
- The minimum width for stacked bars is three character positions
- The space between stacked bars ranges from one character position to one half the bar width
- The minimum width for grouped bars is one character position
- The space between groups of bars equals the bar width
- There is no space between bars within a group

When bars are spaced, a space is also left before the first bar and after the last bar. (The number of spaces is one more than the number of bars or bar groups.)

For example, if you specify a single file with 20 data values and use the default horizontal axis length of 50, the bars will be 2 characters wide with no space between them. If you want space between the bars, you must increase the axis length to at least 61 (20 x 2 + 21 x 1).

Vertical Axis Length (Lines) specifies the height of the space in which the bars are drawn. The default setting is 36 lines (6″). You may enter any even multiple of 6 from 18 to 48 (from 18 to 36 on the Multi-Pen Plotter in horizontal format). Labels are printed on every sixth line, marking off from three to eight intervals on the numeric scale.

Vertical Scale Range specifies the lower and upper limits for the numeric scale along the vertical axis. Together with the vertical axis length, the vertical scale range determines the numeric labels on the vertical axis.

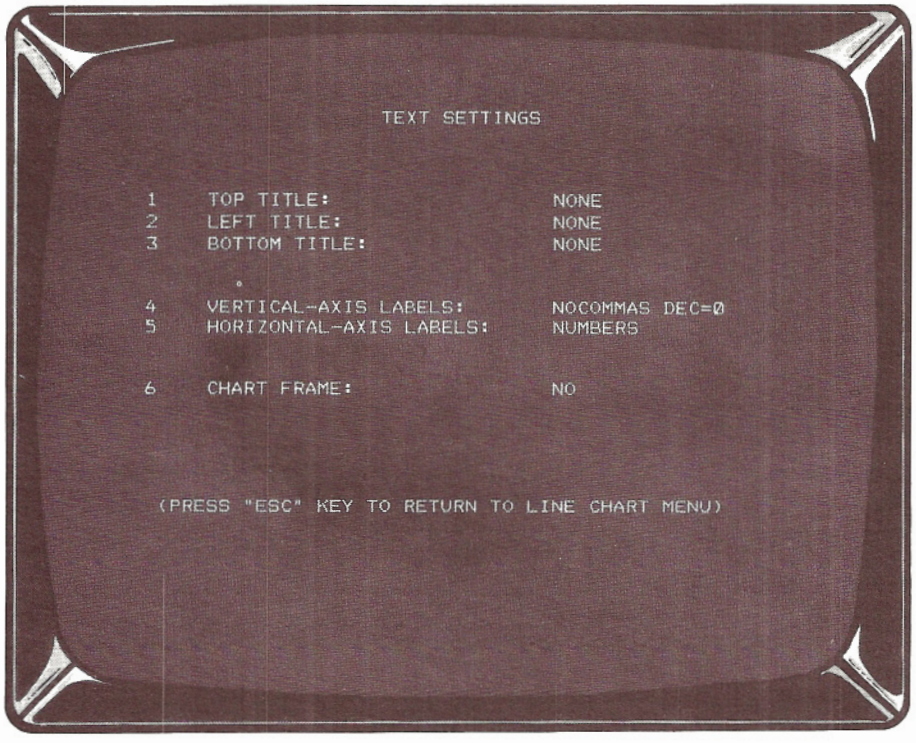
The default setting (AUTO) causes the program to compute a range based on the data in your files, including zero. The program extends the range, if necessary, for more reasonable scale labels and (if both positive and negative values are included) to ensure that zero is labeled. If you prefer

to specify a range, enter the lower limit of the scale, a blank or comma, and the upper limit, and press (ENTER). Make sure all the data values fall within the specified range. If you wish to restore automatic scaling, type **AUTO** (ENTER).

For best results, the range should divide evenly by the number of intervals. For example, if the vertical axis length is 30, there are 5 intervals. (Each interval consists of 6 lines.) The vertical scale range should be divisible by 5.

Text Settings

To create titles, control the labels of the axes, and request a frame for the chart, choose Selection 2, "Text Settings," from the Bar Chart Menu. The Text Settings Menu (with default settings) is displayed, as shown below:



Titles

You can create up to three titles:

- A top title that is centered at the top of the chart
- A left title that is centered and printed vertically to the left of the vertical axis, using two lines per character
- A bottom title that is centered below the horizontal axis

To create a title, choose the appropriate selection (1, 2, or 3) from the Text Settings Menu.

Title is the text that will appear in one of the three areas described above. Type the title and press (ENTER). Top and bottom titles can contain up to 50 characters, but cannot exceed the chart width. Left titles can contain up to 25 characters, but cannot exceed the length of the vertical axis. If you enter a title that is too long, the characters at the end of the title are lost.

If you make an error while typing a title, backspace and erase the incorrect characters with (BACK SPACE) or (←). To delete a title after pressing (ENTER), choose the title selection again and type **NONE** (ENTER).

Color refers to the pen stall on color output devices that will be used to draw the title:

1	BLACK	4	GREEN
2	RED	5	VIOLET
3	BLUE	6	ORANGE

If you do not specify a color, the pen in stall 1 is used. The correct pen must be in the appropriate stall for the chart to be drawn in the color you intend.

Character Size/Spacing lets you enlarge top and bottom titles. The default setting is NORMAL. DOUBLE inserts a space between the characters of the title on printers and on the screen, and causes the Multi-Pen Plotter to draw the characters of the title twice as large as normal. Don't select DOUBLE for titles longer than 32 characters.

Axis and Bar labels

Use Selection 4 of the Text Settings Menu to indicate the format of the vertical axis labels. Use Selection 5 to indicate the type of labels you want to appear under each bar.

Vertical-Axis Labels lets you control the format of the numeric scale labels which are printed to the left of the vertical axis. The following settings are available.

Commas Inserted — NO is the default setting. To insert commas in values of 1000 or more, type **YES** (ENTER).

Number of Decimal Places — The default setting is 0 (no decimals). If you want the vertical-axis labels to contain decimal numbers, enter the number of digits (1 or 2) you want printed to the right of the decimal point.

Leading Character — NONE is the default setting. You can enter one character, such as a dollar sign, to be printed immediately to the left of each vertical-axis label.

Bar Labels specifies the type of bar labels you want printed at the bottom of the chart, centered under the bar or bar group. By default, no bar

labels are provided. If you request labels and there is enough room, every bar or bar group is labeled. Otherwise, the interval between labels depends on the type of label requested:

Label Type	Interval
Numeric	1, 2, 5, 10, 20, or 40
Weekly	1, 2, 4, 13, 26, or 52
Monthly	1, 2, 6, 12, 24, or 48
Quarterly	1, 2, 4, 8, 20, or 40
Yearly	1, 2, 5, 10, 20, or 40

You can choose from the following bar labels:

```
1   NUMBERS, STARTING WITH 1
2   WEEKS, STARTING WITH:
3   MONTHS, STARTING WITH:
4   QUARTERS, STARTING WITH:
5   YEARS, STARTING WITH:
6   NONE (YOU CAN SUPPLY YOUR OWN LABELS
        BY USING THE CHART TEXT EDITOR)
```

Numbers, Starting With 1 — This is the default setting. It prints the sequence numbers of the bars or bar groups. If you do not want the sequence to start with 1, choose Selection 5, "Years, Starting With."

Weeks, Starting With — Enter a starting week in the form nnWyy, where nn is the week number from 1 to 52, and yy is the last two digits of the year. (If more than two digits are entered for the year, the last two are used.) For example, enter **1W84** for the first week of 1984. The week number is increased by 1 for each bar (or group of bars). When week 52 is reached, the week number returns to 1 and the year number is increased by 1 for the next bar or bar group.

Months, Starting With — Enter a month in the form mmmyy, where mmm is the first three letters of the month and yy is the last two digits of the year. (If more than two digits are entered for the year, only the last two are used.) For example, enter **JAN84**, if the first data value is for January, 1984. Bars or bar groups are labeled consecutively through December. For the next bar or bar group, the month is set back to January and the year number is increased by 1.

Quarters, Starting With — Enter a starting quarter in the form nQyy, where n is the quarter number from 1 to 4, and yy is the last two digits of the year. (If more than two digits are entered for the year, only the last two are used.) For example, enter **2Q84** if the first data value is for the second quarter of 1984. The quarter number is increased by 1 for each bar or bar group. When quarter 4 is reached, the quarter number returns to 1 and the year number is increased by 1 for the next bar or bar group.

Years, Starting With — Enter a starting year in the form yy, where yy is the last two are used. For example, enter **85** if the first data value is for

1985. The number is increased by 1 for each bar or bar group. Yearly labels are simply sequence numbers with a specific starting point. You can use any 2-digit number (such as 05) to begin the sequence.

None (default setting) — If you do not require labels, select NONE.

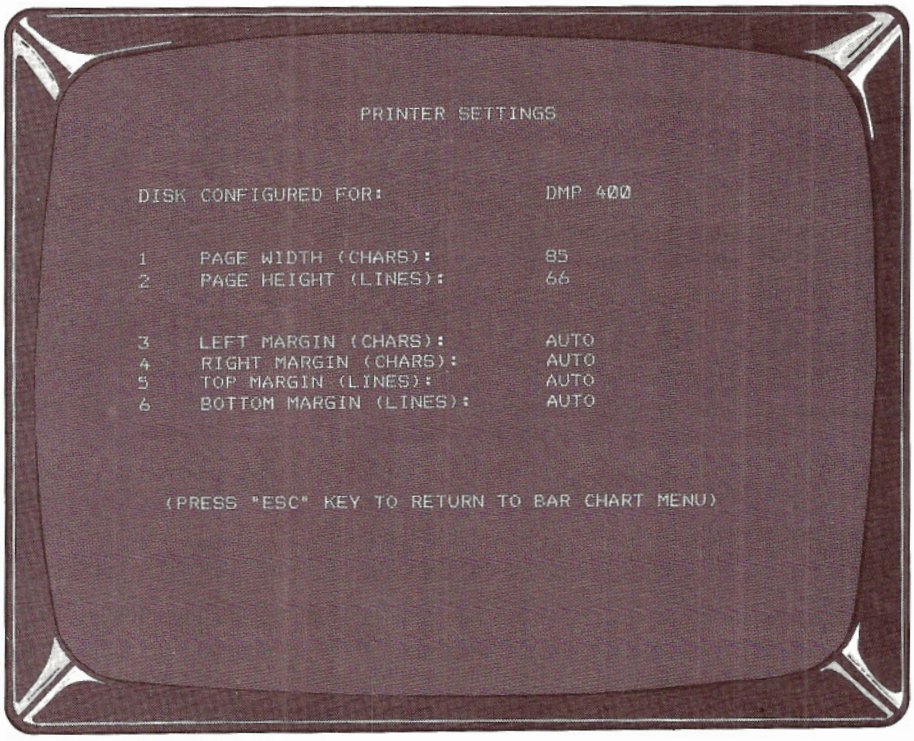
If you prefer, you can create your own labels through the Chart Text Editor Menu. (See Chapter 10, "Chart Text.")

Chart Frame

Selection 6 of the Chart Text Settings Menu, "Chart Frame," determines whether a box is drawn around your bar chart to frame it. The default setting NO — no frame is drawn. To frame the chart, type **YES** (ENTER).

Printer/Plotter Settings

Before printing a bar chart, check the diskette/printer configuration and the current page size and margin settings. To do this, choose Bar Chart Menu Selection 3, "Printer/Plotter Settings." The following screen (showing the default settings) is displayed:



If your screen shows that the diskette is configured for an output device other than the one you intend to use, refer to Chapter 4, "Output Devices and Screen Displays."

Page Size

You can adjust the page size for a bar chart, but you cannot set the page height or width higher than the maximum for the printer or plotter you are using. The maximum, minimum, and default settings for each output device are listed in Chart 7-3.

Page Width (Chars) is the width of the page on which the chart is to be produced.

Page Height (Lines) is the height of the page on which the chart is to be produced. Reducing the page height causes the chart to be placed lower on the page.

Margins

Business Graphics automatically adjusts margins so that charts are centered on the page. If you prefer to set your own margins, refer to Chart 7-3.

If you specify both margins in a set (both left and right margins, or both top and bottom margins), the chart is centered between the margins. If you specify only one margin in a set, the chart is placed against that margin. The chart must fit within whatever margins you specify.

	Wide-Carriage Printers	Narrow-Carriage Printers	Multi-Pen Plotter	
			Vertical	Horizontal
Width (Chars)				
default	85	80	67	87
minimum	35	35	35	35
maximum	110	80	67	87
Height (Lines)				
default	66	66	52	40
minimum	30	30	30	30
maximum	66	66	52	40
Margins				
default	AUTO	AUTO	AUTO	AUTO
maximum range				
left/right (chars)	0-80	0-55	0-40	0-60
top/bottom (lines)	0-40	0-40	0-30	0-18

Chart 7-3: Minimum, Maximum, and Default Settings for Page Width, Height, and Margins.

SAVING, PRINTING, AND LOADING BAR CHART SETTINGS

If you plan to print charts that have something in common — data files, margins, or bar formats, for example — save time by saving the chart settings (created with Bar Chart Menu Selections 1, 2, and 3). When you are ready to create a similar chart, update or create the data files (if necessary), load the saved settings, make whatever changes are necessary, and then print the new chart. You can also print a copy of the current settings on your printer.

Saving Bar Chart Settings

Use Bar Chart Menu Selection 6, "Save Settings," to save the current data and format settings, text settings, and printer settings in a file on a diskette. Type a valid file specification (see "File Specifications" in Chapter 5) and press (ENTER). If you decide not to save the settings, press (ESC) instead of (ENTER).

The settings remain in memory even after they are written to the diskette. They are erased only when you return to the Main Menu or enter different settings.

Printing Bar Chart Settings

Use Bar Chart Menu Selection 5, "Print Settings," to print the current settings on your printer. Settings cannot be printed on the plotter.

After selecting "Print Settings," position the paper and turn on your printer. When the printer is ready, press (ENTER) to begin the printing.

Loading Bar Chart Settings

To use settings that you previously saved in a file on a diskette, use Bar Chart Selection 4, "Load Settings." After selecting "Load Settings," type the name assigned to the settings file (the settings must be for bar charts) and press (ENTER).

If you change the settings, only the version in the computer's memory is affected. Unless you save the changed settings, they are erased when you return to the Main Menu.

DISPLAYING, PRINTING, AND SAVING BAR CHARTS

Displaying Bar Charts

To display on the screen a bar chart based on the current settings, choose Bar Chart Menu Selection 7, "Display Chart." Several seconds elapse while the chart is prepared for display. To return to the Bar Chart Menu, press (ENTER) or (ESC).

Printing Bar Charts

To print a bar chart based on the current settings, choose Bar Chart Menu Selection 8, "Print Chart." Several seconds elapse while the chart is prepared for printing. Position the paper and turn on your output device. When the output device is ready, press (ENTER).

To print another copy of the chart, press (ENTER) again after the chart is produced. To return to the Bar Chart Menu, press (ESC).

To stop printing, press (ESC) and printing stops within a few lines. This does not stop the plotter, because the buffer usually contains the instructions for the entire chart.

Warning: If you turn the Multi-Pen Plotter off before the chart is finished, make sure that the pen being used is in its stall before you turn the plotter back on. Failure to do this might damage the plotter.

Saving Charts

To save the bar chart formed by the current settings, choose Bar Chart Menu Selection 9, "Save Chart." Type the chart's file specification (see "File Specifications" in Chapter 5). To cancel the save function, press (ESC) instead of (ENTER).

The save process takes several seconds. After the chart is written to the diskette, SAVE CHART begins flashing.

Pie charts compare parts to a whole by showing the relative size of the parts. They are most effective when comparing a small number of items. The entire pie represents the sum of the data values, and each slice depicts one value. The chart shows the portion that each value contributes to the total data.

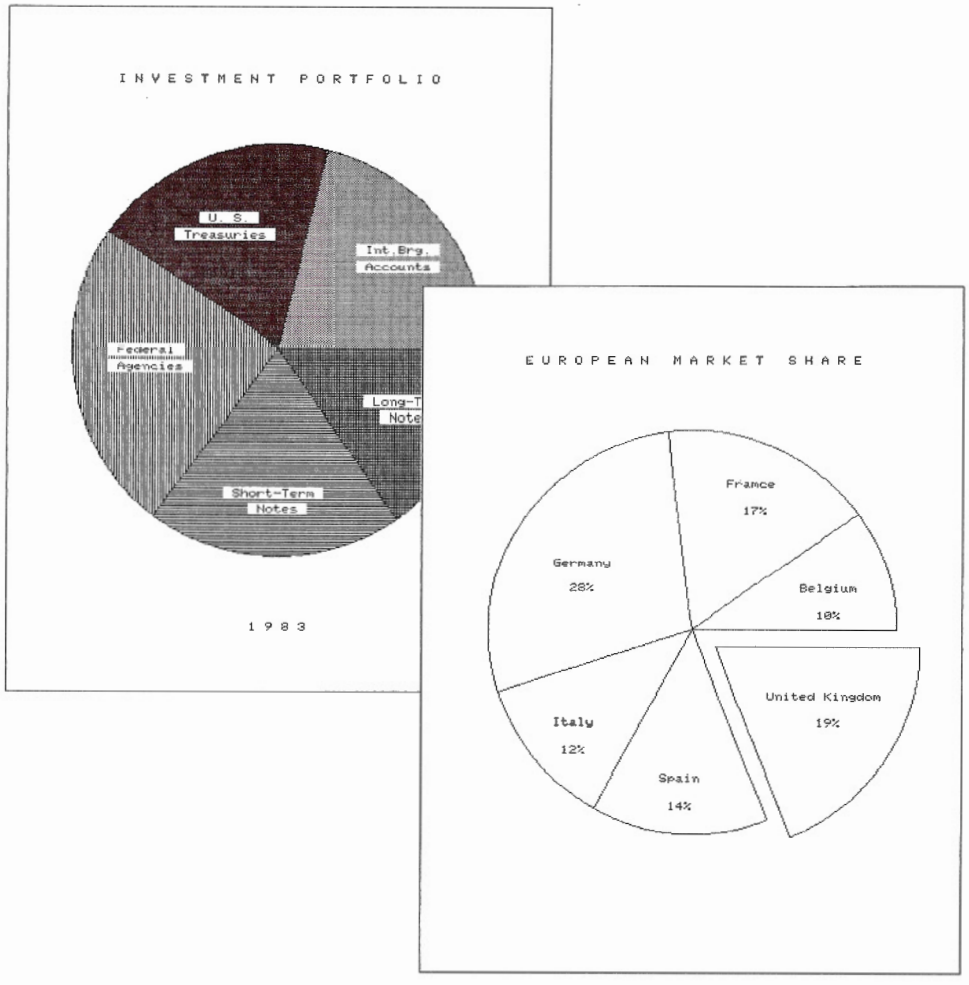


Figure 8-1: Pie Charts.

A pie chart created with Business Graphics is produced using the data in one file. Each pie chart can contain up to 12 slices. The file used to produce the chart must contain at least 2 and no more than 12 values. All data values must be greater than zero.

Page size and margins are preset. Each pie chart is 5" in diameter.

One or more slices can be detached (shifted outward from the center) from the rest of the pie.

When produced on the Multi-Pen Plotter, pie charts are drawn vertically on the page, whether the Processing Diskette is configured for vertical or horizontal format.

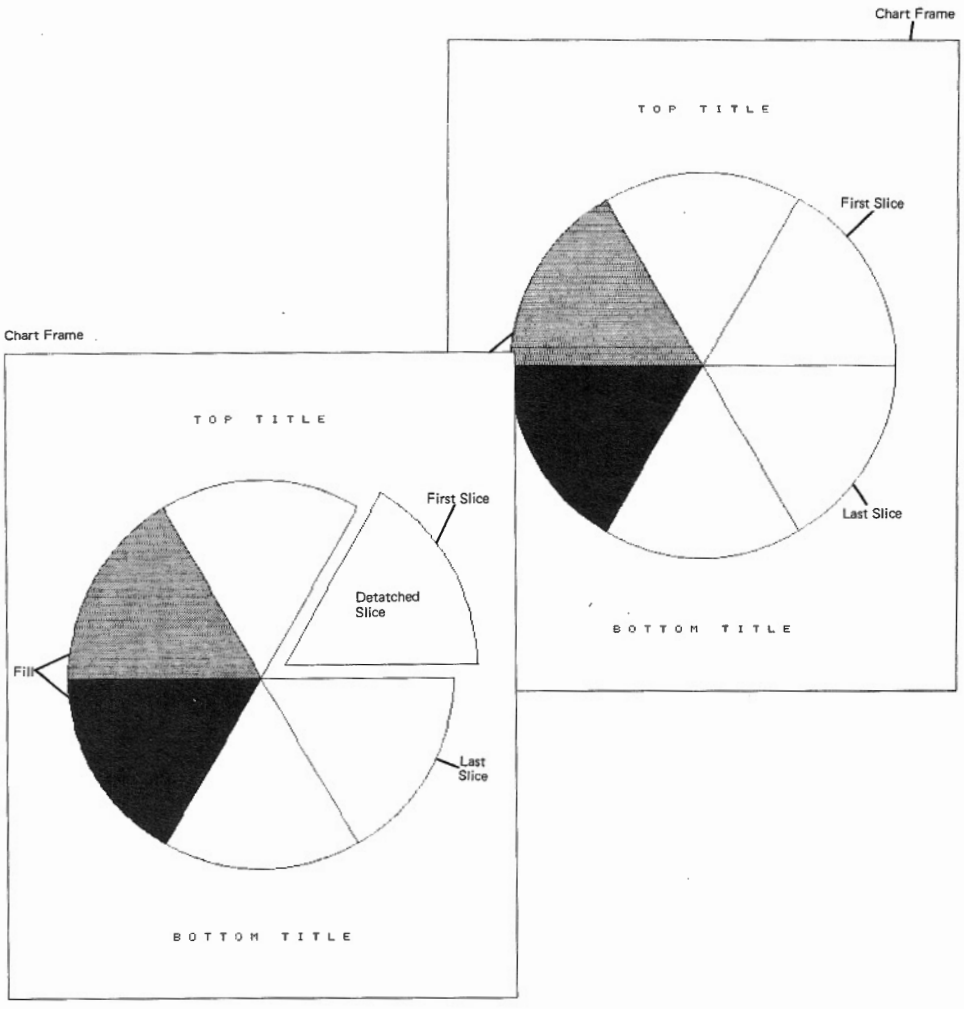
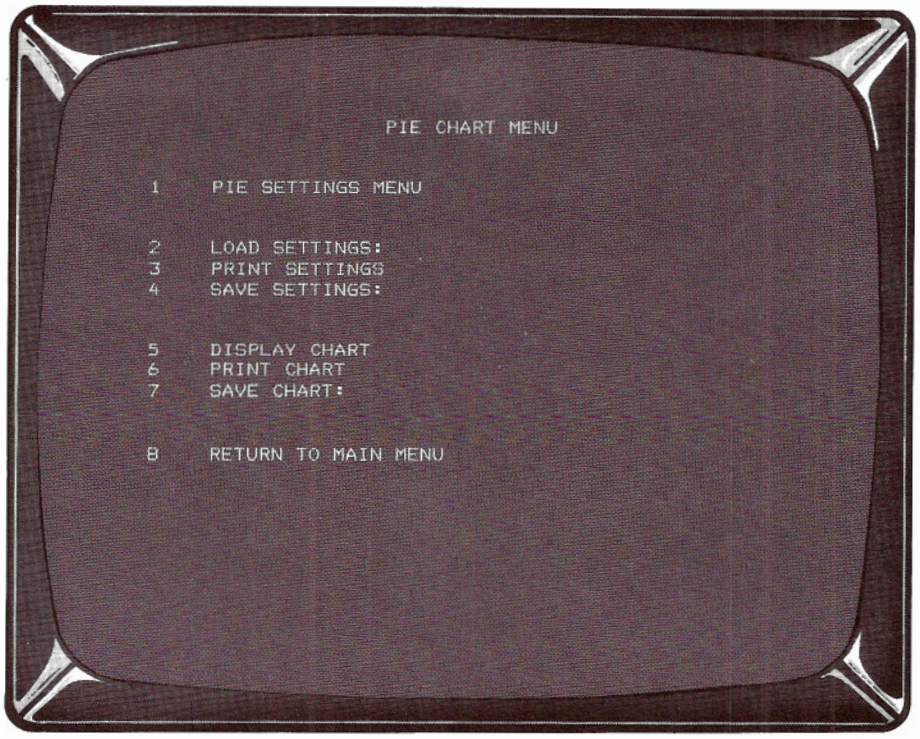


Figure 8-2: Elements of a Pie Chart.

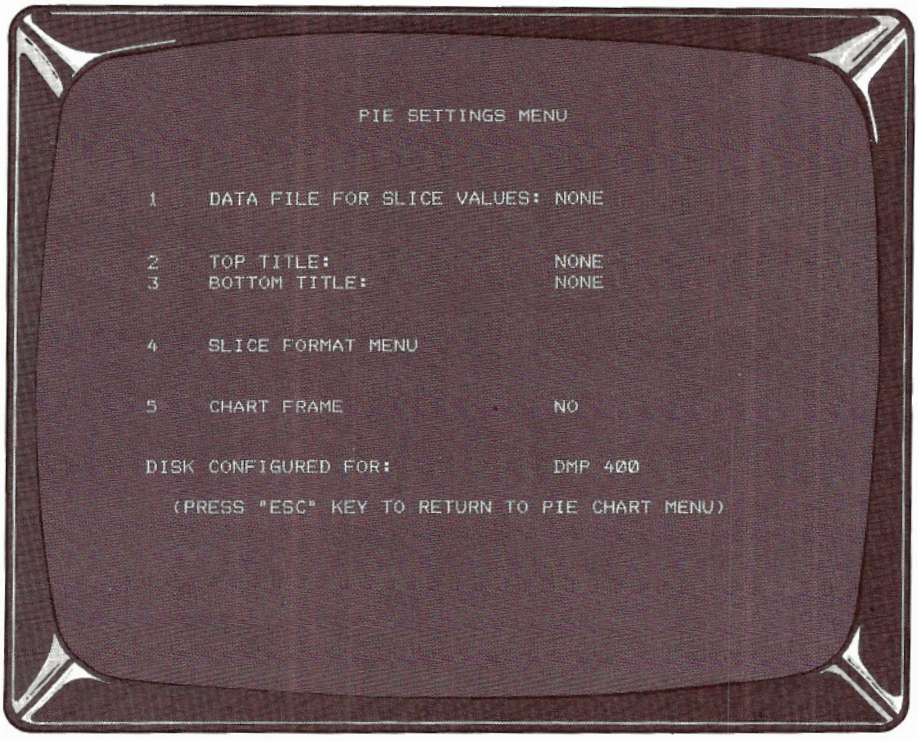
To access the Pie Chart Menu, choose Main Menu Selection 4, "Pie Chart Menu." The following screen is displayed:



The chart and chart settings you create or change through the Pie Chart Menu affect only the data currently in the computer's memory. If you do not save the settings or the chart, both are lost when you return to the Main Menu.

CREATING PIE CHART SETTINGS

Pie chart settings are all the information, other than data values, required to create a chart. To create these settings, choose Pie Chart Menu Selection 1, "Pie Settings Menu." The following screen is displayed:



If your screen shows that the diskette is configured for an output device other than the one you intend to use, refer to Chapter 4, "Output Devices and Screen Displays."

Data and Format Settings

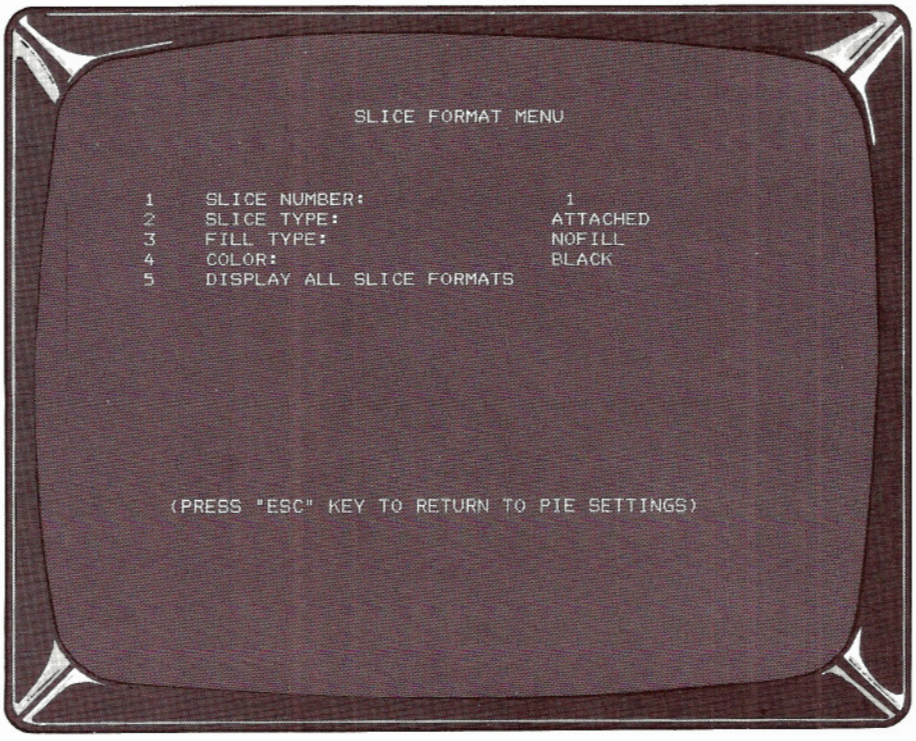
Data File

A pie chart is based on data from one file. The file can contain from 2 to 12 data values, each of which must be greater than zero. If one of the data values is small in proportion to the other values, the corresponding slice might not be visible, particularly on a low-resolution printer or screen.

To enter the name of the file, choose Pie Settings Menu Selection 1, "Data File For Slice Values," type the name of the file, and press (ENTER).

Slice Formats

Use Pie Settings Menu Selection 4, "Slice Format Menu," to specify the format of each slice and to display all the slice formats. The Slice Format Menu (with default settings for Slice 1) is shown below.



Slice Number is the number identifying each slice. The first slice begins at the three o'clock position. The slices move counterclockwise around the chart in the sequence in which the values occur in the file. Enter the sequence number of any value in your data. The settings now pertain to that slice.

Slice Type indicates whether the slice is attached or detached. Attached is the default setting. Attached slices are separated from each other by a line. Detached slices are moved away slightly from the rest of the pie. Use a detached slice to emphasize a single data value. (For best results, do not detach a small slice — a slice representing about one percent of the entire pie — unless the adjacent slices are also detached.)

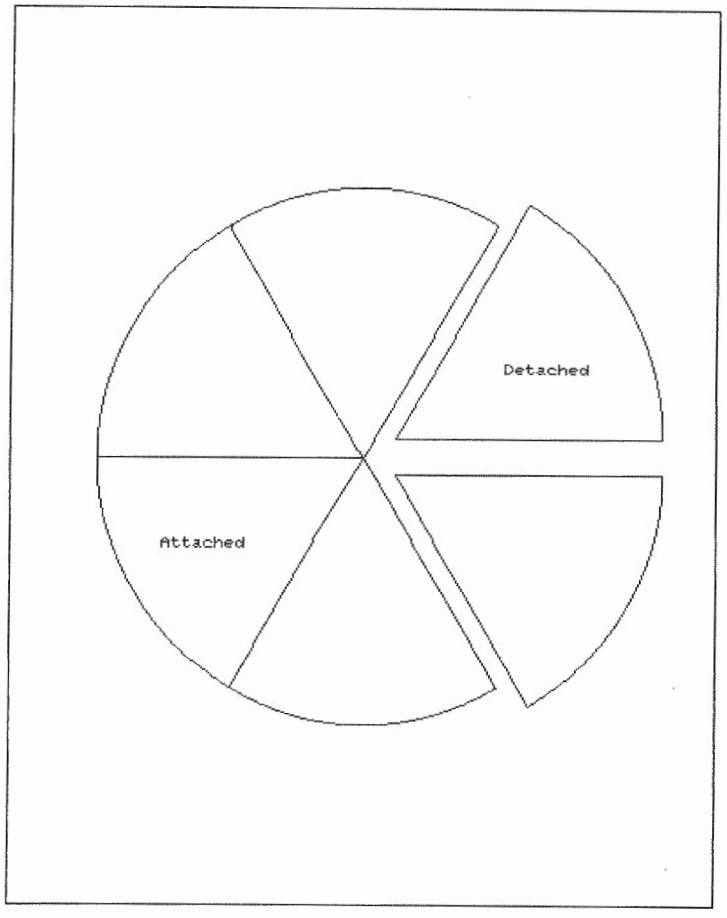


Figure 8-3: Slice Types.

Fill Type is the type of shading inside the slice. Use fill types to emphasize or group one or more slices. (For best results, do not fill a small slice — a slice representing about one percent of the entire pie.) You can choose from at least three fill types:

```
1    NOFILL
2    LIGHT
3    DARK
```

If you have a high-resolution printer, you can choose from three additional fill types:

```
4    VERT
5    HORZ
6    CHECK
```

The default setting is nofill (no shading). The line between contiguous shaded slices might not be detachable on the screen, but the slices are

clearly delineated on printer or plotter output. Light, horizontal, vertical, and checkered fills look the same on the low-resolution screen. Fill types are illustrated in Figure 8-4.

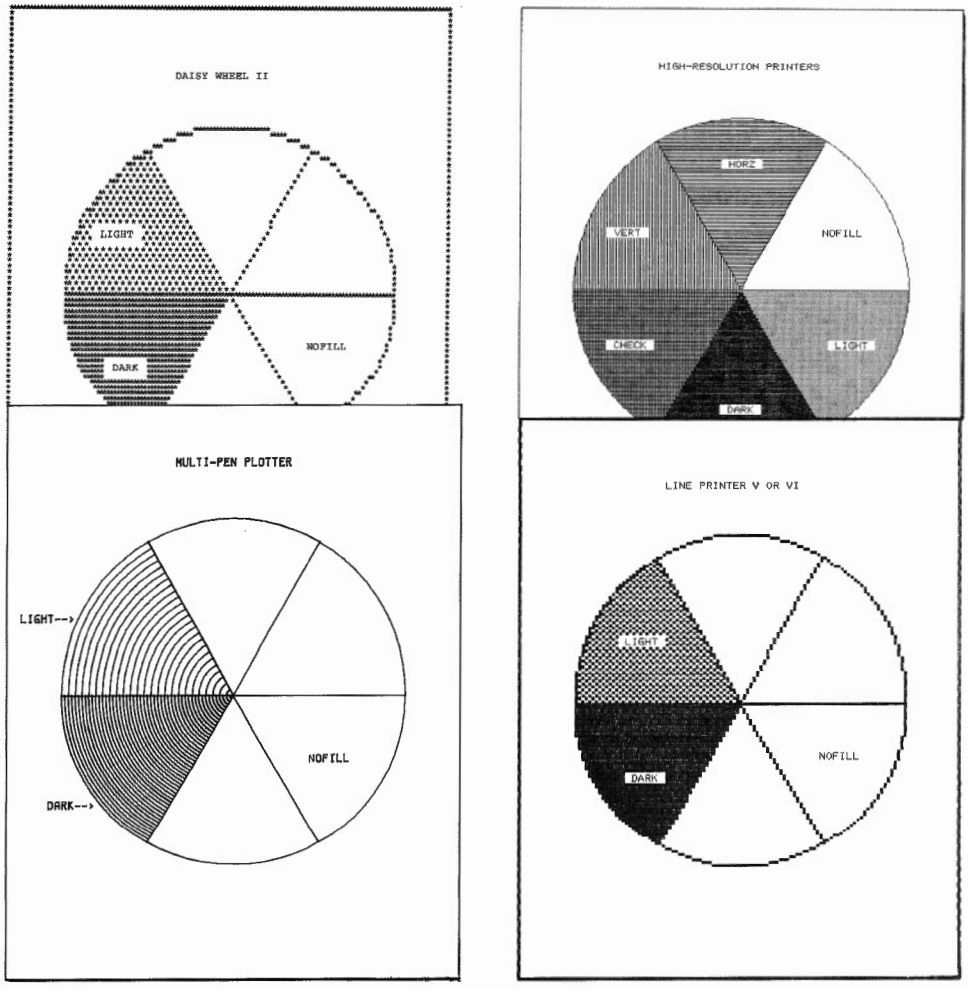


Figure 8-4: Slice Shading.

Color refers to the pen stall used on color output devices:

1	BLACK	4	GREEN
2	RED	5	VIOLET
3	BLUE	6	ORANGE

If you do not specify a color, the pen in Stall 1 is used. The correct pen must be in the appropriate stall for the chart to be drawn in the color you intend.

Display All Slice Formats allows you to display the current format settings for the 12 possible slices. (If your data file contains less than 12 values, not all the settings are used.) Choose Slice Format Menu Selection 5, "Display All Slice Formats."

Text Settings

Labels

To label individual pie slices, save the pie chart on a diskette and add the labels through the Chart Text Editor Menu.

Titles

Through the Pie Settings Menu, you can create two titles for your pie chart:

- A top title centered at the top of the chart
- A bottom title centered at the bottom of the chart

To create a title, choose the appropriate selection (2 or 3) from the Pie Settings Menu.

Title is the text that will appear in one of the two areas described above. Type the type (up to 50 characters) and press (ENTER).

If you make an error while typing a title, backspace and erase the incorrect characters with (BACK SPACE) or (←). To delete a title after pressing (ENTER), choose the title selection again and type **NONE** (ENTER).

Color refers to the pen stall on color output devices used to draw the title:

1	BLACK	4	GREEN
2	RED	5	VIOLET
3	BLUE	6	ORANGE

If you don't specify a color, the pen in Stall 1 is used. The correct pen must be in the appropriate stall for the title to be drawn in the color you intend.

Character Size/Spacing lets you enlarge titles. The default setting is NORMAL. DOUBLE inserts a space between the characters of the title on printers and on the screen and causes the Multi-Pen Plotter to draw the characters of the title twice as large as normal. Do not choose DOUBLE for a title that is longer than 32 characters.

Chart Frame

Selection 5 of the Pie Settings Menu, "Chart Frame," determines whether a box is drawn around your pie chart to frame it. The default setting is NO — no frame is drawn. To frame the chart, type **YES** (ENTER).

SAVING, PRINTING, AND LOADING PIE CHART SETTINGS

If you plan to print charts that have something in common — the data file or slice formats, for example — save time by saving the chart settings (created with Pie Chart Menu Selection 1). When you are ready to create a similar chart, update or create the data file (if necessary), load the saved settings, make whatever changes are necessary, and then print the new chart. You can also print a copy of the current settings on your printer.

Saving Pie Chart Settings

Use Pie Chart Menu Selection 4, "Save Settings," to save the current pie chart settings in a file on a diskette. Type a valid file specification (see "File Specifications" in Chapter 5) and press (ENTER). If you decide not to save the settings, press (ESC) instead of (ENTER).

The settings remain in memory even after they are written to the diskette. They are erased only when you return to the Main Menu or enter different settings.

Printing Pie Chart Settings

Use Pie Chart Menu Selection 3, "Print Settings," to print the current settings on your printer. Settings cannot be printed on the plotter.

After selecting "Print Settings," position the paper and turn on your printer. When the printer is ready, press (ENTER) to begin the printing.

Loading Pie Chart Settings

To use settings that you previously saved in a file on a diskette, use Pie Chart Selection 2, "Load Settings." After selecting "Load Settings," type the name assigned to the settings file (the settings must be for pie charts) and press (ENTER).

If you change the settings, only the version in the computer's memory is affected. Unless you save the changed settings, they are erased when you return to the Main Menu.

DISPLAYING, PRINTING, AND SAVING PIE CHARTS

Displaying Pie Charts

To display on the screen a pie chart based on the current settings, choose Pie Chart Menu Selection 5, "Display Chart." Several seconds elapse while the chart is prepared for display. To return to the Pie Chart Menu, press (ENTER) or (ESC).

Printing Pie Charts

To print a pie chart based on the current settings, choose Pie Chart Menu Selection 6, "Print Chart." Several seconds elapse while the chart is prepared for printing. Position the paper and turn on your output device. When the output device is ready, press (ENTER).

To print another copy of the chart, press (ENTER) again after the chart is produced. To return to the Pie Chart Menu, press (ESC).

To stop printing, press (ESC); printing stops within a few lines. This does not stop the plotter, because the buffer usually contains the instructions for the entire chart.

Warning: If you turn the Multi-Pen Plotter off before the chart is finished, make sure that the pen being used is in its stall before you turn the plotter back on. Failure to do this might damage the plotter.

Saving Pie Charts

To save the pie chart formed by the current settings, choose Pie Chart Menu Selection 7, "Save Chart." Type the chart's file specification (see "File Specifications" in Chapter 5) and press (ENTER). To cancel the save function, press (ESC) instead of (ENTER).

The save process takes several seconds. When the chart has been written to the diskette, SAVE CHART starts flashing.

Scatter charts (sometimes called X-Y plots) show relationships between sets of data. Use scatter charts to reveal cause-and-effect relationships, or to demonstrate that no such relationships exist. You can also use scatter charts to plot data with different or irregular time intervals, or to create designs or logos.

Each data point in a scatter chart represents the intersection of two values: one measured against the horizontal scale (the X-axis) and the other measured against the vertical scale (the Y-axis).

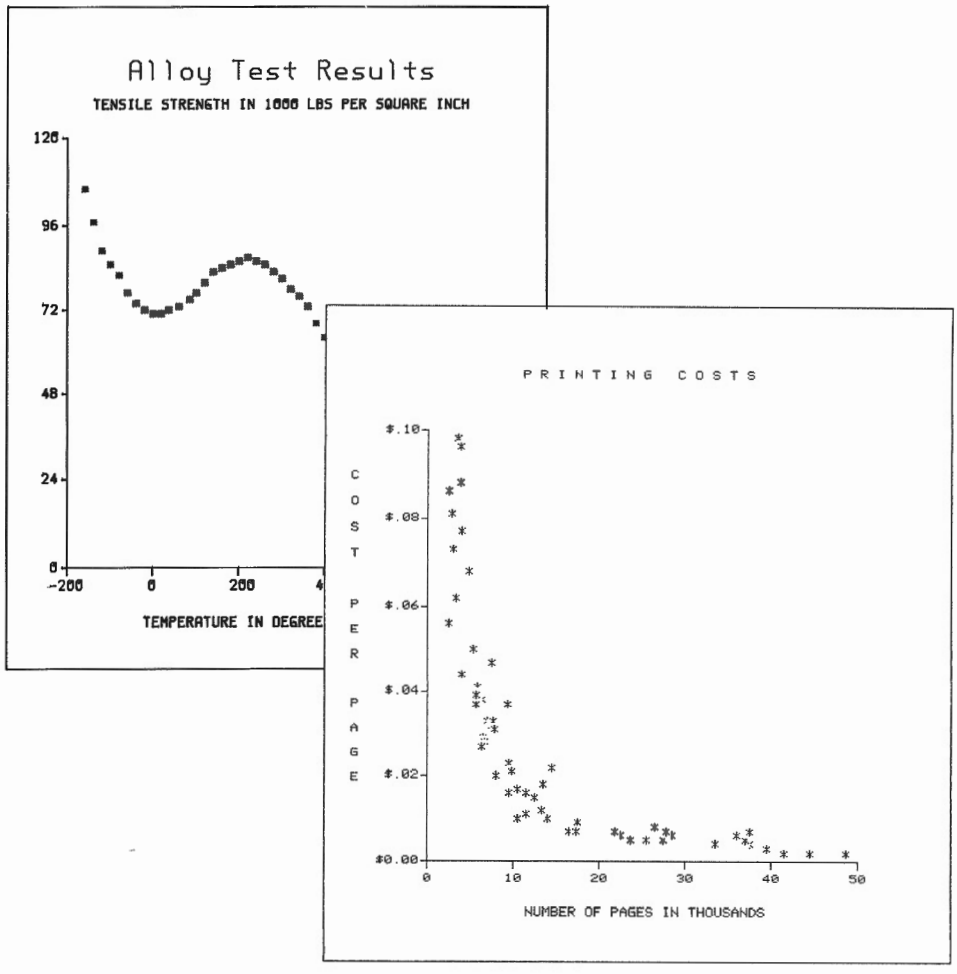


Figure 9-1: Scatter Charts.

Scatter charts that you create with Business Graphics can plot up to three sets of data. A set of data consists of up to 100 pairs of values obtained from two files.

The values in the first file in a set determine the vertical position of the points, and the values in the second file determine the horizontal position of the points. If the data values for the horizontal axis are all in low-to-high sequence, the chart will resemble a line chart.

If a file contains more than 100 values, only the first 100 are used. If the values are plotted, even though the scale settings are based on all values read from the files.

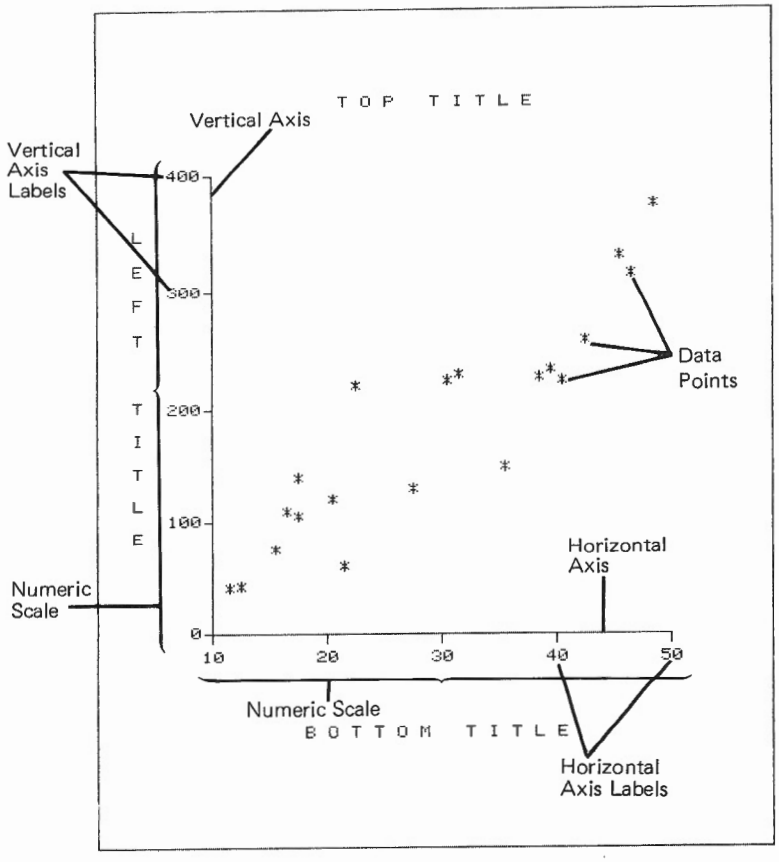
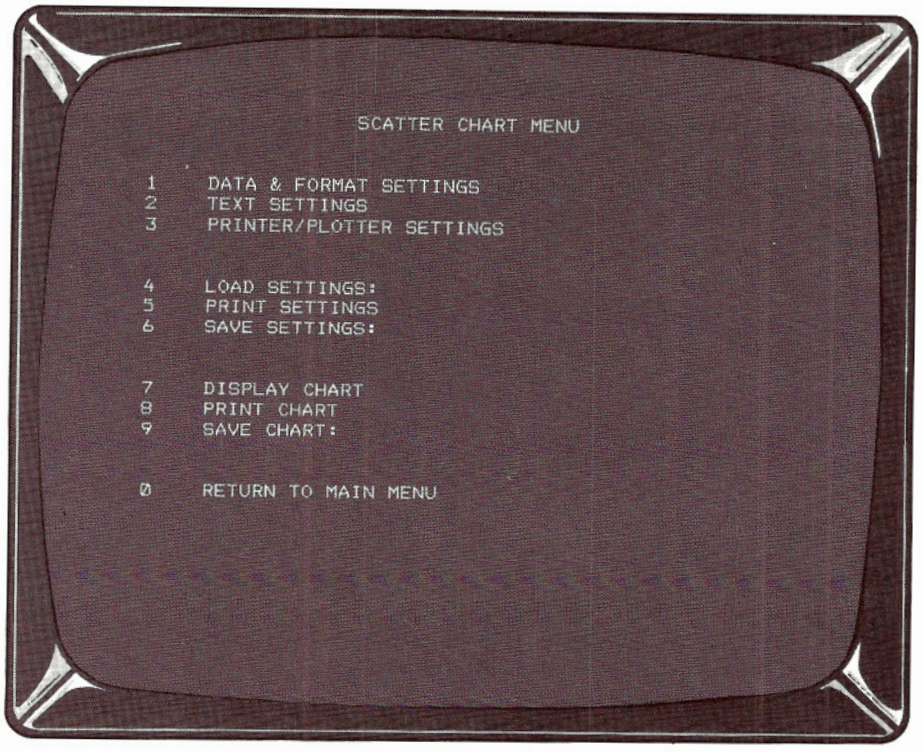


Figure 9-2: Elements of a Scatter Chart.

To access the Scatter Chart Menu, choose Main Menu Selection 5, "Scatter Chart Menu." The following screen appears:



The chart and chart settings you create or change through the Scatter Chart Menu affect only the data currently in the computer's memory. If you do not save the settings or the chart, both are lost when you return to the Main Menu.

CREATING SCATTER CHART SETTINGS

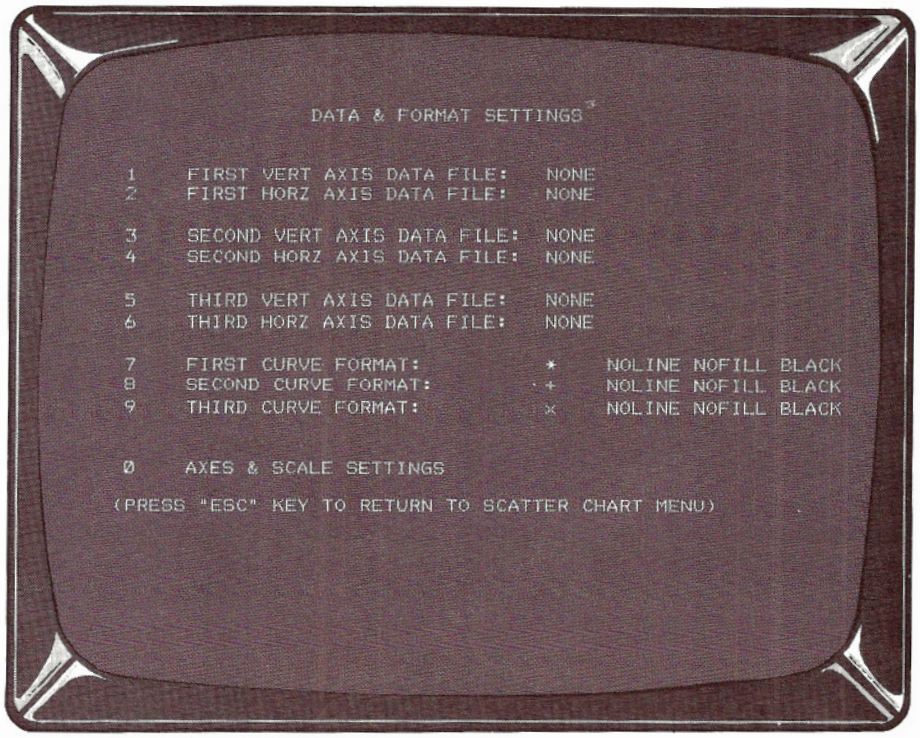
Scatter chart settings (data and format settings, text settings, and printer/plotter settings) are all the information, other than data values, required to create a scatter chart. You create these settings through Scatter Chart Menu Selection 1, 2, and 3.

Data and Format Settings

Use Scatter Chart Menu Selection 1, "Data & Format Settings," to:

- Load the data files that are the basis of your scatter chart
- Select the format of the curve(s) and any shading
- Enter the scales and dimensions of the chart

When you choose Selection 1, "Data & Format Settings," the following screen appears:



Data Files

You must provide at least two file specifications to produce a chart. To indicate which of your saved data files you wish to use for the vertical axis locations of the first (or only) curve, choose Selection 1, "First Vert Axis Data File." Type the name of the file and press (ENTER). Then choose Selection 2, "First Horz Axis Data file." Type the name of the file to be used for the horizontal axis locations of the first (or only) curve and press (ENTER).

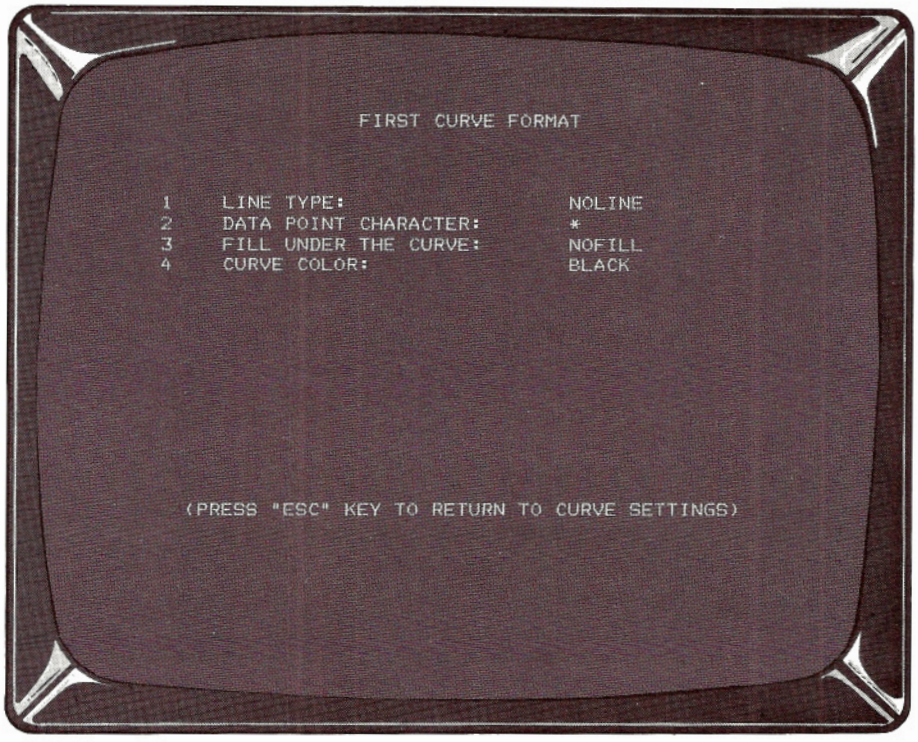
If the chart is based on more than one set of data files, enter two file specifications for Curve 2 (through Selections 3 and 4), and, if necessary, for Curve 3 (through Selections 5 and 6).

To delete a file specification, choose the appropriate selection (1 through 6) and type **NONE** (ENTER).

Curve Format

Use Data & Format Settings Menu Selections 7, 8, and 9 to control how the curves look. When you choose one of the selections, the Curve Format

Menu and default settings are displayed. The First Curve Format Menu is shown below:



Line Type specifies the type of line (if any) that is to connect the coordinate points. Select one of the following types for each curve:

1 SOLID
2 DASHED
3 DOTTED
4 NOLINE

Only the solid line type allows shading under the curve. The solid, dashed, and dotted line types are illustrated in Figure 9-3. The noline line type is illustrated in Figure 9-4.

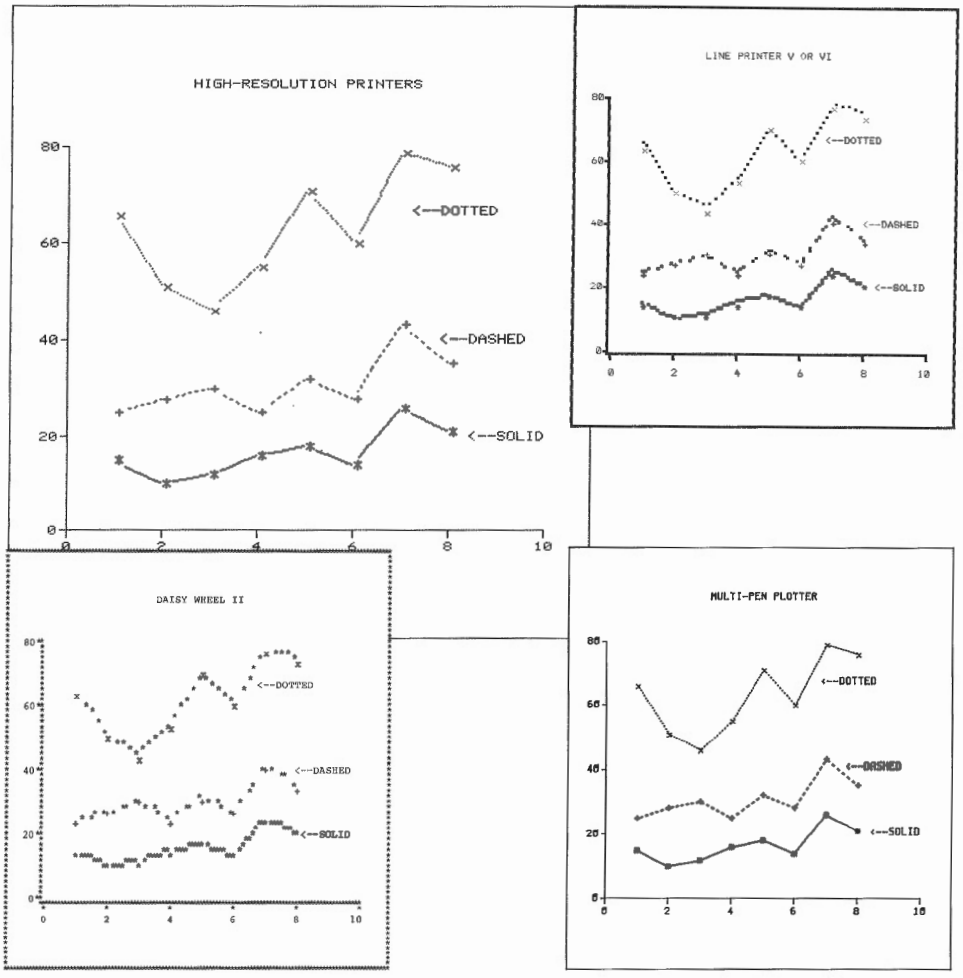


Figure 9-3: Solid, dashed, and dotted, line types.

Data Point Character is the symbol to be printed at each data point. You can enter any character. By default, * is the symbol for the first curve, + the symbol for the second curve, and x the symbol for the third curve. To mark the data points with the character used by the connecting line, type **AUTO** (ENTER). (AUTO data points can be placed more precisely on low-resolution printers than data points represented by a standard character. With high-resolution printers and plotters, all data point characters are placed accurately.) AUTO is selected automatically if the curve is shaded.

Fill Under the Curve is the appearance of the area between the curve and the horizontal axis. You can choose from at least three fill types:

```
1    NOFILL
2    LIGHT
3    DARK
```

If you have a high-resolution printer, you can choose from three additional fill types:

4 VERT
5 HORZ
6 CHECK

Light, horizontal, vertical, and checkered fills look the same on the low resolution screen. Nofill is the default setting. Fill types are illustrated in Figure 9-4. Two conditions must be met to fill under the curve:

- Values used for the horizontal data point locations must be in low-to-high sequence
- Line type must be SOLID

If the curve is shaded, any special data point character is changed to AUTO.

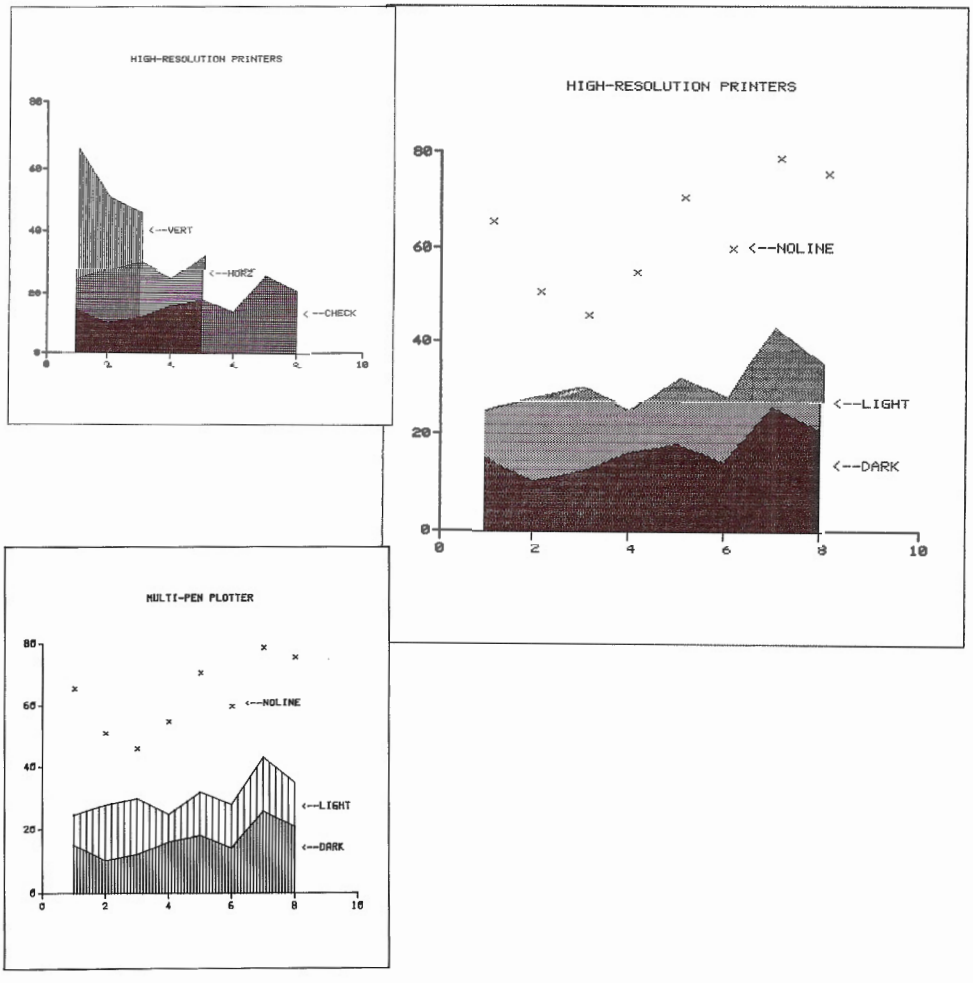


Figure 9-4: Fill Types and Noline Line Type.

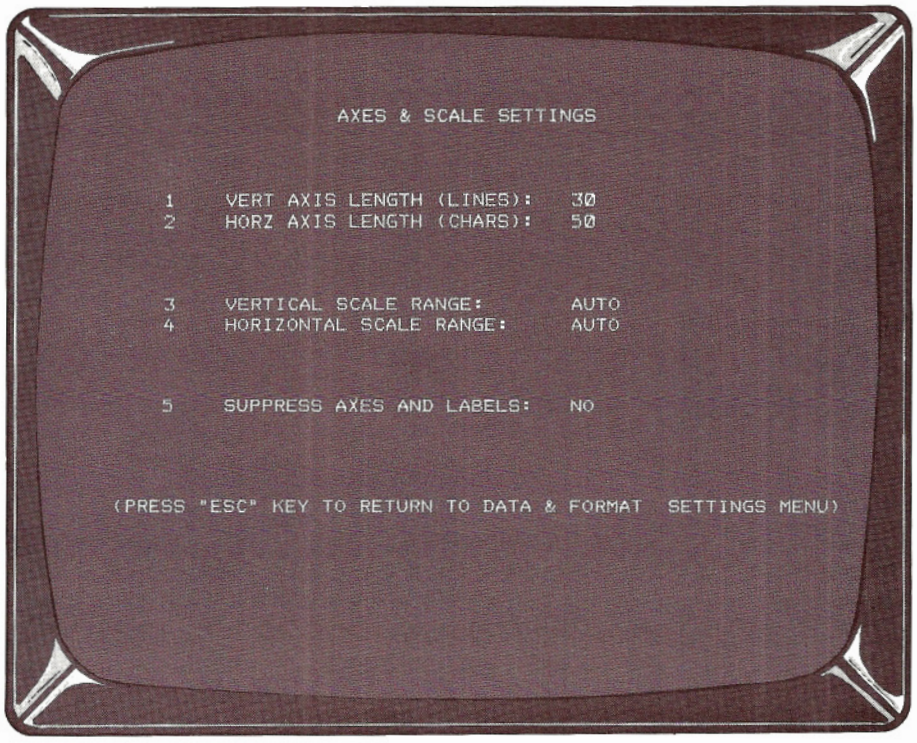
Curve Color refers to the pen stall to be used on color output devices:

1	BLACK	4	GREEN
2	RED	5	VIOLET
3	BLUE	6	ORANGE

If you do not specify a color, the pen in Stall 1 is used. The correct pen must be in the appropriate stall for the chart to be drawn in the color you intend.

Axes and Scale Settings

Selection 0 on the Data & Format Settings Menu displays the following screen:



This menu lets you specify the length of the horizontal and vertical axes and the range of the numeric scales. You can also indicate whether you want the axis borders and labels to appear.

In most cases, you can either allow the program to select the axes and scale settings for you, or you can specify one or more of these items. You must specify the scale range if all the data values along that axis are nearly the same. Any time you specify your own settings, be aware that no chart can be generated if any data values read from the files (whether or not the values are plotted) are outside the specified ranges.

The program determines the numeric labels that appear on the vertical and horizontal axes from the axis lengths and the scale ranges. If you do not specify the range, the program computes a range that incorporates all your values and produces reasonable scale labels. If you specify the range, the program simply divides the range by the number of intervals, rounding off the labels if necessary.

Vert Axis Length (Lines) specifies the height of the space in which the curves are drawn. Together with the vertical scale range, it also determines the numeric labels on the vertical axis.

The default setting is 30 lines (5"). If you prefer, you may enter any multiple of 6 from 18 to 48 (from 18 to 36 with the Multi-Pen Plotter in horizontal format). Numeric labels are printed on every sixth line, marking off from three to eight intervals on the numeric scale.

Horz Axis Length (Characters) specifies the width of the space in which the curve is drawn. Together with the horizontal scale range, it also determines the numeric labels on the horizontal axis.

The default setting is 50 character positions (5"). You may enter any multiple of 10, ranging from 20 to 100 for a wide-carriage printer, from 20 to 70 for a narrow-carriage printer, from 20 to 80 for the Multi-Pen Plotter with horizontal format, and from 20 to 60 for the Multi-Pen Plotter with vertical format.

Numeric labels are printed at every tenth character position, marking off from 2 to 10 intervals on the numeric scale.

Vertical Scale Range specifies the lower and upper limits for the numeric scale along the vertical axis. Together with the vertical axis length, the vertical scale range determines the numeric labels on the vertical axis.

The default setting, AUTO, causes the program to compute a range based on the data in your files. If you prefer to specify a range, type the lower limit of the scale, a blank or comma, and the upper limit, and press (ENTER). Make sure that all the data values fall within the specified range. If you wish to restore automatic scaling, type **AUTO** (ENTER).

For best results, the range should divide evenly by the number of intervals. For example, if the vertical axis length is 30, there are 5 intervals. (Each interval consists of 6 lines.) The vertical scale range should be divisible by 5.

Horizontal Scale Range specifies the lower and upper limits of the numeric scale along the horizontal axis. Together with the horizontal axis length, the horizontal scale range determines the numeric labels on the horizontal axis.

The default setting, AUTO, causes the program to compute a range based on the data in your files. If you prefer to specify a range, type the lower limit of the scale, a blank or comma, and the upper limit, and press (ENTER). Make sure that all the data values fall within the specified range. If you wish to restore automatic scaling, type **AUTO** (ENTER).

For best scale results, the horizontal scale range should divide evenly by the number of intervals on the horizontal axis. For example, if the horizontal axis length is 40, there are 4 intervals. (Each interval consists of 10 character positions.) The horizontal scale range should be divisible by 4.

Suppress Axes and Labels lets you suppress the axis borders and scale labels. The default setting, NO, causes the borders and labels to be displayed and printed.

If you prefer to display or print your chart without borders and labels, choose Axes & Scale Settings Menu Selection 5, "Suppress Axes and Labels." Then type **YES** (ENTER). This can be useful if you are connecting data points to create a picture, such as the flower shown in Figure 9-5, rather than displaying data.

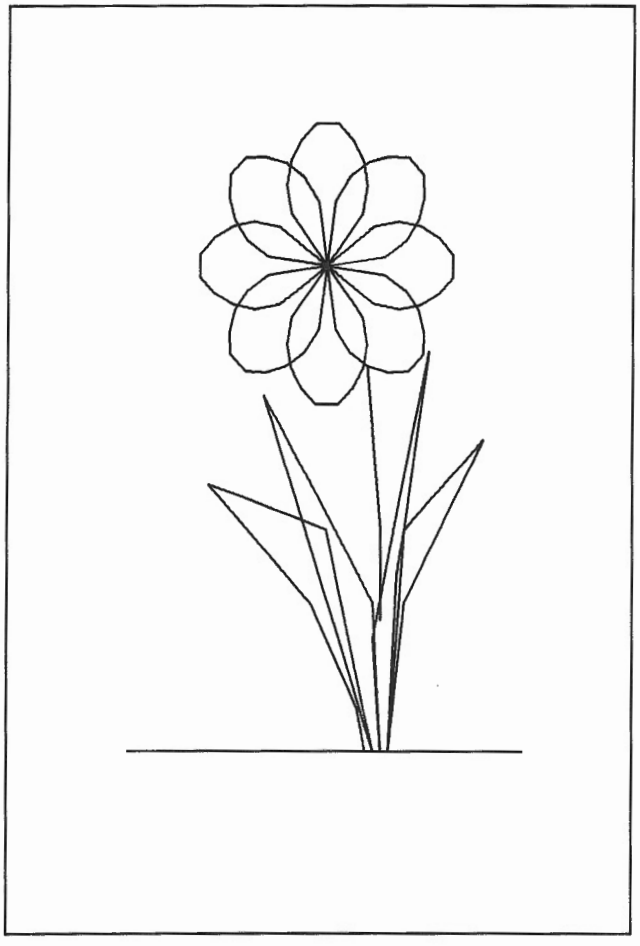
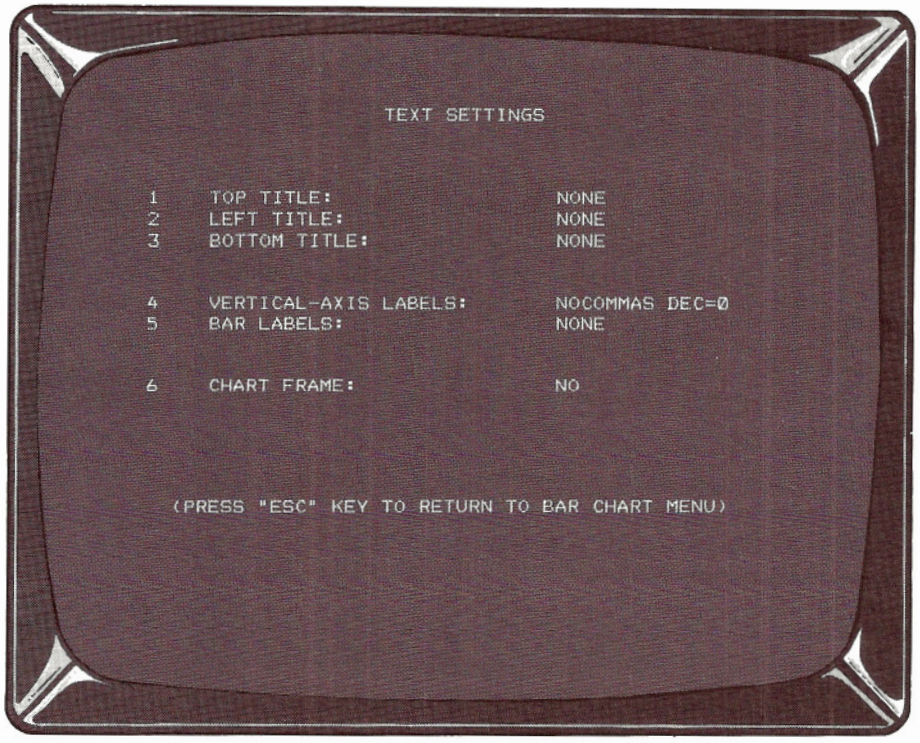


Figure 9-5: Connecting Data Points to Create a Picture.

Text Settings

Use Scatter Chart Menu Selection 2, "Text Settings," to create titles, control the labels of the axes, and request a frame for the scatter chart. The Text Settings Menu and the default settings are shown below:



Titles

Through the Text Settings Menu, you can create up to three titles:

- A top title which is centered at the top of the chart
- A left title which is centered and printed vertically to the left of the vertical axis, using 2 lines per character
- A bottom title which is centered below the horizontal axis.

To create a title, choose the appropriate selection (1, 2, or 3) from the Text Settings Menu.

Title is the text that will appear in one of the three areas just described. Type the title and press (ENTER). Top and bottom titles can contain up to 50 characters, but cannot exceed the chart width. Left titles can contain up to 25 characters, but cannot exceed the length of the vertical axis. If you enter a title that is too long, the characters at the end of the title are lost.

If you make an error while typing a title, backspace and erase the incorrect characters with (BACK SPACE) or (←). To delete a title after pressing (ENTER), choose the title selection again and type **NONE** (ENTER).

Color refers to the pen stall on color output devices used to draw the title:

1	BLACK	4	GREEN
2	RED	5	VIOLET
3	BLUE	6	ORANGE

If you do not specify a color, the pen in Stall 1 is used. The correct pen must be in the appropriate stall for the chart to be drawn in the color you intend.

Character Size/Spacing lets you enlarge top and bottom titles. The default setting is NORMAL. DOUBLE inserts a space between the characters of the title when the chart is produced on a printer or on a screen, and causes the Multi-Pen Plotter to draw the characters of the title twice as large as normal. Don't select DOUBLE for a title longer than 32 characters.

Axis Labels

Use Selections 4 and 5 of the Text Settings Menu to indicate the format of the vertical and horizontal axis labels. The scale labels are printed to the left of the vertical axis and below the horizontal axis. The following settings are available.

Commas Inserted lets you insert commas in values of 1000 or more. NO is the default setting. To insert commas, type **YES** (ENTER).

Number of Decimal Places specifies the number of digits to be printed to the right of the decimal point. The default setting is 0 (no decimals). If you want the axis labels to contain decimal numbers, enter the number of digits to be printed to the right of the decimal point (1 or 2).

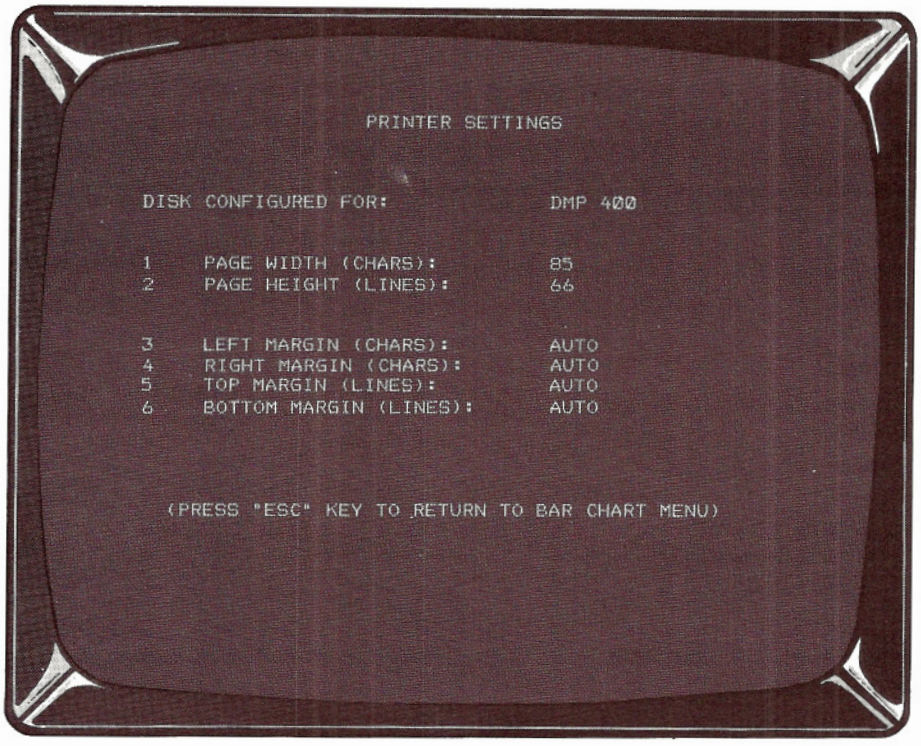
Leading Character is a character to be printed immediately to the left of the axis label. NONE is the default setting. You can enter any one character, such as a dollar sign.

Chart Frame

Selection 6 on the Text Settings Menu, "Chart Frame," determines whether a box is drawn around your scatter chart to frame it. The default setting is NO — no frame is drawn. To frame the chart, type **YES** (ENTER).

Printer/Plotter Settings

Before printing a scatter chart, check the diskette/printer configuration and the current page size and margin settings. To do this, choose Scatter Chart Menu Selection 3, "Printer/Plotter Settings." The following screen (showing the default settings) is displayed:



If your screen shows that the diskette is configured for an output device other than the one you intend to use, refer to Chapter 4, "Output Devices and Screen Displays."

Page Size

You can adjust the page size for a scatter chart, but you cannot set the page height or width higher than the maximum for the printer or plotter you are using. The maximum, minimum, and default settings for each output device are listed in Chart 9-1.

Page Width (Chars) is the width of the page on which the chart is to be produced.

Page Height (Lines) is the height of the page on which the chart is to be produced. Reducing the height causes the chart to be placed lower on the page.

Margins

Business Graphics automatically adjusts margins so that charts are centered on the page. If you prefer to set your own margins, refer to Chart 9-1.

If you specify both margins in a set (both left and right margins, or both top and bottom margins), the chart is centered between the margins. If

you specify only one margin in a set, the chart is placed against that margin. The chart must fit within whatever margins you specify.

	Wide-Carriage Printers	Narrow-Carriage Printers	Multi-Pen Plotter	
			Vertical	Horizontal
Width (Chars)				
default	85	80	67	87
minimum	35	35	35	35
maximum	110	80	67	87
Height (Lines)				
default	66	66	52	40
minimum	30	30	30	30
maximum	66	66	52	40
Margins				
default	AUTO	AUTO	AUTO	AUTO
maximum range				
left/right (chars)	0-80	0-55	0-40	0-60
top/bottom (lines)	0-40	0-40	0-30	0-18

Chart 9-1: Minimum, Maximum, and Default Settings for Page Width, Height, and Margins.

SAVING, PRINTING, AND LOADING SCATTER CHART SETTINGS

If you plan to print charts that have something in common — data files, margins, or curve formats, for example — save time by saving the chart settings you created through Scatter Chart Menu Selections 1, 2, and 3. When you are ready to create a similar chart, update or create the data files (if necessary), load the saved settings, make whatever changes are necessary, and print the new chart. You can also print a copy of the current settings on your printer.

Saving Scatter Chart Settings

Use Scatter Chart Menu Selection 6, "Save Settings," to save the current data and format settings, text settings, and printer settings in a file on a diskette. Type a valid file specification (see "File Specifications" in Chapter 5) and press (ENTER). If you decide not to save the settings, press (ESC) instead of (ENTER).

The settings remain in memory even after they are written to the diskette. They are erased only when you return to the Main Menu or enter different settings.

Printing Scatter Chart Settings

Use Scatter Chart Menu Selection 5, "Print Settings," to print the current settings on your printer. Settings cannot be printed on the plotter.

After selecting "Print Settings," position the paper and turn on your printer. When the printer is ready, press (ENTER) to begin printing.

Loading Scatter Chart Settings

To use settings that you previously saved in a file on a diskette, use Scatter Chart Selection 4, "Load Settings." After selecting "Load Settings," type the name assigned to the settings file (the settings must be for scatter charts) and press (ENTER).

If you change the settings, only the version in the computer's memory is affected. Unless you save the changed settings, they are erased when you return to the Main Menu.

DISPLAYING, PRINTING, AND SAVING SCATTER CHARTS

Displaying Scatter Charts

To display on the screen a scatter chart based on the current settings, choose Scatter Chart Menu Selection 7, "Display Chart." Several seconds elapse while the chart is prepared for display. To return to the Scatter Chart Menu, press (ENTER) or (ESC).

Printing Scatter Charts

To print a scatter chart based on the current settings, choose Scatter Chart Menu Selection 8, "Print Chart." Several seconds elapse while the chart is prepared for printing. Position the paper and turn on your output device. When the output device is ready, press (ENTER).

To print another copy of the chart, press (ENTER) again after the chart is produced. To return to the Scatter Chart Menu, press (ESC).

To stop printing, press (ESC); printing stops within a few lines. This does not stop the plotter, because the buffer usually contains the instructions for the entire chart.

Warning: If you turn the Multi-Pen Plotter off before the chart is finished, make sure that the pen being used is in its stall before you turn the plotter back on. Failure to do this might damage the plotter.

Saving Scatter Charts

To save the scatter chart formed by the current settings, choose Scatter Chart Menu Selection 9, "Save Chart." Type the chart's file specification (see "File Specifications" in Chapter 5) and press (ENTER). To cancel the save function, press (ESC) instead of (ENTER).

The save process takes several seconds. After the chart is written to the diskette, SAVE CHART begins flashing.

There's more to charts than bars, curves, and slices. Titles, labels, and notes can enhance and explain the data illustrated by a chart. You can create top and bottom titles and select specific labels through the chart menus. But to create your own labels or to change a chart title and then print or save the new chart, use the Chart Text Editor Menu. This menu lets you add, change, or move text anywhere in your chart while the picture is displayed. For example, you can:

- Add titles
- Supply special labels
- Insert notes in or around the picture
- Change or delete any of the text in the chart
- Move text freely about the chart

The Chart Text Editor Menu is also used to display or print any chart you have saved on a diskette.

ABOUT CHART TEXT

You can create or change only one label at a time.

If the text you enter or move overlaps part of the chart, that part of the chart is erased on the screen to provide a blank background for the lettering. (When entering text over shading, you can make the text easier to read by typing a blank space before and after the text.) If you later move or delete the text, the "hole" created by the blank background remains on the screen until the chart is saved and reloaded, but does not appear when the chart is printed.

Printers print the chart as it appears on the screen (including a blank background for any lettering). Multi-Pen Plotters draw lettering over the chart elements without leaving a blank background, so make sure the text will be legible where you insert it.

You cannot enter text that overlaps existing text.

Through the Chart Text Editor Menu, you can enter text as far as the cursor can move — up to 11" by 11". Be sure the text does not exceed the maximum page width of your printer or plotter (listed in chart sections). Any text that exceeds the maximum page size of the Multi-Pen Plotter is truncated. On a printer, overflow text continues on the next line and might disrupt the chart.

Each character cell on the low-resolution screen uses the space of two vertical lines, causing all horizontal text within the chart to be double-spaced. Characters are usually printed slightly higher than they appear on the low-resolution screen. On the Multi-Pen Plotter, program-supplied labels may be adjusted slightly for better alignment with the tick marks.

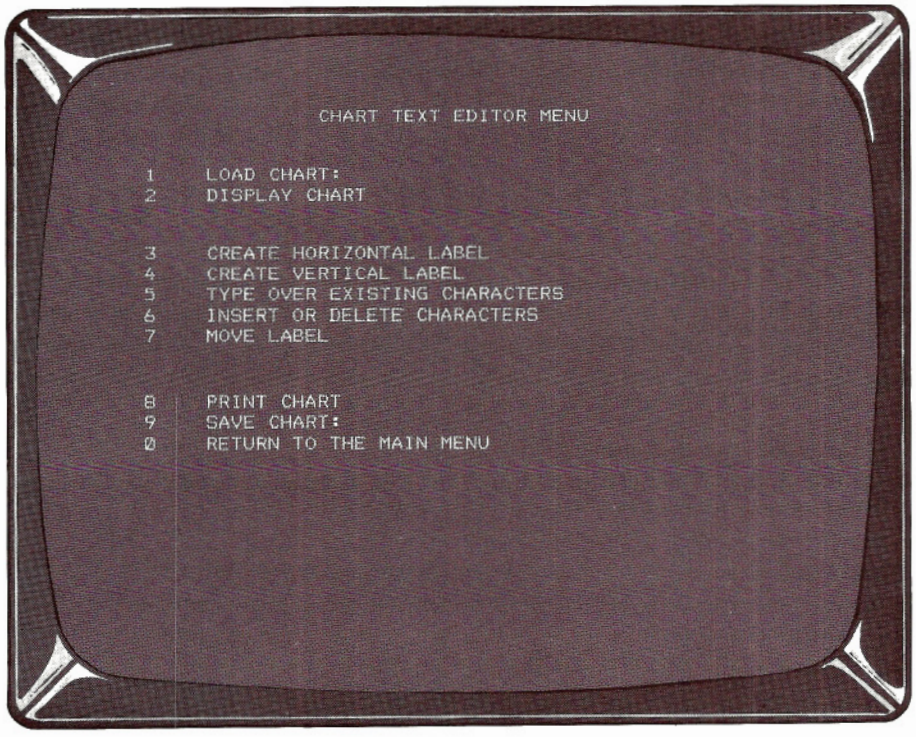
On the high-resolution screen, each character of horizontal text is represented by one box, and each character of vertical text by three boxes. On the Multi-Pen Plotter, text is placed just as it appears on the high-resolution screen. On high-resolution printers, horizontal placement is duplicated, but because of device variations, vertical text lines may be slightly elongated or shortened (the starting point of the text is preserved, but the end point may vary). On low-resolution printers, text placement can vary slightly in any direction.

If you are doing extensive editing, it is a good idea to save the chart periodically, preferably using a new name.

CREATING AND EDITING CHART TEXT

Getting Started

To access the Chart Text Editor Menu, choose Main Menu Selection 6, "Chart Text Editor Menu." The following screen is displayed:



Before you can create, change, or move text, you must first load a chart (recall the chart from a diskette file), display the chart, and position the cursor.

Loading Charts

To load a chart, choose Chart Text Editor Menu Selection 1, "Load Chart." Type the name of the file you want to load and press (ENTER). The load process takes a few seconds.

Displaying Charts

After loading a chart, choose Selection 2 on the Chart Text Editor Menu, "Display Chart." Always display the chart and position the cursor before selecting other menu options.

If you want to create new text, position the cursor where the text is to begin. If you want to change, delete, or move existing text, position the cursor anywhere on that line of text.

To return to the Chart Text Editor Menu when the chart is displayed, press (ENTER).

Creating Text

To insert horizontal or vertical lines of text on a previously created chart, display the chart and position the cursor where you want the text to begin. Press (ENTER) to return to the Chart Text Editor Menu and choose Selection 3, "Create Horizontal Label," or Selection 4, "Create Vertical Label."

If the chart was created for a plotter, choose one of the following pen stalls:

1	BLACK	4	GREEN
2	RED	5	VIOLET
3	BLUE	6	ORANGE

The correct pen must be in the appropriate stall for the text to be drawn in the color you intend.

When the chart is displayed, type the characters you want. The maximum length of a label is 64 characters. To correct any errors, use (↑) or (←) to back up over the characters, and retype the text. When you're finished typing, press (ENTER) to return to the Chart Text Editor Menu.

Changing Text

There are many ways to change the text on a chart. Always start by displaying the chart and positioning the cursor anywhere on the text you wish to change. Then you can type over the text (Chart Text Editor Menu Selection 5), insert or delete text (Selection 6), or add text to the end of a label, extending the label's length (Selection 5 or 6).

Typing Over Existing Characters

To type over existing text, choose Chart Text Editor Menu Selection 5, "Type Over Existing Characters." The chart is displayed again. Move the cursor (using ↑, ↓, ←, or →) to the first character you want to change. Type over the text currently displayed. If you wish, you can extend the length of the label.

After you make all the desired changes, make sure the new labels do not overlap other text. Press ENTER.

Inserting Characters

To insert characters into existing text, choose Chart Text Editor Menu Selection 6, "Insert or Delete Characters." The chart is displayed.

Move the cursor to the desired point — anywhere from the first character of the label to the position following the last character. Type the characters you want to insert. If you are not at the end of the text, the characters under and beyond the insertion move to the right in horizontal text or down in vertical text.

After you make all the desired changes, make sure the new label does not overlap existing text. Press ENTER.

Deleting Characters

To delete characters from existing text, choose Chart Text Editor Menu Selection 6, "Insert or Delete Characters." The chart is displayed.

Position the cursor on the (first) character you wish to delete. Press F2. Any characters following the deleted character move to the left in horizontal text or up in vertical text. By repeatedly pressing F2, you can delete all remaining characters in the label.

After you make all the desired changes, press ENTER.

Moving Text

To move text from one location on the chart to another, display the chart and position the cursor anywhere on the text to be moved. Then choose Chart Text Editor Menu Selection 7, "Move Label." The chart is displayed.

Press ↑, ↓, ←, or → to move the text. You can place the label anywhere — inside or outside the chart — as long as it does not overlap another label. The chart scrolls automatically if you reach the edge of the screen. When the text is where you want it, press ENTER.

PRINTING AND SAVING CHARTS

If you make a lot of changes to the text on a chart, save it periodically, under different names, so that you can go back to an earlier version if you wish. Use Chart Text Editor Selection 9, "Save Chart," to do this.

To print a chart you have already saved, load the chart (Chart Text Editor Menu Selection 1) and then use Selection 8, "Print Chart."

Printing Charts

To print a chart, choose Chart Text Editor Selection 8, "Print Chart." Several seconds elapse while the chart is prepared for printing. Position the paper and turn on the printer or plotter. When the output device is ready, press (ENTER).

To stop printing, press (ESC); printing stops within a few lines. This does not stop the plotter, because the buffer usually contains the instructions for the entire chart.

Warning: If you turn the Multi-Pen Plotter off before the chart is finished, make sure that the pen being used is in its stall before you turn the plotter back on. Failure to do this might damage the plotter.

Saving Charts

To save a chart in a diskette file, choose Chart Text Editor Menu Selection 9, "Save Chart." Type the chart's file specification (see "File Specifications" in Chapter 5) and press (ENTER). To cancel the save function, press (ESC) instead of (ENTER).

The save process takes several seconds. After the chart is written to the diskette, SAVE CHART begins flashing.

This section contains five exercises to familiarize you with Business Graphics. The exercises include procedures for creating a line chart, a bar chart, and a scatter chart (a sample session creating a pie chart is in Chapter 2); entering, recalling, generating, editing, and transforming data; creating and editing chart text; and adjusting the horizontal and vertical axis lengths for a different effect.

Start with the first exercise. Each exercise builds on the previous one, using previous data and/or chart settings, and adding new skills.

Be sure to use backup copies of the Processing and Setup Diskettes, rather than the originals. (See Appendix A for backup procedures.) Also, if your output device is not the DMP 400, reconfigure the diskettes before starting the exercises. (Chapter 4, "Output Devices and Screen Displays," explains how to reconfigure diskettes.)

If you make an error in typing, use (BACK SPACE) or (←) to backspace. Then type over the characters to make the necessary correction.

Sometimes when a chart is displayed on the low-resolution screen, only a portion of the chart is visible. To view the rest of the chart, move the cursor by pressing (←), (→), (↑), or (↓). When the cursor reaches the edge of the screen, the chart window scrolls automatically.

Session 1 begins at the point at which you turn on the computer; the other sessions begin at the Main Menu.

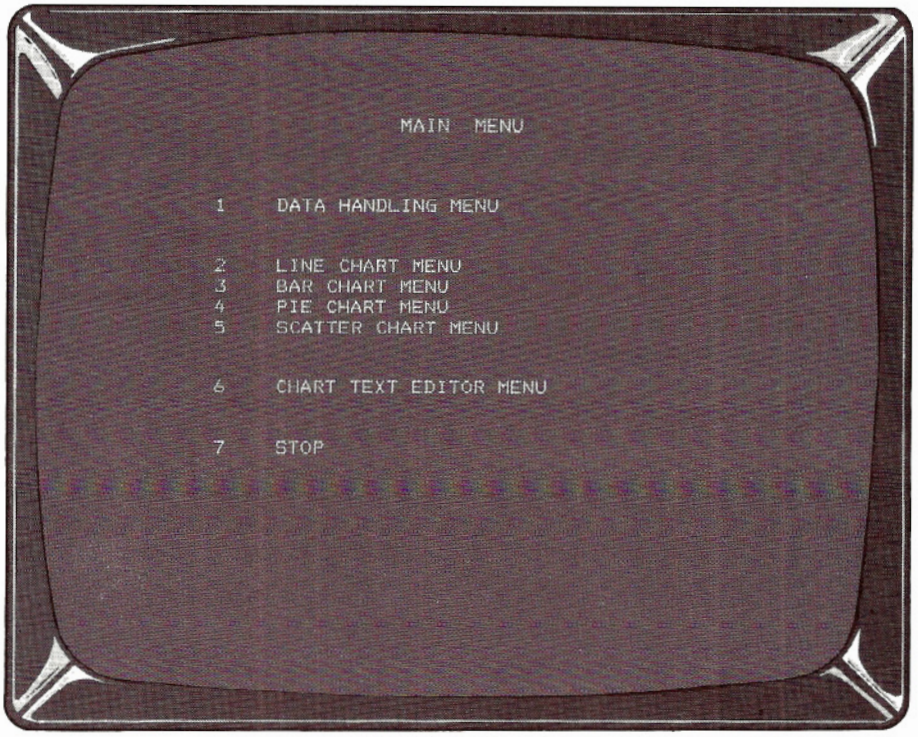
SESSION 1: CREATING A LINE CHART

This sample session steps you through the procedures for producing a line chart containing a single curve.

Turn on your computer system as instructed in your computer owner's manual. Insert a backup Processing Diskette into Drive 0.

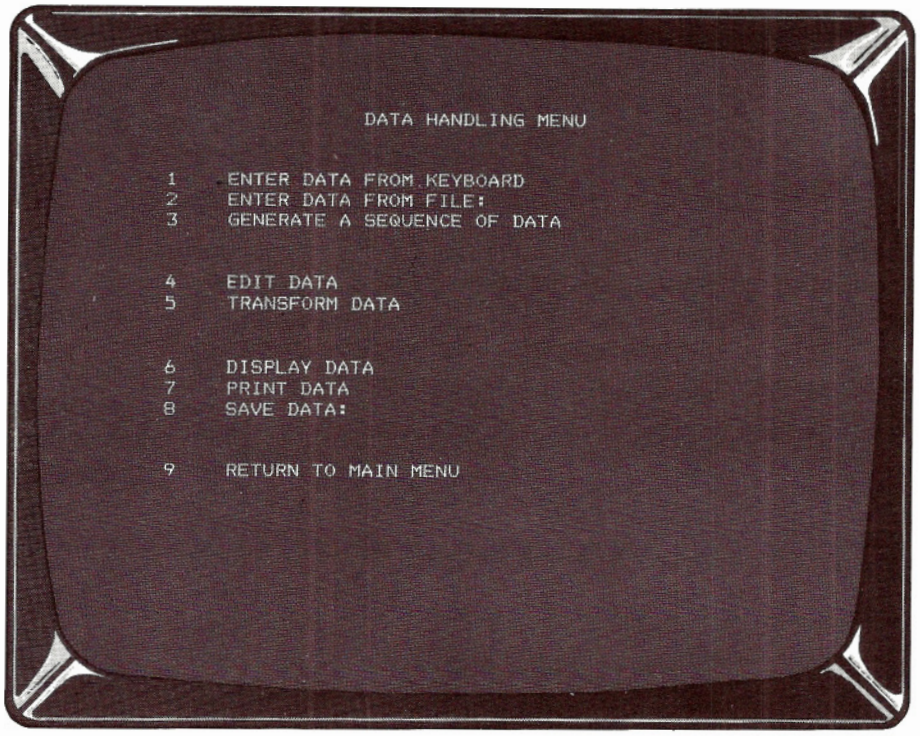
The screen shows:	**Your response:**
`Enter Date (MM/DD/YYYY)`	Enter today's date. For example, for December 27, 1983, type **12/27/1983** (ENTER).
`Enter Time (HH.MM.SS)`	Press (ENTER).
`TRSDOS READY`	Type **TRSCHART** (ENTER).

The Main Menu appears:



Generating a Sequence of Data

The first selection, "Data Handling Menu," is flashing. Press (ENTER) to choose it and display the Data Handling Menu:



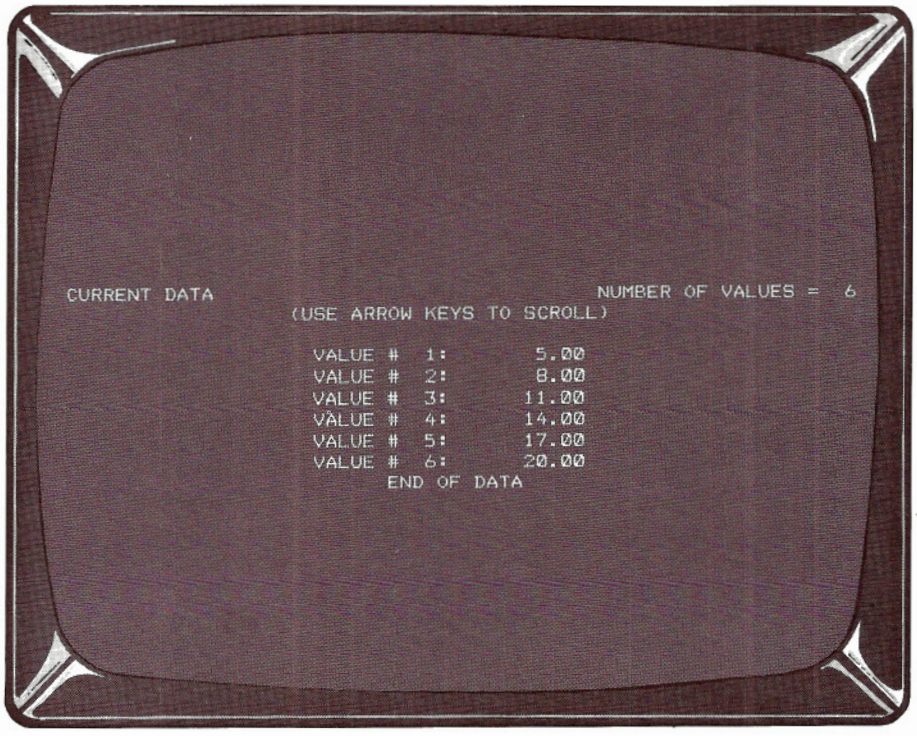
Press (↓) twice (or type **3**) until Selection 3, "Generate a Sequence of Data," is flashing. Press (ENTER). When the program asks you to choose a type of sequence, choose Selection 1, "Arithmetic."

The screen shows:	**Your response:**
INITIAL VALUE:	Type **5** (ENTER)
INCREMENT FOR ARITHMETIC SEQUENCE:	Type **3** (ENTER)
NUMBER OF VALUES TO BE GENERATED (MAX 100):	Type **6** (ENTER)

The Data Handling Menu reappears.

Displaying the Data

Display the data by pressing (ENTER) while Selection 6, "Display Data," is flashing. Your screen shows:



If your data is different, you must have made a typing error. Leave it for now. The next sample session explains how to edit and correct data. Remember that your chart won't look exactly like the sample chart for this session.

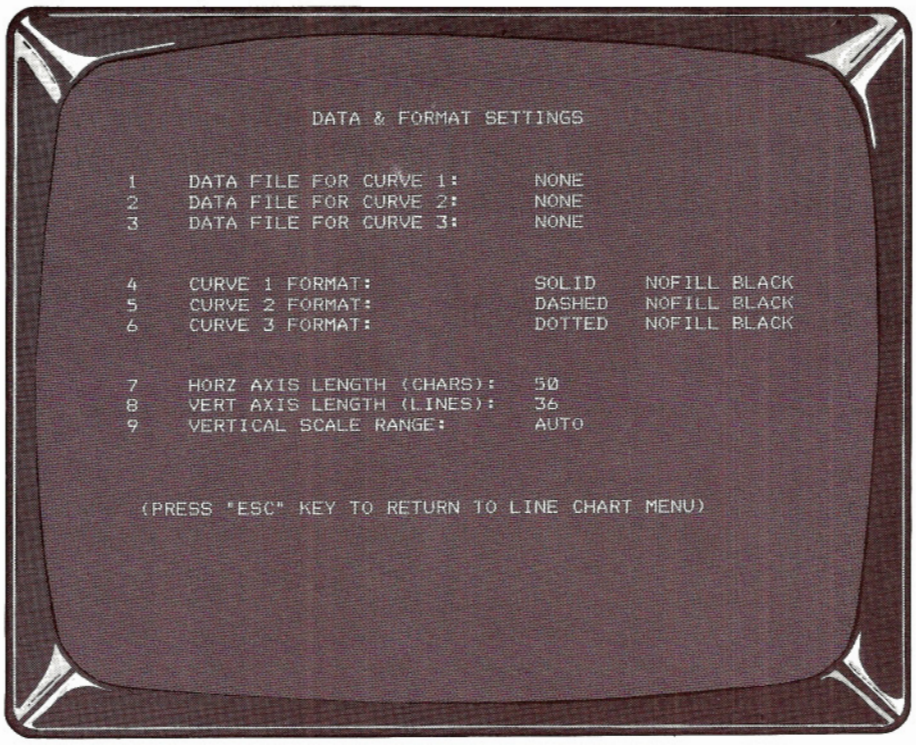
When you finish examining the data, press (ESC). The Data Handling Menu returns.

Saving Data in a File

Choose Selection 8, "Save Data." Type **SAMPLE1/DAT** (ENTER). The data is saved in a file named "SAMPLE1/DAT." When SAVE DATA begins to flash, the process is complete. Choose Selection 9, "Return to Main Menu."

Using a Data File to Create a Chart

Choose Main Menu Selection 2, "Line Chart Menu." Then choose Line Chart Menu Selection 1, "Data and Format Settings." The following screen appears:



To use the data file you just created to produce a line chart, choose Data & Format Settings Menu Selection 1, "Data File for Curve 1," and type **SAMPLE1/DAT** (ENTER). To return to the Line Chart Menu, press (ESC).

Displaying, Printing, and Saving the Chart

To display the chart, choose Line Chart Menu Selection 7, "Display Chart." Use (↑) to view the top of the chart (unless you have the high-resolution screen). When you finish examining the chart, return to the Line Chart Menu by pressing (ESC).

To print the chart, choose Line Chart Menu Selection 8, "Print Chart." Adjust the paper in your output device to the top of the page. If you are using a color output device, place a black pen in Stall 1. Make sure the output device is on-line and press (ENTER). The chart is printed. If you need to stop printing the chart for any reason, press (ESC). When the chart is printed, press (ESC) to return to the Line Chart Menu.

To save the chart, choose Line Chart Menu Selection 9, "Save Chart:". Type **SAMPLE1/LIN** (ENTER). The chart is saved in a file named SAMPLE1/LIN.

Type **0** (ENTER) to return to the Main Menu.

You can now either go to the next sample session or stop using the program. To stop using the program, choose Main Menu Selection 7,

"Stop." When TRSDOS READY appears, remove the diskette and turn off the computer system.

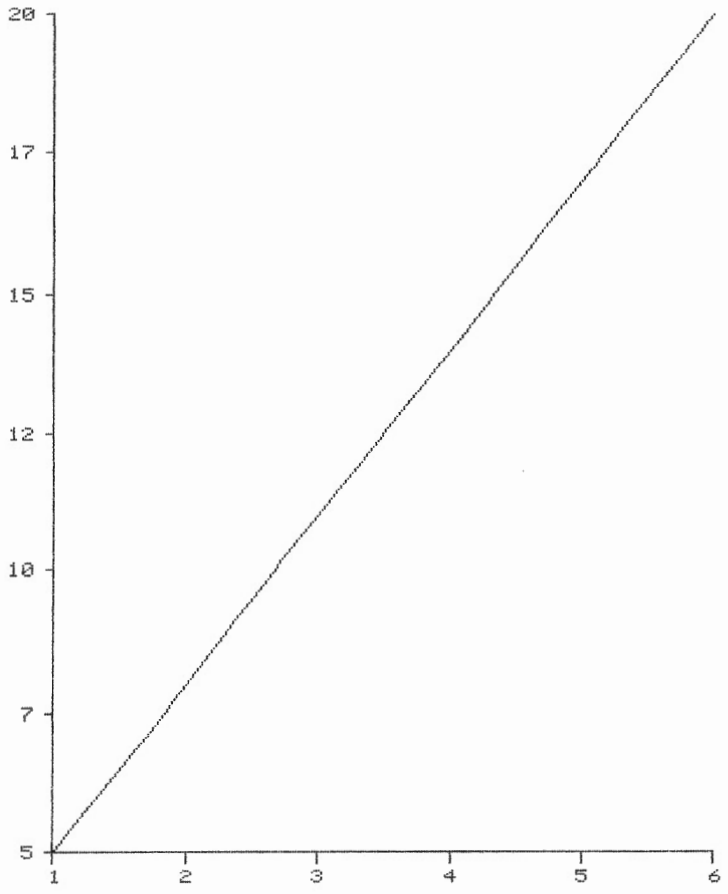


Figure 11-1: Chart Produced by Sample Session 1.

SESSION 2: EDITING AND TRANSFORMING DATA

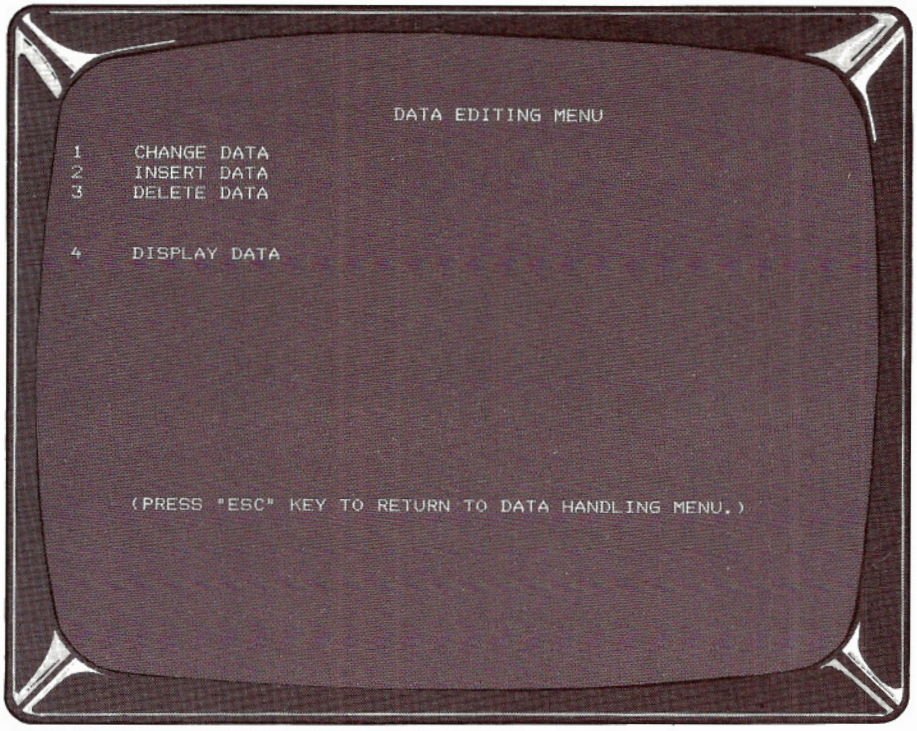
In this exercise, you will recall data from the data file you created in Session 1 (SAMPLE1/DAT), edit and save the data, and then transform the edited data and save it in another file.

Editing Data

First you will change the data values from Session 1 as follows:

	SAMPLE1/DAT	New Data
Value #1	5.00	35.00
Value #2	8.00	22.00
Value #3	11.00	41.00
Value #4	14.00	53.00
Value #5	17.00	—
Value #6	20.00	—

To edit data, first choose Main Menu Selection 1, "Data Handling Menu." To load the file containing the data to be edited, choose Data Handling Menu Selection 2, "Enter Data from File," and type **SAMPLE1/DAT** (ENTER). Choose Selection 6, "Display Data," to review the data. Press (ESC) to return to the Data Handling Menu. Then choose Data Handling Menu Selection 4, "Edit Data." The following screen appears:



Changing Data

To replace the first four values with new values, choose Data Editing Menu Selection 1, "Change Data."

The screen shows:	Your response:
ENTER # OF THE FIRST VALUE TO BE CHANGED	Type **1** (ENTER)
VALUE # 1:	Type **35** (ENTER)
VALUE # 2:	Type **22** (ENTER)
VALUE # 3:	Type **41** (ENTER)
VALUE # 4:	Type **53** (ENTER)
VALUE # 5:	Press (ESC)

The edited data is displayed. Press (ESC). To keep the edited data, type **Y** (ENTER). The Data Editing Menu reappears.

Deleting Data

To delete the last two values, choose Data Editing Menu Selection 3, "Delete Data."

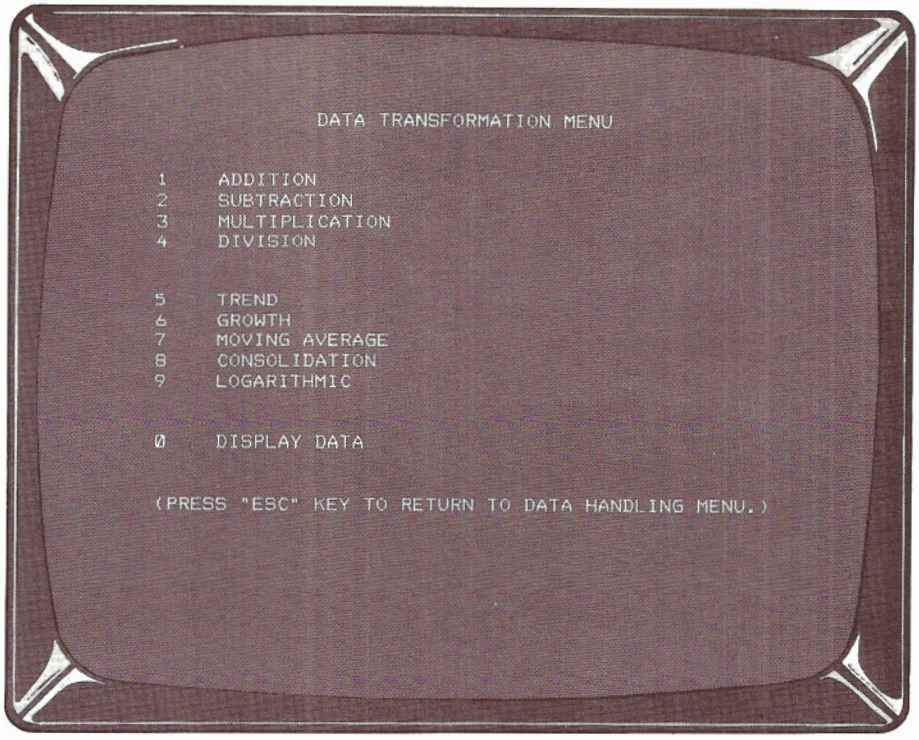
The screen shows:	Your response:
# OF THE FIRST VALUE TO BE DELETED:	Type **5** (ENTER)
# OF THE LAST VALUE TO BE DELETED:	Type **6** (ENTER)

The new data is displayed. Press (ESC). To keep the edited data, type **Y** (ENTER). The Data Editing Menu reappears. Press (ESC) to return to the Data Handling Menu.

To save the edited data, choose Data Handling Menu Selection 8, "Save Data." Type **SAMPLE1/EDT** (ENTER). The edited data is saved in a file named SAMPLE1/EDT.

Transforming Data

Choose Data Handling Menu Selection 5, "Transform Data." The Data Transformation Menu appears:



Using Moving Average to Smooth Data

The data currently in memory is the edited data that is stored under the name SAMPLE1/EDT. To smooth the data by applying a moving average, choose Data Transformation Menu Selection 7, "Moving Average."

The program asks you to enter the number of values to be averaged. Type **3** (ENTER). The transformed data appears on the screen.

Press (ESC). To keep the transformed data, type **Y** (ENTER). The Data Transformation Menu reappears. The data currently in memory now is the transformed data, not the edited data.

To save the transformed data, return to the Data Handling Menu by pressing (ESC). Choose Data Handling Menu Selection 8, "Save Data." Type **SAMPLE1/TRS** (ENTER). The transformed data is saved in a file named SAMPLE1/TRS.

Choose Selection 9 to return to the Main Menu.

You can now either go to the next sample session or stop using the program. To stop using the program, choose Main Menu Selection 7,

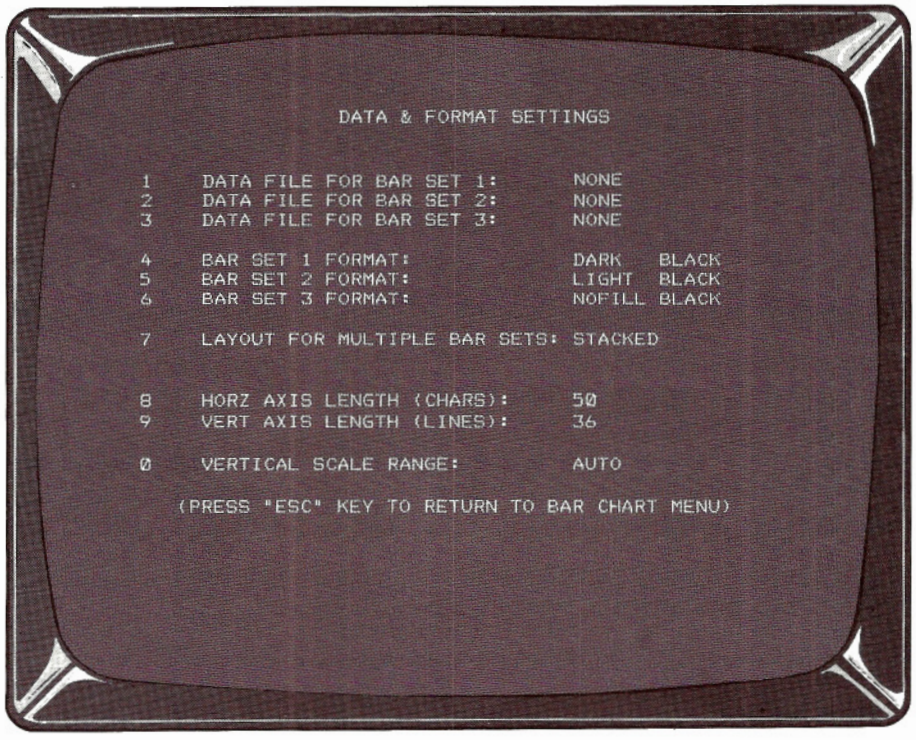
"Stop." When TRSDOS READY appears, remove the diskette and turn off the computer system.

SESSION 3: USING A BAR CHART TO COMPARE DATA

Follow the steps in this exercise to produce a bar chart comparing two sets of data. The chart includes a title, numeric scale labels, bar labels, and a frame. To begin, choose Main Menu Selection 3, "Bar Chart Menu."

Loading the Data Files

Now choose Bar Chart Menu Selection 1, "Data and Format Settings." The following screen appears:



Choose Data & Format Menu Selection 1, "Data File For Bar Set 1." Type **SAMPLE1/EDT** (ENTER) to use the edited data from the previous session as the first file in your Bar Chart.

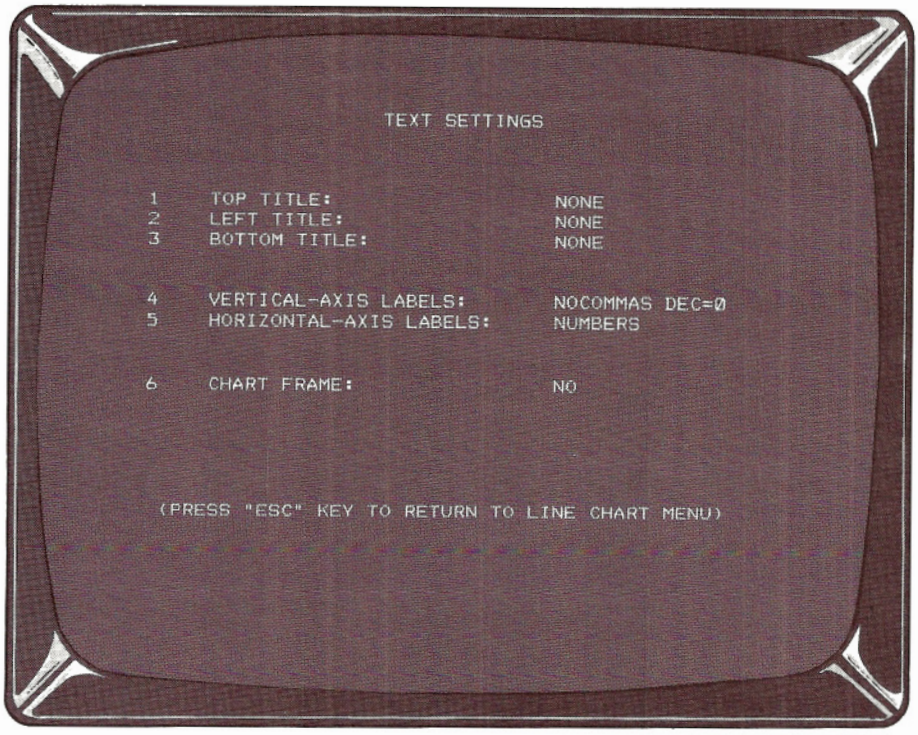
Choose Selection 2, "Data File For Bar Set 2." Type **SAMPLE1/TRS** (ENTER) to use the transformed data from the previous session as the second file in your Bar Chart.

Selecting the Bar Layout

Choose Data & Format Settings Menu Selection 7, "Layout For Multiple Bar Sets." Type **2** (ENTER) to select grouped bar sets. The Data & Format Settings Menu reappears. Press (ESC) to return to the Bar Chart Menu.

Selecting Text Settings

Choose Bar Chart Menu Selection 2, "Text Settings." The Text Settings Menu appears:



To enter a title for your chart, choose Text Settings Menu Selection 1, "Top Title," and enter a title. Use any title of 50 characters or less, such as SAMPLE SESSION 3 BAR CHART. Press (ESC) to return to the Text Settings Menu.

Choose Selection 5, "Bar Labels." The choices for the bar labels are displayed. Choose Selection 4, "Quarters, Starting With." Type **1Q83** (ENTER) to label the bars from 1Q83 (first quarter of 1983) to 4Q83. The Text Settings Menu reappears.

To frame the chart, choose Text Settings Menu Selection 6, "Chart Frame." Type **YES** (ENTER). Press (ESC) to return to the Bar Chart Menu.

To print the chart, choose Bar Chart Menu Selection 8, "Print Chart." Ready your printer or plotter and, when instructed, press (ENTER). Printing begins.

After the chart is printed, press (ESC) to return to the Bar Chart Menu. This chart is used again in the next sample session, so save it by choosing Selection 9, "Save Chart." Type **SAMPLE3/BAR** (ENTER) to save the chart under the name SAMPLE3/BAR. Choose Selection 0 to return to the Main Menu.

You can now either go to the next sample or stop using the program. To stop using the program, choose Main Menu Selection 7, "Stop." When TRSDOS READY appears, remove the diskette and turn off the computer system.

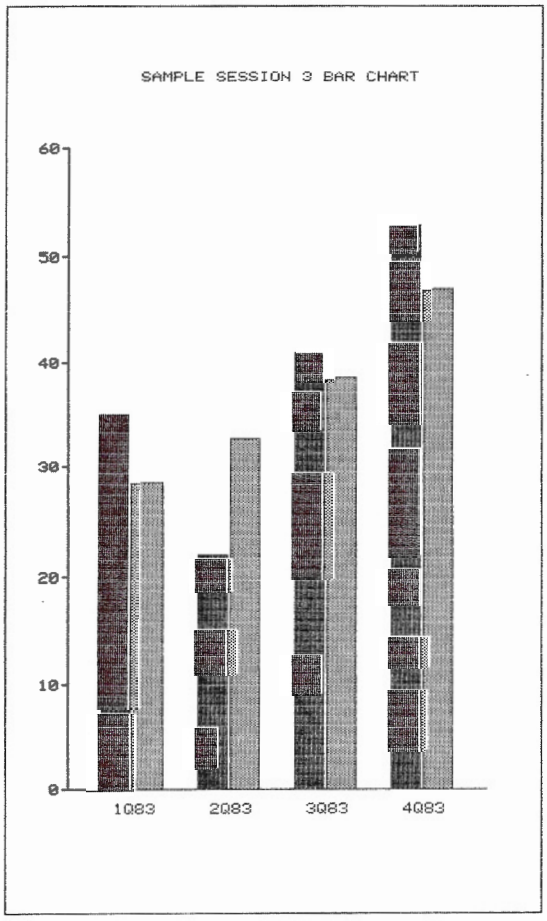
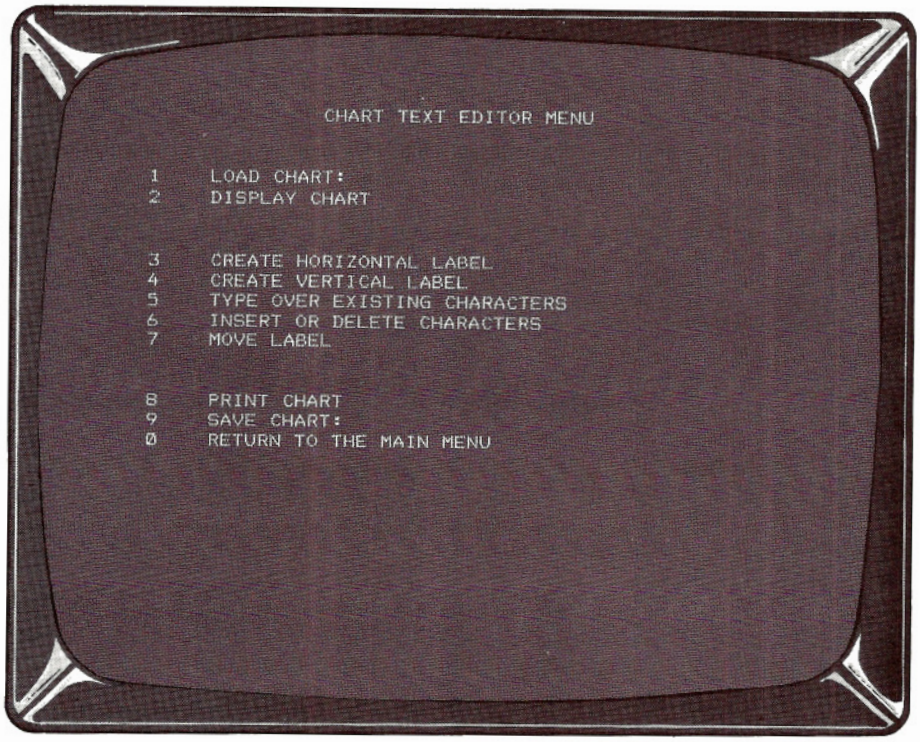


Figure 11-2: Chart Produced by Sample Session 3.

SESSION 4: ADDING TEXT TO A CHART

There are two ways to add text to a chart. One is through the Text Settings Menu of each chart type. The other way is through the Chart Text Editor Menu. This sample session gives you a chance to try out the second way.

Choose Main Menu Selection 6, "Chart Text Editor Menu." The following screen appears:



Loading the Chart

To load the bar chart you created in the previous sample session, choose Chart Text Editor Menu Selection 1, "Load Chart" and type **SAMPLE3/BAR** (ENTER). The Chart Text Editor Menu reappears when the chart is loaded.

Entering a Horizontal Label

When the Chart Text Editor reappears, choose Selection 2, "Display Chart."

Use the arrow keys to move the cursor until it is below the chart but inside the frame. Then press (ENTER) to return to the Chart Text Editor Menu.

Choose Selection 3, "Create Horizontal Label." The chart is displayed again. (If you are using a color output device, select a pen color for the label.) Type **Edited by *your name*** (ENTER). The Chart Text Editor Menu reappears.

Moving Text

Choose Chart Text Editor Menu Selection 2, "Display Chart." Position the cursor on the bottom label (`Edited by` *your name*). Press (ENTER). The Chart Text Editor Menu reappears.

Choose Selection 7, "Move Label." When the chart appears, use (→) to move the cursor and the label to the lower right corner of the chart. If you wish, use the other arrow keys to move the label anywhere on or outside the chart. When the label is positioned where you want it, press (ENTER). The Chart Text Editor Menu reappears.

If you wish to print the chart, choose Chart Text Editor Menu Selection 8, "Print Chart." Ready your printer or plotter. When you press (ENTER), printing begins. When the chart is finished, press (ESC) to return to the Chart Text Editor Menu. Type **0** (ENTER) to return to the Main Menu.

You can now either go to the next sample session or stop using the program. To stop using the program, choose Main Menu Selection 7, "Stop." When `TRSDOS READY` appears, remove the diskette and turn off the computer system.

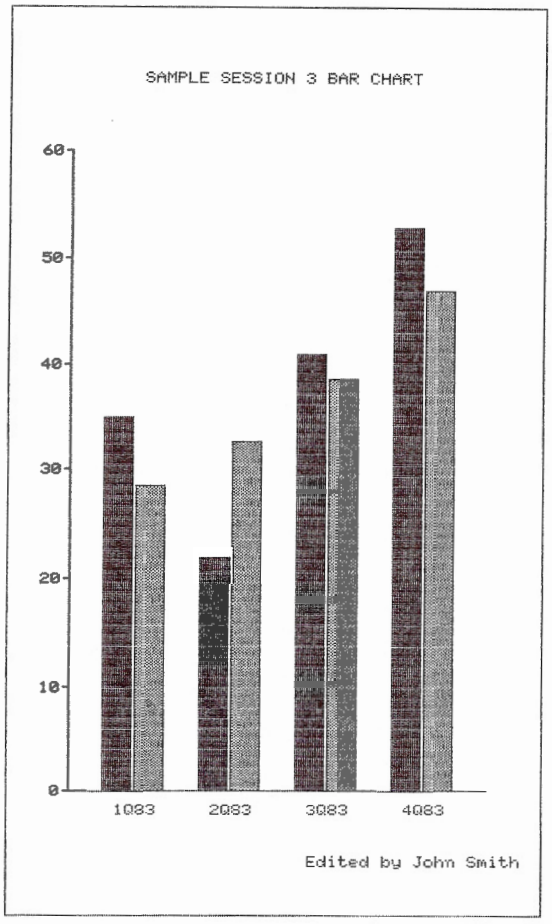


Figure 11-3: Chart Produced by Sample Session 4.

SESSION 5: CREATING AND MODIFYING A SCATTER CHART

Follow the steps in this exercise to produce and modify a scatter chart. The chart has six data points.

Creating a Scatter Chart

Data Files

Choose Main Menu Selection 1, "Data Handling Menu." Then choose Data Handling Menu Selection 1, "Enter Data from Keyboard."

The screen shows:	Your response:
VALUE #1	Type **39** (ENTER)
VALUE #2	Type **15** (ENTER)
VALUE #3	Type **27** (ENTER)
VALUE #4	Type **41** (ENTER)
VALUE #5	Type **70** (ENTER)
VALUE #6	Type **65** (ENTER)
VALUE #7	Press (ESC)

The Data Handling Menu reappears. Choose Data Handling Menu Selection 6, "Display Data," to review the data. Press (ESC) to return to the Data Handling Menu.

Choose Selection 8, "Save Data." Type **SCAT1/DAT** (ENTER) to save the data.

To enter the other set of data values, choose Selection 1, "Enter Data from Keyboard," again.

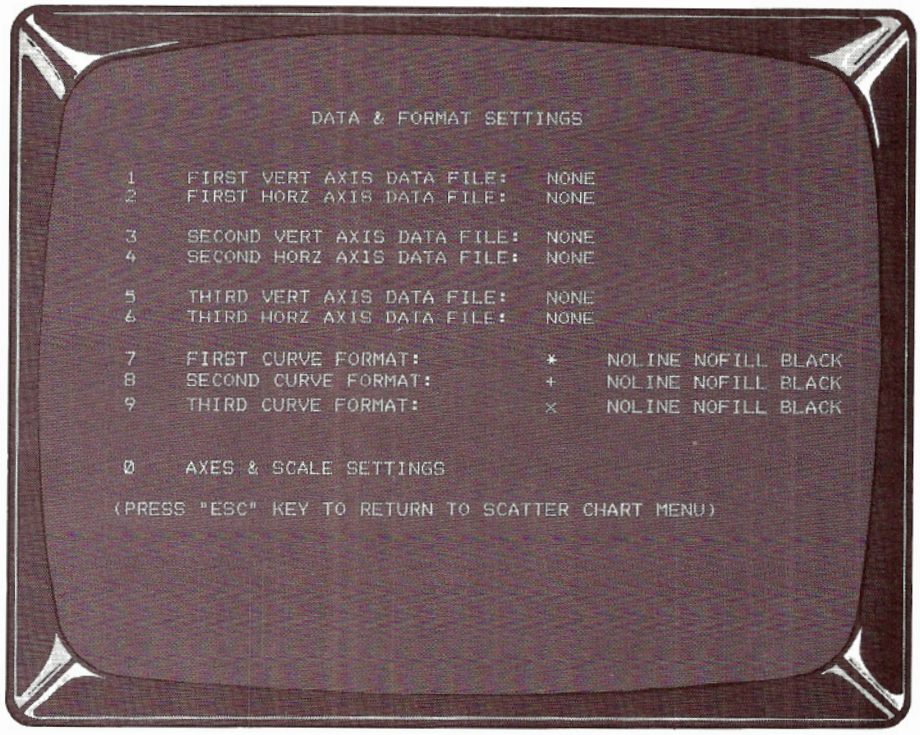
The screen shows:	Your response:
VALUE #1	Type **1** (ENTER)
VALUE #2	Type **2** (ENTER)
VALUE #3	Type **5** (ENTER)
VALUE #4	Type **9** (ENTER)
VALUE #5	Type **12** (ENTER)
VALUE #6	Type **17** (ENTER)
VALUE #7	Press (ESC)

When the Data Handling Menu reappears, choose Selection 6, "Display Data." When you finish reviewing the data, press (ESC) to return to the Data Handling Menu.

Choose Data Handling Menu Selection 8, "Save Data." Type **SCAT2/DAT** (ENTER) to save the data. Return to the Main Menu by typing **9** (ENTER).

Data and Format Settings

Choose Main Menu Selection 5, "Scatter Chart Menu." Then choose Scatter Chart Menu Selection 1, "Data & Format Settings." The following screen appears:



Choose Data & Format Settings Menu Selection 1, "First Vertical Axis Data File." Type **SCAT1/DAT** (ENTER). This file supplies the values along the vertical axis.

Type **2** (ENTER) to choose Selection 2, "First Horizontal Axis Data File." Type **SCAT2/DAT** (ENTER). This file supplies the values along the horizontal axis. Press (ESC) to return to the Scatter Chart Menu.

Choose Scatter Chart Menu Selection 7, "Display Chart." In a few seconds, your scatter chart appears on the screen. Press (ESC) to return to the Scatter Chart Menu.

If you wish to print or save the settings or the chart, do so now.

Modifying Chart Appearance

Choose Scatter Chart Menu Selection 1, "Data & Format Settings," then Data & Format Settings Menu Selection **0**, "Axes & Scale Settings." The vertical axis length is now **30** and the horizontal axis length is now **50**.

To extend the vertical axis length, choose Axes & Scale Settings Menu Selection 1 and type **36** (ENTER). To shorten the horizontal axis length, choose Selection 2 and type **20** (ENTER).

Press (ESC) twice to return to the Scatter Chart Menu. Choose Selection 7, "Display Chart."

When you finish examining the chart, press (ESC) to return to the Scatter Chart Menu. If you wish, save and/or print the chart and/or chart settings. Type **0** (ENTER) to return to the Main Menu.

This ends all the sample sessions. If you wish to stop using the program for now, choose Main Menu Selection 7, "Stop." When TRSDOS READY appears, remove the diskette and turn off the computer system.

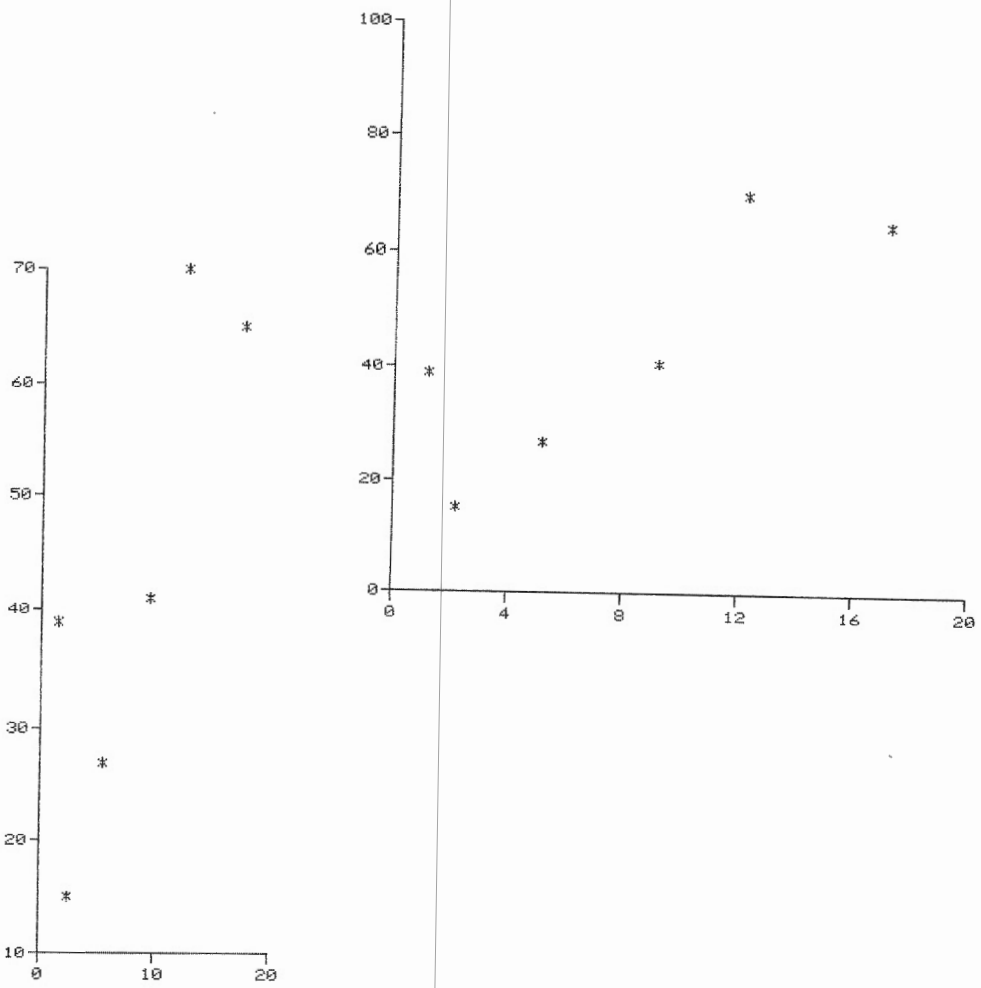


Figure 11-4: Original Scatter Chart and Modified Version. The taller vertical axis and shorter horizontal axis emphasize the fluctuations in data.

Appendix A
BACKUP, FORMAT, SAVE, and RESTORE Procedures

Business Graphics is distributed on two TRSDOS program diskettes:

- Processing Diskette
- Setup Diskette

The first step in using Business Graphics is making backups (copies) of these diskettes. Label these backups "working copy" and use them to actually run the program. Store the original master diskettes in a safe place, away from dust, magnetic fields, excessive heat, or anything else that might damage them. **Never** run Business Graphics with the original diskettes — use them **only** to make working copies.

Several things, such as improper diskette care or power outages, can cause you to lose information stored on a diskette. To be able to recover lost data, make backups on a regular basis of all diskettes on which you store data, chart settings, and charts. The frequency with which you should make backups depends on how often you add or change the stored data. To help prevent data loss, follow the diskette care and computer maintenance instructions in your computer owner's manual.

This appendix has three sections:

- TRSDOS Backup and Format Procedures — Use this section if you have a floppy diskette Model II system or a floppy diskette system with thinline drives that is operating under TRSDOS 2.0b. (Instructions for operating under TRSDOS 2.0b are in your computer owner's manual.)
- TRSDOS-II Backup and Format Procedures — Use this section if you have a floppy diskette system with thinline drives (such as Model 12 or Model 16 floppy diskette system) that is operating under TRSDOS-II. (Instructions for converting to TRSDOS-II are in Appendix B.)
- TRSDOS-II Hard Disk Save and Restore Procedures — Use this section if you have a hard disk system. (Instructions for copying the program onto hard disk are in Appendix B.)

In this appendix, the Processing and Setup Diskettes are called "program" diskettes. The diskettes that you back up are referred to as the "source" diskettes. The backup copies you create are referred to as "destination" diskettes. Follow the instructions **exactly**.

During the backup, the computer appears to stop for short periods, as if "hung up" or not running. This is normal. Refer to your computer owner's manual if you need help.

TRSDOS BACKUP AND FORMAT PROCEDURES

TRSDOS is the operating system used by Model II floppy diskette systems. If you are using a Model II floppy diskette system, follow the instructions in this section for backing up and formatting diskettes.

BACKUP, FORMAT, SAVE, and RESTORE Procedures

TRSDOS 2.0b is the version of TRSDOS that runs on Radio Shack computers with thinline drives (such as the Model 12 or Model 16). If you are using TRSDOS 2.0b, follow the instructions in this section for backing up and formatting diskettes.

Backing Up TRSDOS Program Diskettes on a Multi-Drive System

1. Place a gummed foil tape over the write protect notch of a blank diskette.
2. Turn on your computer system as instructed in your computer owner's manual.
3. Insert the source diskette into Drive 0.

The screen shows:	Your response:
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH:MM:SS)`	Press (ENTER).
`TRSDOS READY`	Type **FORMAT 1** (ENTER).
`Mount Diskette for Formatting on Drive 1 Continue? (Y/Q)`	Insert the destination diskette in Drive 1. Type **Y** (ENTER).
`Diskette CONTAINS DATA; Format OVER it? (Y/Q)`	This prompt appears only if your destination diskette is not a blank diskette. To use the diskette, type **Y** (ENTER). To terminate the backup and return to TRSDOS READY, type **Q** (ENTER).
`00 Flawed Tracks System tracks now being written to the diskette TRSDOS READY`	The format process is complete. (If the screen shows any number of flawed tracks except 00, don't use the diskette. You can try bulk erasing the diskette and reformatting it.) Type **BACKUP :0 TO :1** (ENTER).
`TRS-80 Model II Backup Utility Vers 2.0 Source Diskette Ready? (Y/Q)`	Type **Y** (ENTER).
`Reading Boot Track SYSTEM/SYS DESTINATION Disk Ready? (Y/Q)`	Type **Y** (ENTER).
`Change Diskette Information?`	Type **N** (ENTER).

When the backup is complete, the screen shows:

```
XX Files Examined, XX Files Copied
00 Files Deleted, 00 Files Defective

Writing DIRECTORY Track

Backup Complete

TRSDOS READY
```

If your screen displays a message that the backup aborted, try again, using a different destination diskette.

Backing Up TRSDOS Program Diskettes on a Single-Drive System

1. Place a gummed foil tape over the write protect notch of a blank diskette.
2. Turn on your computer system as instructed in your computer owner's manual.
3. Insert the source diskette into Drive 0.

The screen shows:	**Your response:**
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH:MM:SS)`	Press (ENTER).
`TRSDOS READY`	Type **FORMAT 0** (ENTER).
`Mount Diskette for Formatting on Drive 0 Continue? (Y/Q)`	Remove the source diskette from Drive 0 and insert the destination diskette. Type **Y** (ENTER).
`Diskette CONTAINS DATA; Format OVER it? (Y/Q)`	This prompt appears only if your destination diskette is not a blank diskette. To use the diskette, type **Y** (ENTER). To terminate the backup and return to `TRSDOS READY`, type **Q** (ENTER).
`00 Flawed Tracks Insert SYSTEM diskette- press ANY key to continue`	The format process is complete. (If the screen shows any number of flawed tracks except 00, don't use the diskette. You can try erasing the diskette and reformatting it.) Remove the destination diskette from Drive 0 and insert the source diskette.
`TRSDOS READY`	Type **BACKUP :0 TO :0** (ENTER).

`TRS-80 Model II Backup Utility Vers 2.0 Source Diskette Ready? (Y/Q)`	Type **Y** (ENTER).
`Reading Boot Track SYSTEM/SYS Insert DESTINATION diskette- press ANY key to continue`	Remove the source diskette and insert the destination diskette. Press (ENTER).
`Change Diskette Information?`	Type **N** (ENTER).
`Insert SYSTEM diskette- press ANY key to continue`	Remove the destination diskette and insert the source diskette. Press (ENTER).

Repeat the last two steps as often as the program prompts you. When the backup is complete, the screen shows:

```
XX Files Examined, XX Files Copied
00 Files Deleted, 00 Files Defective

Writing DIRECTORY Track

Backup Complete

TRSDOS READY
```

If your screen displays a message that the backup aborted, try again, using a different destination diskette.

TRSDOS Format Procedures

If you have two or more floppy diskette drives, you can store information on a data diskette (a formatted diskette). To make a data diskette, follow these steps:

1. Place a gummed foil tape over the write protect notch of a blank diskette.
2. Turn on your computer system as instructed in your computer owner's manual.
3. Insert the source diskette into Drive 0.

The screen shows:	**Your response:**
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH.MM.SS)`	Press (ENTER).
`TRSDOS READY`	Type **FORMAT 1** (ENTER).

`Mount Diskette for Formatting on Drive 1 Continue? (Y/Q)`	Insert the destination diskette in Drive 1. Type **Y** (ENTER).
`Diskette CONTAINS DATA; Format OVER it? (Y/Q)`	This prompt appears only if your destination diskette is not a blank diskette. To use the diskette, type **Y** (ENTER). To terminate the backup and return to TRSDOS READY, type **Q** (ENTER).
`00 Flawed Tracks System tracks now being written to the diskette TRSDOS READY`	The format process is complete. (If the screen shows any number of flawed tracks except **00**, don't use the diskette. You can try bulk erasing the diskette and reformatting it.)

Backing Up TRSDOS Data Diskettes on a Multi-Drive System

1. Place a gummed foil tape over the write protect notch of a blank diskette.
2. Turn on your computer system as instructed in your computer owner's manual.
3. Insert a TRSDOS program diskette into Drive **0**.

The screen shows:	**Your response:**
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH.MM.SS)`	Press (ENTER).
`TRSDOS READY`	Type **FORMAT 1** (ENTER).
`Mount Diskette for Formatting on Drive 1 Continue? (Y/Q)`	Insert the destination diskette in Drive 1. Type **Y** (ENTER).
`Diskette CONTAINS DATA; Format OVER it? (Y/Q)`	This prompt appears only if your destination diskette is not a blank diskette. To use the diskette, type **Y** (ENTER). To terminate the backup and return to TRSDOS READY, type **Q** (ENTER).

`00 Flawed Tracks`
`System tracks now being written to the diskette`
`TRSDOS READY`
	The format process is complete. (If the screen shows any number of flawed tracks except 00, don't use the diskette. You can try erasing the diskette and reformatting it.) Remove the destination diskette from Drive 1. Insert the source diskette. Type **I** (ENTER).

`TRSDOS READY`	Type **BACKUP :1 TO :0** (ENTER).

`TRS-80 Model II Backup`
`Utility Vers 2.0`
`Source Diskette Ready?`
`(Y/Q)`
	Type **Y** (ENTER).

`Reading Boot Track`
`SYSTEM/SYS`
`DESTINATION Disk Ready?`
`(Y/Q)`
	Remove the TRSDOS program diskette from Drive 0. Insert the destination diskette into Drive 0. Type **Y** (ENTER).

`Change Diskette` `Information?`	Type **N** (ENTER).

When the backup is complete, the screen shows:

```
XX Files Examined, XX Files Copied
00 Files Deleted, 00 Files Defective

Writing DIRECTORY Track

Backup Complete

Mount System Diskette on Drive 0
Continue? (Y/N)
```

Remove the destination diskette from Drive 0. Insert the TRSDOS program diskette. Type **Y** (ENTER). `TRSDOS READY` appears. (If your screen displays a message that the backup aborted, try again, using a different destination diskette.)

TRSDOS-II BACKUP AND FORMAT PROCEDURES

TRSDOS-II is an operating system that can be used to operate Radio Shack computers with two or more thinline floppy diskette drives or with a hard disk. If you are operating your program under TRSDOS-II and using floppy diskettes, follow the instructions in this section to backup and format diskettes.

Remember that you cannot backup double-sided to single-sided diskettes.

Backing Up TRSDOS-II Program Diskettes

1. Place a gummed foil tape over the write protect notch of a blank diskette.
2. Turn on your computer system as instructed in your computer owner's manual.
3. Insert the TRSDOS-II source diskette you wish to copy into Drive 0.

The screen shows:	Your response:
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH:MM:SS)`	Press (ENTER).
`TRSDOS-II Ready`	Insert the destination diskette into Drive 1 (use a double-sided destination diskette for maximum storage space). Type **BACKUP 0 TO 1** (ENTER).

When the backup is complete, the screen shows:

```
Backup Successfully Completed
Drive 1 Disk ID is: TRSDOS
TRSDOS-II Ready
```

If your screen displays a message that the backup aborted, try again, using a different destination diskette.

Formatting TRSDOS-II Data Diskettes

If you have two or more floppy diskette drives, you can store information on a data diskette (a formatted diskette). To make a TRSDOS-II data diskette, follow these steps:

1. Place a gummed foil tape over the write protect notch of a blank diskette.
2. Turn on your computer system as instructed in your computer owner's manual.
3. Insert a TRSDOS-II program diskette into Drive 0.

The screen shows:	Your response:
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH:MM:SS)`	Press (ENTER).
`TRSDOS-II Ready`	Type **FORMAT 1** (ENTER).
`Mount Diskette for Formatting on Drive 1 Continue? (Y/Q)`	Insert the destination diskette in Drive 1. Type **Y** (ENTER).

`Diskette CONTAINS DATA; Format OVER it? (Y/Q)`	This prompt appears only if your destination diskette is not a blank diskette. To use the diskette, type **Y** (ENTER). To terminate the format and return to TRSDOS-II Ready, type **Q** (ENTER).
`00 Flawed Tracks System tracks now being written to the diskette TRSDOS-II Ready`	The format process is complete. (If the screen shows any number of flawed tracks except **00**, don't use the diskette. You can try erasing the diskette and reformatting it.)

Backing Up TRSDOS-II Data Diskettes Using Multi Floppy Disk Drives

1. Place a gummed foil tape over the write protect notch of a blank diskette. Use a double-sided diskette for maximum storage space.
2. Turn on your computer system as instructed in your computer owner's manual.
3. Insert a TRSDOS-II program diskette into Drive **0** and the source data diskette into Drive 1.

The screen shows:	**Your response:**
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH:MM:SS)`	Press (ENTER).
`TRSDOS-II Ready`	Insert the destination diskette into Drive 2. Type **BACKUP 1 TO 2** (ENTER).

When the backup is complete, the screen shows:

```
Backup Successfully Completed
TRSDOS-II Ready
```

If your screen displays a message that the backup aborted, try again, using a different destination diskette.

Backing Up TRSDOS-II Data Diskettes Using a Hard Disk System

You need two floppy diskette drives and a hard disk for this method.

1. Place a gummed foil tape over the write protect notch of a blank diskette. Use a double-sided diskette for maximum storage space.
2. Power up your computer under hard disk control as instructed in your computer or hard disk owner's manual.
3. Insert the TRSDOS-II data diskette that you wish to copy (source diskette) into Drive **0**. Insert the destination diskette into Drive 1.

The screen shows:	Your response:
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH:MM:SS)`	Press (ENTER).
`TRSDOS-II Ready`	Type **BACKUP 0 TO 1** (ENTER).

When the backup is complete, the screen shows:

```
Backup Successfully Completed
TRSDOS-II Ready
```

If your screen displays a message that the backup aborted, try again, using a different destination diskette.

TRSDOS-II SAVE AND RESTORE PROCEDURES

A good way to make copies of files stored on a hard disk operating under TRSDOS-II is to use the SAVE utility.

The SAVE utility stores files in a special, compact form on floppy diskettes. Because of the special format, files occupy less space than they normally would on floppy diskettes. TRSDOS-II cannot directly read files stored in this format.

The RESTORE utility returns saved information to a TRSDOS-II formatted disk. It is the only way to retrieve information stored by SAVE.

To decide how often to make "save copies" (archive files) of your hard disk files, think how much time, effort, and money could be lost if your hard disk files suddenly were destroyed. We suggest hard disk users keep two major sets of archive files:

- Monthly Save Set — A set of save diskettes containing everything on your hard disks, including your programs. Make this set on of the first day of each month. Always keep a previous month's save set and a current month's save set.
- Daily Save Set — A set of save diskettes containing the files that were created or changed since the current monthly save set was made. Make this set at the end of each day. Always keep a previous daily save set and a current daily save set.

If you enter large amounts of data every day, you might want to make more than one "daily" save set each day. No matter how much data you enter, however, never wait longer than three days before making a daily save set.

Note: The examples in this section use Drive 4 (hard disk) as the source and Drive 0 as the destination. To use SAVE and RESTORE with other drives, substitute the appropriate drive numbers.

TRSDOS-II SAVE and RESTORE Procedures for Floppy Disk Systems

The SAVE and RESTORE utilities are intended for hard disk use. However, SAVE and RESTORE can also be used to save files from a TRSDOS-II formatted floppy diskette to a SAVE formatted diskette. When using SAVE and RESTORE between two floppy diskettes, follow the instructions in the rest of this section (substituting appropriate drive numbers) and be sure:

- The source and destination drive numbers are different
- The destination drive number is not Drive 0, since Drive 0 must contain a TRSDOS-II system diskette

Creating a Monthly Save Set

Creating a monthly save set takes time, but it's worth it. To save all the files (including system files) and programs from hard disk Drive 4 to a floppy diskette in Drive 0, follow these instructions:

1. Place a gummed foil tape over the write protect notch of each of several blank, unformatted diskettes.
2. Turn on your computer system as instructed in your computer owner's manual.

The screen shows:	**Your response:**
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH:MM:SS)`	Press (ENTER).
`TRSDOS-II Ready`	Insert a floppy diskette into Drive 0. Type **SAVE :4 :0 {SYS,ALL,ABS}** (ENTER).

TRSDOS-II displays a "volume number" which identifies the diskette in Drive 0. A "dataset signature" identifies the set of diskettes. Write down the volume number and dataset signature. When you later remove the diskette from the drive, write this information on the diskette's label.

When the diskette is full, TRSDOS-II prompts you to insert another diskette. When all the files are saved, TRSDOS-II prompts you to reinsert the first diskette of the set (Volume 0). It then updates the diskette with housekeeping information.

`TRSDOS-II Ready` appears when the SAVE is finished. Make sure you have labeled all the save diskettes. Store them in a safe place.

At the beginning of the next month, create a new monthly save set using a different set of diskettes. This set becomes the "current monthly save set." The other set becomes the "previous monthly save set."

Rotating Monthly Save Sets

When you have two monthly save sets, begin rotating the diskettes. When you make a new monthly save set, use the older monthly save set diskettes instead of blank diskettes.

Creating a Daily Save Set

To create a daily save set of all the Drive 4 files that were created or changed since the monthly save set was created, follow these steps:

1. Place a gummed foil tape over the write protect notch of each of several blank, unformatted diskettes.
2. Turn on your computer system as instructed in your computer owner's manual.

The screen shows:	**Your response:**
`Enter Date (MM/DD/YYYY)`	Enter the date. For example, for July 1, 1984, type **07/01/1984** (ENTER).
`Enter Time (HH:MM:SS)`	Press (ENTER).
`TRSDOS-II Ready`	Insert a floppy diskette into Drive 0. Type **SAVE !:4 :0 {DM>mmddyy,ABS,SYS}** (ENTER). Instead of typing "mmddyy," type the date that you made the most recent monthly save set.

TRSDOS-II displays a "volume number" which identifies the diskette in Drive 0. A "dataset signature" identifies the set of diskettes. Write down the volume number and dataset signature. When you later remove the diskette from the drive, write this information on the diskette's label.

When the diskette is full, TRSDOS-II prompts you to insert another diskette. When all the files are saved, TRSDOS-II prompts you to reinsert the first diskette of the set (Volume 0). It then updates the diskette with housekeeping information.

`TRSDOS-II Ready` appears when the SAVE is finished. Make sure you have labeled all the save diskettes. Store them in a safe place.

At the end of the next day, create a new daily save set, using different diskettes. This set becomes the "current daily save set." The other set is the "older daily save set."

Rotating Daily Save Sets

Once you have two daily save sets, rotate the diskettes. When you make a new daily save set, use the older daily save set diskettes instead of blank diskettes.

Restoring Your Files

If you lose some or all of the data on your hard disk(s), use your monthly and/or daily save sets to recover the lost data. You can restore one file, several files, or all files.

To restore data, turn on your computer system, answer the date and time prompts, and follow the appropriate steps below.

Restoring One File

To restore only one file, insert Volume 0 of your most recent save set into Drive 0. At `TRSDOS-II Ready`, type **RESTORE *filespec*:0 :4** {**ABS**} (ENTER).

Where *filespec* is the name of the file you want to restore.

Restoring a Group of Files

To restore a group of files, insert Volume 0 of your most recent save set into Drive 0. AT `TRSDOS-II Ready`, type **RESTORE :0 :4** {**PROMPT**} (ENTER).

TRSDOS-II prompts you before restoring each file. Press **Y** to restore a file. Press **N** if you don't wish to restore the file.

Restoring All Files

If you lose most or all of the data on your hard disk(s), follow these steps to recover the lost data:

1. If Drive 4's operating system is damaged, re-transfer TRSDOS-II and BASIC from the diskette supplied with your hard disk to Drive 4. Instructions are in your *Hard Disk Owner's Manual.*

   If you are sure Drive 4's operating system is not damaged, go to Step 2.

2. Insert Volume 0 of your current monthly save set into Drive 0. AT `TRSDOS-II Ready`, type **RESTORE :0 :4** {**ABS,SYS**} (ENTER). Follow TRSDOS-II's prompts.

3. Insert Volume 0 of your current daily save set into Drive 0. At `TRSDOS-II Ready`, type **RESTORE :0 :4** {**ABS,SYS**} (ENTER).

4. Re-enter any information added to the hard disk since the last current daily save set was created.

You can use your TRSDOS program with TRSDOS-II, but because TRSDOS and TRSDOS-II use different formats, there's more involved than simply running the program.

TRSDOS formats floppy diskettes to 26 sectors per track and TRSDOS-II formats floppy diskettes to 32 sectors per track. Because of this different format, you cannot read or write to a TRSDOS-formatted diskette directly with TRSDOS-II. (For more information about the differences between TRSDOS and TRSDOS-II, refer to your *TRSDOS-II Reference Manual.*)

To use programs that are on TRSDOS-formatted diskettes, you must copy the programs and data to disks formatted by TRSDOS-II. A special command, FCOPY, lets you do this.

This appendix describes one way to convert your Radio Shack TRSDOS program to TRSDOS-II and run it as a TRSDOS-II program. For details about the FCOPY command and for alternate methods, see your computer *Owner's* or *Startup Manual, Hard Disk Owner's Manual,* or your *TRSDOS-II Reference Manual.*

This appendix also describes how to patch your program so that you can use it with ARCNET™. (See "Using ARCNET" at the end of this appendix.)

USING FCOPY TO CONVERT YOUR PROGRAMS

You can use FCOPY on multi-drive systems only. If you have a single-drive system, see your Radio Shack dealer for assistance.

Floppy Diskette Use

To convert a TRSDOS application program so that it runs under TRSDOS-II, follow these steps:

1. Make a backup of each diskette you wish to convert, using the TRSDOS backup procedures. (Instructions are in Appendix A.)
2. Make a backup of your TRSDOS-II System Diskette.

   Note: You may wish to delete files from this backup, making it a minimum system diskette. If so, follow the instructions in your computer owner's or startup manual.
3. Label the TRSDOS-II backup, including the name of the application you are converting and "TRSDOS-II." For example:

   Business Graphics Processing Diskette
   TRSDOS-II Version 4.2
   Drive 0
4. Insert the TRSDOS-II diskette in Drive 0.
5. Insert your TRSDOS source diskette in Drive 1.

6. At `TRSDOS-II Ready`, type **FCOPY 1 TO 0 {SYS,ALL}** (ENTER). This copies all files, systems and user, that are on the TRSDOS source diskette in Drive 1 to the TRSDOS-II diskette in Drive 0.
7. To convert other TRSDOS diskettes, repeat steps 1-6 as necessary.

Hard Disk Use

1. Make sure your hard disk system is formatted and running under TRSDOS-II Version 4.2 or later.
2. Insert your TRSDOS source diskette in Drive 0.
3. At `TRSDOS-II Ready`, type **FCOPY 0 TO 4 {SYS,ALL}** (ENTER). This copies all files (system and user) that are on the TRSDOS source diskette in Drive 0 to Drive 4, which is formatted by TRSDOS-II.
4. To convert other TRSDOS diskettes, repeat steps 1-3 as necessary.

USING FCOPY TO CONVERT YOUR DATA TO TRSDOS-II

Floppy Diskette Use

1. Format a TRSDOS-II data diskette. (Instructions are in Appendix A.)

2a. If you have more than two drives, leave the TRSDOS-II data diskette in Drive 1. Insert the TRSDOS data diskette in Drive 2. At `TRSDOS-II Ready`, type **FCOPY 2 TO 1 {SYS,ALL}** (ENTER).

2b. If you have only two drives, type, at `TRSDOS-II Ready`: **FCOPY 1 TO 1 {SYS,ALL}** (ENTER). FCOPY prompts you when to swap source (TRSDOS data) and destination (TRSDOS-II data) diskettes.

3. TRSDOS-II stores your data on the TRSDOS-II diskette. When it finishes the conversion. TRSDOS-II displays the message `**FCOPY Complete**`.

Hard Disk Use

1. Insert the TRSDOS data diskette you wish to convert into Drive 0.
2. At `TRSDOS-II Ready`, type **FCOPY 0 TO 4 {SYS,ALL}** (ENTER).
3. TRSDOS-II stores your data on Drive 4. When it finishes the conversion, TRSDOS-II displays the message `**FCOPY Complete**`.

EXECUTING YOUR TRSDOS-II PROGRAM

Floppy Diskette Use

If you FCOPYed your Radio Shack program onto the same number of diskettes that it had used under TRSDOS, you can execute it as described in the body of this manual, substituting the words "TRSDOS-II Ready" for "TRSDOS READY."

If you FCOPYed the data and programs from two single-sided diskettes onto a double-sided diskette, the way you start the program is a little different. When TRSDOS-II Ready is displayed, type **FLOPPY OFF** (ENTER).

Then load and execute the program as instructed in the body of this manual, substituting the words "TRSDOS-II Ready" for "TRSDOS READY."

Always have FLOPPY ON when FCOPYing.

Hard Disk Use

After FCOPYing your Radio Shack program, you must turn FLOPPY OFF before executing each program. When TRSDOS-II Ready is displayed, type **FLOPPY OFF** (ENTER). Then load and execute the program as instructed in the body of this manual, substituting the words "TRSDOS-II Ready" for "TRSDOS READY."

Always have FLOPPY ON when FCOPYing.

USING ARCNET

If you have version 4.3.7 or later of TRSDOS-II and wish to use Business Graphics with ARCNET, follow these steps:

1. FCOPY Business Graphics onto your ARCNET file processor shared hard disk just as you would for any hard disk. (See "Using FCOPY to Convert Your Programs," earlier in this appendix.)
2. Type the following patch exactly (on your file processor): **PATCH TRSCHART:4 A=3126,F=00,C=03** (ENTER). You won't be able to use Business Graphics with ARCNET unless you enter the above patch.
3. If you plan to spool graphics to the system printer, type the following command on the file processor under ARCNET: **FORMS W=0 TRANS** (ENTER).
4. If you plan to print on the system printer via the spooler, bypass the printer ready check by typing this patch exactly: **PATCH TRSLBPS A=3FC4 F=2004 C=0000** (ENTER).

   You can now use Business Graphics and ARCNET as instructed in this manual and in your ARCNET manual.

ACCEPTABLE FILE TYPES

You can use many types of data files with the Business Graphics package. These include files created by:

- The Data Handling Menu of the Business Graphics package
- VisiCalc DIF files (VisiCalc files written in Data Interchange Format, identified by the extension /DIF), saved in row format
- SCRIPSIT
- BASIC as an editor
- A BASIC program
- A FORTRAN program

The most common files used with Business Graphics are those created through the Data Handling Menu. Instructions for creating and accessing these files are in Chapter 3, "Chart Data."

Instructions for using the other type of files listed above are in this appendix.

USING VISICALC DIF FILES

You can use a row or column from a VisiCalc DIF file if you first access the row or column of data and save it through the Business Graphics Data Handling Menu. The VisiCalc DIF file must have been saved in row format. (In row format, rows are read from left to right and columns are read from top to bottom.) To access and save a row or column of data from a VisiCalc DIF file:

1. Power up your computer system. Insert the Business Graphics Processing Diskette that contains the DIF file into Drive Ø. (If you have a Multi-Drive system, the DIF file can be on a separate diskette.) Load Business Graphics as instructed in Chapter 2.
2. Choose Main Menu Selection 1, "Data Handling Menu."
3. Choose Data Handling Menu Selection 2, "Enter Data from File."
4. Enter the name of the DIF file. The program displays the number of rows and columns of data and asks you to choose either a row or a column:

```
DIF FILE CONTAINS XX COLUMNS AND XX ROWS.
DO YOU WANT A ROW OR COLUMNN OF DATA (ROW/COL):
```

5. If you want a column from the file, type **COL** (ENTER). If you want a row from the file, type **ROW** (ENTER).
6. Answer the next prompt by entering the row or column number.

7. After the program processes the file, the Data Handling Menu is displayed. Choose Selection 8, "Save Data," to save the row or column from the DIF file as a Business Graphics file.

You can now use this file to create a chart.

CONVERTING SCRIPSIT, BASIC, AND FORTRAN FILES

The following types of files must be converted with READATA1/BAS or READATA2/BAS, utility programs on the Setup Diskette, before you can use them as data files with Business Graphics.

- Files created by SCRIPSIT
- Files created by using BASIC as an editor
- Files created by a BASIC program
- Files created by a FORTRAN program (except as noted)

Exception: Files created through the Data Handling Menu are in FORTRAN E15.7 format; those converted by READATA1/BAS or READATA2/BAS are in FORTRAN D15.7 format. Any FORTRAN files created in FORTRAN E15.7 or D15.7 can be used with Business Graphics without conversion.

The File Conversion Utilities

READATA1/BAS and READATA2/BAS, the file conversion utilities, are BASIC programs which run via the TRSDOS BASIC interpreter. READATA1/BAS is for use with floppy diskette systems; READATA2/BAS is for use with hard disk systems.

Both utilities have the following capabilities:

- The utilities can read every value or every nth value in an input file. You can specify the starting sequence number and the number of values to be read.
- You can choose whether to skip non-numeric data values in the file or to replace them. If you choose to replace such values, you are asked to enter the corrected value each time a non-numeric field is encountered.
- Up to 100 values can be written to the output file.
- If any field contains more than 15 characters, only the first 15 are converted as one value. Any remaining characters are converted as a separate value. (The characters can include digits, a leading + or –, decimal point, and the format indicator D or E.)

Make sure any file you wish to convert meets the following requirements:

- Data must be stored in ASCII code.

- Data items must be separated by commas, blanks, or carriage returns. Do not use tabs.
- If the file was created using BASIC as an editor, the file must have been saved using the ",A" (ASCII) option. Every record in such a file has a statement number as the first field, sometimes followed by the option "DATA" as the second field. The file specification should have the extension "/BAS". Otherwise, READATA1/BAS and READATA2/BAS treat the statement numbers as data.

Note: The last requirement differs from the suggestion in the TRS-80 Disk System Owner's Manual. (The manual recommends the extension "/BAS" for BASIC programs and the extension "/TXT" for ASCII text.)

A sample session showing the conversion of a FORTRAN file to a file acceptable for use with Business Graphics is at the end of this appendix.

Conversion Procedure

To convert SCRIPSIT, BASIC, and FORTRAN files to an acceptable format, follow these instructions, using READATA1/BAS if you have a floppy diskette system or READATA2/BAS if you have a hard disk system.

Power-up or reset your computer system. Insert the Business Graphics Setup Diskette that contains your data files into Drive 0. (If you have a multi-drive system, the data files can be on another diskette.) Answer the date and time prompts.

When TRSDOS READY is displayed, type **BASIC *utility* –F:*n*** (ENTER). *Utility* is READATA1/BAS (floppy diskette systems) or READATA2/BAS (hard disk systems), and *n* is the number of files you wish to convert (at least two). For example, to convert two files on a floppy diskette system, type **BASIC READATA1/BAS –F:2** (ENTER). Then answer the utility's prompts as follows.

The screen shows: NAME OF FILE TO BE READ?
Your response: Enter the name of the input data file to be converted.

NAME OF FILE TO BE CREATED?
Enter the name you want to assign to the resulting output file. It cannot be the same as the name of the input file.

READ ALL VALUES OR READ SELECTED VALUES (ALL/SELECT)?
To read all values, type **A** (ENTER). The next three questions are bypassed.

To read selected values, type **S** (ENTER).

START WITH WHICH VALUE (ENTER SEQUENCE #)?
Enter the sequence number of the first value you wish to read. (Enter **1** to start at the beginning of the file.)

SELECT EVERY 'NTH' VALUE (E.G., ENTER 5 FOR EVERY 5TH)?
Enter **1** if you want every value selected.

NUMBER OF VALUES TO BE SELECTED (OR ALL)?

To limit the number of values selected, enter any number up to 100.

DO YOU WANT TO SKIP NON-NUMERIC DATA OR CHANGE THEM? (SKIP/CHANGE)?

To bypass non-numeric values, type **S** (ENTER). To cause any non-numeric value in the file to stop execution until you supply a corrected value, type **C** (ENTER).

The utility displays the selected values from the input file and the new values written to the output file.

DO YOU WANT TO CREATE ANOTHER FILE (YES/NO)?

To convert another file, type **Y** (ENTER) and return to the first question (NAME OF FILE TO BE READ?)

If you don't want to convert another file, type **N** (ENTER). TRSDOS READY appears.

Sample Session

The following sample session shows how to convert a FORTRAN file named FORT1/DAT (on your Setup Diskette) to an acceptable Format and name it OUTPUT1/DATA for use with Business Graphics (using a floppy diskette system).

Prompt: TRSDOS READY

Response: **BASIC READATA1/BAS -F:2** (ENTER)

```
TRS-80 II BASIC-80 Rev. 1.2
Copyright 1979, 1980 by Tandy Corp. Licensed from
Microsoft
Created: 10-Jun-80
31940 Bytes free, 2 Files

FILE READING & DATA SELECTION PROGRAM, VERSION 1.0
COPYRIGHT 1982 TIMEWARE CORPORATION LICENSOR
ALL RIGHTS RESERVED
LICENSED TO TANDY CORPORATION

NAME OF FILE TO BE READ
    FORT1/DAT (ENTER)

NAME OF FILE TO BE CREATED?
    OUTPUT1/DAT (ENTER)

READ ALL VALUES OR READ SELECTED VALUES (ALL/SELECT)?
    S (ENTER)

START WITH WHICH VALUE (ENTER SEQUENCE #)?
    5 (ENTER)

SELECT EVERY 'NTH' VALUE (E.G., ENTER 5 FOR EVERY 5TH)?
    2 (ENTER)
```

```
NUMBER OF VALUES TO BE SELECTED (OR ALL)?
    5 (ENTER)

DO YOU WANT TO SKIP NON-NUMERIC DATA OR CHANGE THEM?
(SKIP/CHANGE)?
    C (ENTER)
```

INPUT SEQUENCE#	INPUT VALUE	OUTPUT SEQUENCE#	OUTPUT VALUE
5	5.9999995	1	5.9999995
7	8.3999996	2	8.3999996
9	10.7999992	3	10.7999992
11	13.1999989	4	13.1999989
13	15.5999994	5	15.5999994

```
OUTPUT FILE OUTPUT1/DAT CONTAINS 5 VALUES

DO YOU WANT TO CREATE ANOTHER FILE (YES/NO)?
    N (ENTER)

TRSDOS READY
```

Appendix D
Configuration And Data Conversion Files

Many of the files on the Setup Diskette pertain to features and output devices that you might not ever use. If you wish, you can create a Setup Diskette that contains only those files that you need. To do this, use the MOVE or COPY command to copy the necessary files onto a system diskette (a diskette that contains an operating system). Details on the use of the MOVE and COPY commands are in your computer owner's manual. The following chart lists the files you need.

Necessary Files	Conditions
READATA1/BAS RDSUBR20	You have a floppy disk system and you plan to convert SCRIPSIT, BASIC, or FORTRAN files for use with Business Graphics.
READATA2/BAS RDSUBR4X	You have a hard disk system and you plan to convert SCRIPSIT, BASIC, or FORTRAN files for use with Business Graphics.
LOSCREEN LORESCRN	You do not intend to install the high resolution graphics board for use with Business Graphics.
HISCREEN HIRESCRN	You plan to use Business Graphics' high resolution graphics feature (with the high resolution graphics board).
LPV MTRX5LIN MTRX5BAR MTRX5PIE MTRX5CT DRIVR56	You plan to use a Line Printer V with Business Graphics.
LPVI MTRX6LIN MTRX6BAR MTRX6PIE MTRX6SCT DRIVR56	You plan to use a Line Printer VI with Business Graphics.
LPVII MTRX7LIN MTRX7BAR MTRX7PIE MTRX7SCT DRIVR7	You plan to use a Line Printer VII with Business Graphics.
LPVIII MTRX8LIN MTRX8BAR MTRX8PIE MTRX8SCT DRIVR7	You plan to use a Line Printer VIII with Business Graphics.

DAISYII DAISYLIN DAISYBAR DAISYPIE DAISYSCT DRIVRDII	You plan to use a Daisy Wheel II Printer with Business Graphics.
DWP410 DWP41LIN DWP41BAR DWP41PIE DWP41SCT DRIVRDII	You plan to use a DWP-410 with Business Graphics.
MULTIPHZ MPLTHLIN MPLTHBAR MPLTHPIE MPLTHSCT DRIVRPLT	You plan to use the Multi-Pen Plotter in horizontal format with Business Graphics.
MULTIPVT MPLTVLIN MPLTVBAR MPLTVPIE MPLTVSCT DRIVRPLT	You plan to use the Multi-Pen Plotter in vertical format with Business Graphics.
DMP100 DMP10LIN DMP10BAR DMP10PIE DMP10SCT DRIVR7	You plan to use the DMP-100 with Business Graphics.
DMP200 DMP20LIN DMP20BAR DMP20PIE DMP20SCT DRIVR7	You plan to use the DMP-200 with Business Graphics.
DMP400 DMP40LIN DMP40BAR DMP40PIE DMP40SCT DRIVR7	You plan to use the DMP-400 with Business Graphics.

DMP500 DMP50LIN DMP50BAR DMP50PIE DMP50SCT DRIVR7	You plan to use the DMP-500 with Business Graphics.
DMP2100 DMP21LIN DMP21BAR DMP21PIE DMP21SCT DRIVR7	You plan to use the DMP-2100 with Business Graphics.

Appendix E Program Messages

A flashing message that appears at the bottom of the screen is a program message. It can be either a warning or an indication of an error. All such messages require you to respond in some way.

Warning messages (all of which begin with "WARNING:") notify you of some action the program has taken or some condition of which you should be aware. If you wish, you can simply press (ESC) to acknowledge the message and then continue. However, you may want to change some of your settings or revise your data before proceeding.

Error messages appear when the program cannot follow your instructions — for example, if a file cannot be located, if settings are inconsistent, or if an entry is outside the acceptable range. When an error message appears, you must change your instructions before the program can continue.

The program messages are listed in this appendix in alphabetical order. Possible causes and suggested remedies are included.

```
# MUST BE 1 TO xxx! PRESS "ESC".
```

If you are editing data, you specified a sequence number that is either too large or less than 1. If you are changing or deleting data, "xxx" is the sequence number of the last current data value. If you are inserting data, "xxx" is one beyond the sequence number of the last current data value.

If you are recalling data from a VisiCalc DIF file, you specified a row or column number that is either less than 1 or greater than the number of rows or columns (indicated by "xxx") in the file.

Press (ESC) and enter a valid number.

```
# MUST BE xxx TO yyy! PRESS "ESC".
```

You are trying to delete a range of data values, but you either specified an upper limit that is less than the lower limit (xxx) or entered a sequence number larger than that of the last current data value (yyy). Press (ESC) and enter a valid number.

```
AT LEAST n VALUES NEEDED FOR TREND! PRESS "ESC".
```

You are trying to compute a trend with too few values. At least two values are needed to compute a linear or exponential trend; at least three values are needed to compute a quadratic trend. Press (ESC), return to the Data Handling Menu, and enter more values.

```
CANNOT ACCESS DATA FILE!   PRESS "ESC".
CANNOT ACCESS DATA FILE x! PRESS "ESC".
```

You are trying to generate a chart, and the computer is unable to load the specified data file. "x" is the number of the bar set or curve to which the data file pertains. This message may result from one of the following conditions:

- No filename is specified in the chart settings.

- The filename is invalid.
- The computer cannot find the file.
- The computer cannot read the file.

Press (ESC), select the Data & Format Settings Menu, and make sure you entered the name of a file that is saved on your diskette.

```
CANNOT ACCESS YOUR FILE! SELECT 2 TO TRY AGAIN.
CANNOT ACCESS YOUR SETTINGS FILE! PRESS "ESC".
CANNOT LOAD YOUR CHART! SELECT 1 TO TRY AGAIN.
```

The computer is unable to load your data file, chart settings file, or chart file for one of the following reasons:

- The filename is invalid.
- The computer cannot find the file.
- The computer cannot read the file.

Press (ESC) and make sure you entered the name of a file that is saved on your system diskette.

```
CANNOT SAVE YOUR CHART! PRESS "ESC".
CANNOT SAVE YOUR CHART! SELECT 9 TO TRY AGAIN.
CANNOT SAVE YOUR DATA! SELECT 8 TO TRY AGAIN.
CANNOT SAVE YOUR SETTINGS! PRESS "ESC".
```

Your current chart, data, or settings cannot be saved on diskette for one of the reasons listed in the following chart.

Cause	Remedy
No room on diskette (no free granules or no room in the directory)	Place a new system diskette in Drive 0.
Protected file	Specify an unprotected file.
Diskette error	Try again or use a new diskette.
Invalid filename	Try again.

Press (ESC) and remedy the problem.

```
CANNOT STACK NEGATIVE VALUES. PRESS "ESC".
```

You are trying to generate a stacked bar chart using at least one data set that contains one or more negative values. Press (ESC) and either return to the Data & Format Settings Menu and specify grouped format for the bars, or return to the Data Handling Menu and remove the negative values from your data files.

```
CONSTANT CANNOT BE ZERO! PRESS "ESC".
```

You are trying to divide by zero. Press (ESC) and try a different constant.

DATA CANNOT BE NEGATIVE OR NEAR ZERO! PRESS "ESC".

You are trying to apply the logarithmic function or the exponential trend to data that has one or more values less than, equal to, or near zero. Press (ESC) and either change the value(s) or try a different function.

DATA UNSUITABLE FOR AUTO SCALING! PRESS "ESC".

You are trying to generate a chart using data values that are inappropriate for automatic scaling. The screen shows the current data range and the number of data values. With scatter charts, the screen indicates whether the problem pertains to the horizontal or vertical scale. All values in files 1, 3, and 5 (if specified) are used for the vertical scale; and all values in files 2, 4, and 6 (if specified) are used for the horizontal scale.

This message results from one of the following conditions:

- Only one data point exists.
- All data points have the same value.
- The data is made up of values with very small relative differences between them (for example, 900,000 to 900,100).

Press (ESC) and either specify your own numeric scale range in the Data & Format Settings Menu or revise the data through the Data Handling Menu.

ENTER "ROW" OR "COL" ONLY! PRESS "ESC".

The only valid response to the current prompt is "ROW" or "COL". (The program actually reads only the first character of the response.) Only one row or column of a VisiCalc DIF file can be recalled at one time. Press (ESC) and enter a valid response.

ENTER "YES" OR "NO" ONLY! PRESS "ESC".

The only valid response to the current prompt is "YES" or "NO". (The program actually reads only the first character of the response.) Press (ESC) and enter a valid response.

ENTRY INVALID OR OUT OF RANGE! PRESS "ESC".

This message is caused by one of the following problems:

- You specified a horizontal axis length that is outside the permissible range (20 to 100) or invalid (not a whole number or, with a scatter chart, not an even multiple of 10).
- You specified a vertical axis length that is invalid. The valid lengths are 18, 24, 30, 36, 42, and 48.
- You entered a value other than 0, 1, or 2 for the number of digits to be printed to the right of the decimal point in numeric scale labels.

- You entered a slice number that is not a whole number between 1 and 12.
- You specified a page width, page height, or page margin that is invalid (not a whole number) or outside the permissible range. The valid ranges are shown in the following chart.

Device	Page Width	Page Height	Top & Bottom Margins	Left & Right Margins
Wide-carriage printer	35-110	30-66	0-40	0-80
Narrow-carriage printer	35-80	30-66	0-40	0-55
Multi-Pen Plotter				
horizontal format	35-87	30-40	0-18	0-60
vertical format	35-67	30-52	0-30	0-40

Press (ESC) and enter a valid number.

```
ERROR: BOTH FILES CANNOT BE THE SAME
```

You specified the same name for your input and output files. The conversion program will not write the converted data back to the same file. Specify another name for the output file.

```
ERROR: CANNOT ALLOCATE DISK SPACE FOR YOUR FILE
```

Either the diskette is full, the filename is invalid, or the diskette is write-protected. If the filename is valid and the diskette is not write-protected, return to TRSDOS to kill some unused files on the diskette.

```
ERROR: CANNOT FIND YOUR FILE
```

The input file does not exist. Make sure you entered the name correctly. Then check the directory to make sure the file is on the diskette.

```
ERROR: CANNOT READ YOUR FILE
```

The utility program cannot read the input file. Check the format of the file to make sure it is acceptable to the conversion program.

```
ERROR: CANNOT WRITE YOUR FILE
```

During conversion to the output file, the diskette was filled. The program converted only what the diskette space allowed. Return to TRSDOS to kill some unused files on the diskette.

```
ERROR: "F" OPTION REQUIRED WHEN ENTERING BASIC.
SPECIFY AT LEAST TWO FILES (E.G., "BASIC -F:2").
```

If the **F** option is omitted when you enter BASIC, you can neither read nor write files. Type **SYSTEM** (ENTER) to return to `TRSDOS READY` and reenter **BASIC**, specifying two or more files.

FACTOR IS TOO LARGE/SMALL FOR xxx VALUES! PRESS "ESC".

You entered a geometric factor that will produce numbers either too large or too small (outside the range of 10^{-15} to 10^{15} absolute value) to be handled by the program. "xxx" is the number of values requested. Press (ESC) and try again, changing the factor and/or the number of values to be generated.

GRAPHICS BOARD NOT INSTALLED OR NOT WORKING!
PRESS "ESC" TO RETURN TO PREVIOUS MENU

You tried to display a chart with a Processing Diskette that is configured for a high-resolution graphics board. The computer you are using does not have a properly functioning graphics board, or the board is not installed. Press (ESC) and don't try to display a chart until you have reconfigured the diskette (see Chapter 4 for instructions) or until the graphics board has been installed or repaired.

HORIZONTAL-AXIS LABEL EXCEEDS 15 CHARS! PRESS "ESC".

You are trying to generate a scatter chart for which the horizontal-axis label has more than 15 characters (the maximum allowed). Press (ESC) and remedy the problem. If you requested a leading character, commas, or one or two decimal places in the scale labels, return to the Data & Format Settings Menu. Then, change the format so the label fits within the limit. If your data includes a value outside the range of -10^{13} through 10^{14}, return to the Data Handling Menu. Then, scale the data with the division transformation before trying to use it for the scatter chart.

INVALID DATE ENTRY! PRESS "ESC".

You entered a starting date for the horizontal-axis labels in an invalid format or range. The starting date must be in the form nnWyy for weekly labels, mmmyy for monthly labels, nQyy for quarterly labels, or yy for yearly labels. For weekly labels, the range must be from 1 to 52; for quarterly labels, it must be from 1 to 4. Press (ESC) and enter a valid date.

INVALID OR INSUFFICIENT DATA ON YOUR FILE! PRESS "ESC".

You are trying to recall data from a VisiCalc DIF file that contains invalid data or less data than indicated by the number of rows and columns. Press (ESC) and try another file.

INVALID SCALE RANGE ENTRY! PRESS "ESC".

You specified a numeric scale range that does not conform to the required format: two numbers, each containing up to 12 digits (including up to two decimal places), separated by a comma or a blank. Press (ESC) and enter a valid range.

LABEL EXISTS AT CURSOR! SELECT 2 TO MOVE CURSOR.

You are trying to create a new label, but the cursor is positioned on an existing label. Press (ESC) to return to the Chart Text Editor Menu. Choose Selection 2 to display the chart. Reposition the cursor before trying again to create the label.

LABELS OVERLAP! LATEST LABEL MUST BE MOVED! SELECT 7

You created, changed, or moved a label so it overlaps an existing label. (If no overlap is visible, the label may be overlapping a blank.) The label must be moved to a non-overlapping position before you can do anything else. Press (ESC) or (7) to display the chart. Then move the label by using the arrow keys. (See Chapter 10, "Chart Text.") When the label no longer overlaps any other label, press (ENTER).

MAX 100 DATA VALUES ALREADY PRESENT! PRESS "ESC".

You are trying to insert data when 100 data values (the maximum) already are present. Press (ESC) and remove some data before trying again.

MORE THAN 12 DATA VALUES IN DATA FILE! PRESS "ESC".

You are trying to generate a pie chart using a data file that has more than 12 values. Press (ESC) and specify a different file or return to the Data Handling Menu and save a data file that has from 2 to 12 values.

MUST HAVE MORE THAN 1 DATA VALUE! PRESS "ESC".

You are trying to generate a moving average or consolidate your data, but there is only one data value. Press (ESC) and return to the Data Handling Menu to enter more values.

NEGATIVE OR ZERO VALUE(S) IN DATA FILE! PRESS "ESC".

You are trying to generate a pie chart, using a data file that contains an invalid value. Press (ESC) and specify a different file or return to the Data Handling Menu and remove all negative and zero data values from the file.

NO CHART HAS BEEN LOADED! SELECT 1 TO LOAD A CHART.

You are trying to edit, save, display, or print a chart, but no chart is in current memory. Choose the "Load Chart" Selection before trying any other functions.

NO DATA PRESENT! SELECT 1, 2 OR 3 TO ENTER DATA.

You are trying to edit, transform, print, or save data when no data is present. Choose Data Handling Menu Selection 1, 2, or 3 to enter, retrieve, or generate some data.

NO FILE NAME FOR BAR SET 1 AND/OR 2! PRESS "ESC".

You are trying to generate a bar chart after supplying a filename for Bar Set 2 but not for Bar Set 1, or for Bar Set 3 but not for both Bar Sets 1 and 2. Press (ESC) and select the Data & Format Settings Menu. Either specify files for the missing bar sets or assign the existing file(s) to the first or the first and second bar sets.

NO FILE NAME FOR CURVE 1 AND/OR 2! PRESS "ESC".

You are trying to generate a line chart after supplying a filename for Curve 2 but not for Curve 1, or for Curve 3 but not for both Curves 1 and

2. Press (ESC) and select the Data & Format Settings Menu. Either specify files for the missing curves or assign the existing file(s) to the first or the first and second curves.

NO LABEL AT CURSOR! SELECT 2 TO MOVE CURSOR.

You are trying to change or move a label, but the cursor is not positioned on an existing label. Choose the "Display Chart" Selection and use the arrow keys to position the cursor on the desired label before trying this function again.

NOT A BAR CHART SETTINGS FILE! PRESS "ESC".
NOT A LINE CHART SETTINGS FILE! PRESS "ESC".
NOT A PIE CHART SETTINGS FILE! PRESS "ESC".
NOT A SCATTER CHART SETTINGS FILE! PRESS "ESC".

You are trying to load settings, naming a file that either does not contain chart settings or contains settings for a different chart type. Press (ESC) and enter the name of a file that has been saved using the "Save Settings" selection of the current chart menu.

ONLY 1 TO 100 VALUES MAY BE GENERATED! PRESS "ESC".

You are trying to generate a sequence that would result in more than 100 data values, the maximum allowed. Press (ESC) and try a sequence with fewer values.

ONLY 2 TO xxx VALUES MAY BE AVERAGED! PRESS "ESC".

You are trying to average either too few values (0 or 1) or too many values (more than the number in the current file). "xxx" is the number of values in the current data file. Press (ESC) and try again.

ONLY 2 TO xxx VALUES MAY BE TOTALED! PRESS "ESC".

You are trying to consolidate either too few values (0 or 1) or too many values (more than the number in the current file). "xxx" is the number of values in the current data file. Press (ESC) and try again.

ONLY NUMBERS MAY BE ENTERED! PRESS "ESC".

You entered a non-numeric character such as a letter or symbol when a numeric value was expected. Only digits, decimal points, and leading plus or minus signs are acceptable. Press (ESC) and enter a valid number.

ONLY ONE DATA VALUE IN DATA FILE! PRESS "ESC".

You are trying to generate a pie chart using a data file that has only one value. Press (ESC) and specify a different file, or return to the Data Handling Menu and save a data file that has from 2 to 12 values.

ONLY UP TO 10 CHARACTERS MAY BE ENTERED! PRESS "ESC".

You are trying to enter a data value with more than 10 characters (the maximum allowed), including any decimal point or leading sign. Press (ESC) and try again.

ONLY UP TO xx VALUES MAY BE PROJECTED! PRESS "ESC".

You are trying to project values in a trend or growth transformation beyond the maximum of 100 values. "xx" is the highest acceptable number, based on the current data. Press (ESC) and try again.

ONLY WHOLE NUMBERS MAY BE ENTERED! PRESS "ESC".

You are trying to enter a non-integer value when an integer (whole number) is required (for example, a sequence number, or a row or column number). Press (ESC) and enter a whole number.

PAIRS OF DATA FILE NAMES ARE REQUIRED! PRESS "ESC".

You are trying to generate a scatter chart when either one or no data filename was supplied. Press (ESC), select the Data & Format Settings Menu, and supply the missing filename(s).

PLOTTER IS NOT READY! PRESS "ENTER" WHEN READY.
PLOTTER IS NOT READY! PRESS "ENTER" WHEN READY.
PLOTTER NOT READY! PRESS "ESC".

You are trying to print a chart, data, or chart settings when the printer or plotter is not ready. The device either is not turned on, is not on-line, or is not functioning properly. If you are printing a chart, remedy the problem and press (ENTER) to start printing. If you are printing data or chart settings, press (ESC) to return to the menu. Then remedy the problem and select the print function again.

SCALE RANGE NOT LOW-TO-HIGH! PRESS "ESC".

For the numeric scale, you specified a range in which the second value is smaller than the first. Press (ESC) and reenter the lower and upper limits in that order.

SOME/ALL HORZ DATA OFF SCALE! PRESS "ESC".

You are trying to generate a scatter chart and specified for the horizontal scale a range that does not include all your data values. (Values in files 2, 4, and 6 are used for the horizontal scale.) Press (ESC), return to the Data & Format Settings Menu, and increase the range (or enter AUTO to let the program determine the range).

SOME/ALL VERT DATA OFF SCALE! PRESS "ESC".

You are trying to generate a line chart, bar chart, or scatter chart and specified for the vertical scale a range that does not include all your data values. (In a scatter chart, values in files 1, 3, and 5 are used for the vertical scale.) Press (ESC), return to the Data & Format Settings Menu, and increase the range (or enter **AUTO** to let the program compute the range).

SOME DATA VALUES ARE TOO LARGE! PRESS "ESC".

You are trying to perform a transformation on data values that are too large (greater than $+/- 10^{15}$) for the computations to be performed. Press (ESC) and scale your data using the division transformation.

THE CHART HAS TOO MANY REQUESTED PARTS! PRESS "ESC".

You are trying to generate a chart that requires more internal storage space than the computer has available. Press (ESC) and simplify your chart. (For example, you can delete or shorten labels or decrease the number of data points in the chart.)

THIS CHART IS NOT FOR THIS PRINTER! PRESS "ESC"

You are trying to load a chart that was created for an output device different than the one for which the current Processing Diskette is configured. Press (ESC) and specify a chart that was created for the current device type.

THIS FILE IS NOT A CHART FILE! PRESS "ESC".

You are trying to load a chart, naming a file that is not a chart file. Press (ESC) to delete the filename. Then, press (ENTER) and supply the name of a chart file.

TITLE TOO LONG! PRESS "ESC".

You entered a title that exceeds the maximum number of characters (50 for top and bottom titles, 25 for left titles). Press (ESC) and enter a shorter title.

TOO MUCH TEXT IN CHART! SELECT 6 TO DELETE.

Because of text added through the Chart Text Editor Menu, the chart used up the available internal storage space in the computer. Use Selection 6 to delete some of the text. The first time this message appears, you still have some leeway — about 30 characters — and can delete text, adjust one or more existing labels, and so on. If the message appears a second time, you are locked out of the editing functions. You can save or print the chart as is or you can reload the chart, discarding all editing changes made since you last saved the chart, and start over.

TOTAL HEIGHT EXCEEDS PAGE HEIGHT! PRESS "ESC".

You are trying to generate a chart that is taller than the page height on which it is to be printed. The screen shows a summary of the settings that contribute to chart height. For example:

CHART ELEMENT	SETTING	RANGE
(1) TOP MARGIN	0	0 – 40
(2) FRAME (TOP & BOTTOM)	8	0 OR 8
(3) TOP TITLE AREA	5	0 OR 5
(4) VERT AXIS LENGTH	48	18 – 48
(5) BOTTOM SCALE LABEL	3	1 OR 3
(6) BOTTOM TITLE AREA	4	0 OR 4
(7) BOTTOM MARGIN	0	0 – 40
TOTAL HEIGHT (1) THRU (7)	68	30 – 66
PAGE HEIGHT	66	30 – 66

On the Multi-Pen Plotter with vertical format, total height and page height are limited to 52 lines. Top and bottom margins are limited to 30 lines. With horizontal format, total height and page height are limited to 40 lines top and bottom margins to 18 lines.

The frame and space inside it require eight lines; five lines are used for the top title and space following it; and four lines are used for the bottom title and space preceding it. If you omit the horizontal-axis labels, one line is used for the axis border. Otherwise, three lines are used for the border, labels, and a line following them.

Press (ESC), return to the appropriate menu, and change the settings to reduce the height of the chart, and/or increase the page height setting if it is not already at its maximum value.

`TOTAL WIDTH EXCEEDS PAGE WIDTH! PRESS "ESC"`

You are trying to generate a chart that is wider than the page width on which it is to be printed. The screen shows a summary of the settings that contribute to chart width. For example, the following screen could pertain to any wide-carriage printer:

CHART ELEMENT	SETTING	RANGE
(1) LEFT MARGIN	0	0 – 80
(2) LEFT FRAME	3	0 OR 3
(3) LEFT TITLE AREA	0	0 OR 3
(4) VERTICAL AXIS & LABELS	2	2 – 16
(5) HORZ AXIS LENGTH (ADJUSTED)	100	20 – 100
(6) RIGHT FRAME	4	0 – 21
(7) RIGHT MARGIN	0	0 – 80
TOTAL WIDTH (1) THRU (7)	109	35 – 110
PAGE WIDTH	85	35 – 110

On the Multi-Pen Plotter with vertical format, total width and page width are limited to 67 character positions. Left and right margins are limited to 40 character positions. With horizontal format, total width and page width are limited to 87 character positions. Left and right margins are limited to 60 character positions.

On narrow-carriage printers, total width and page width are limited to 80 character positions. Left and right margins are limited to 55 character positions.

The frame and space inside it require seven character positions, and three character positions are used for a left title and space following it. At least two character positions are used for the vertical axis and labels.

Press (ESC), return to the appropriate menu, and change the settings to reduce the width of the chart, and/or increase the page width settings if it is not already at its maximum value.

VERTICAL-AXIS LABEL EXCEEDS 15 CHARS! PRESS "ESC".

You are trying to generate a line chart, bar chart, or scatter chart for which the vertical-axis label has more than 15 characters, the maximum allowed. Press (ESC) and remedy the problem. If you requested a leading character, commas, or one or two decimal places in the scale labels, return to the Data & Format Settings Menu and change the format so the label fits within the limit. If your data values themselves exceed 15 digits (that is, your data includes a value outside the range of -10^{13} through 10^{14}), return to the Data Handling Menu and scale the data with the division transformation before trying to use it for a chart.

WARNING: BOTTOM TITLE SHORTENED TO FIT. PRESS "ESC".

You are trying to generate a chart, and the bottom title you supplied either did not fit within a requested frame or did not fit within the page width. The rightmost letters of the title are deleted. Press (ESC) to continue. If you save the chart, you can then change the title through the Chart Text Editor Menu.

WARNING: FILL IGNORED FOR NON-SOLID CURVE! PRESS "ESC".

You are trying to generate a line chart or scatter chart, and you requested fill for a curve that is represented by a dashed or dotted line or by data points only. Fill is available under solid-line curves only. Press (ESC) to continue.

WARNING FILL IGNORED-HORZ DATA OF CURVE n UNSUITABLE!
PRESS "ESC".

You are trying to generate a scatter chart with fill, but the values for the horizontal data point locations for curve n are not in low-to-high sequence. Press (ESC) to continue.

WARNING: FILL OVERRIDES DATA POINT CHARACTER.
PRESS "ESC".

You are trying to generate a line chart or scatter chart and you requested both fill and a special data point character for a curve. The data point character is set to AUTO (the character used for the connecting line) in order to fill under the curve. Press (ESC) to continue.

WARNING: LABEL AT 64-CHARACTER MAXIMUM! PRESS "ESC".

You are trying to create a label that is more than 64 characters in length. Only the first 64 characters have been retained. Press any key to return to the Chart Text Editor Menu. Choose Selection 2 to display the chart. Reposition the cursor if you want to delete or type over some characters in the label.

WARNING: LEFT TITLE SHORTENED TO FIT! PRESS "ESC".

You are trying to generate a line chart, bar chart, or scatter chart, but the left title you supplied exceeds the length of the vertical axis. The lowermost letters of the title are deleted. Press (ESC) to continue. If you

save the chart, you can then change the title through the Chart Text Editor Menu.

```
WARNING: n NON-NUMERIC INPUT VALUES WERE SKIPPED
```

While using the conversion procedures, you chose to skip non-numeric values, and n such values were encountered in the input file.

```
WARNING: ONLY 1ST 100 ITEMS TAKEN FROM COLUMN!
PRESS "ESC"
```

```
WARNING: ONLY 1ST 100 ITEMS TAKEN FROM DATA FILE!
PRESS "ESC".
```

```
WARNING: ONLY 1ST 100 ITEMS TAKEN FROM ROW! PRESS
"ESC".
```

You are trying to retrieve a data file or a column or row of a VisiCalc DIF file that contains more than 100 data values. Only the first 100 values are retrieved. Press (ESC) to continue.

```
WARNING: ONLY 1ST 100 ITEMS TAKEN FROM DATA FILE x!
PRESS "ESC".
```

You are trying to generate a chart using a data file that contains more than 100 data values. "x" is the number of the bar set or curve to which the data pertains. Only the first 100 values are used. Press (ESC) to continue.

```
WARNING: PAGE HEIGHT TOO LARGE, DEFAULT USED.
PRESS "ESC".
```

```
WARNING: PAGE WIDTH TOO LARGE, DEFAULT USED.
PRESS "ESC".
```

You loaded a chart settings file that contains a page height or page width setting that exceeds your current device maximum. The default value of the current device is used instead. Press (ESC) to continue.

```
WARNING: POSSIBLE HIDDEN SLICE(S). PRESS "ESC".
```

You are trying to generate a pie chart, and at least one slice is too small to show up on the screen. The slice may be visible if the chart is produced on a printer or pen plotter. Press (ESC) to continue.

```
WARNING: TITLE TOO LONG, "NORMAL" SIZE SET. PRESS "ESC".
```

You have requested DOUBLE character size or spacing for a title that exceeds 32 characters. The size has been reset to NORMAL. Press (ESC) to continue.

```
WARNING: TOO MANY BAR DATA VALUES! PRESS "ESC".
```

You are trying to generate a bar chart that has more bars than will fit within the current format settings. Some bars must be omitted. The message on the screen tells you how many bars can fit and suggests ways to remedy the problem. When you press (ESC), you are asked

whether you want the program to generate the chart the way it is. If you answer YES, the chart is displayed, printed, or saved. If you answer NO or press (ESC), you are returned to the Bar Chart Menu.

If the horizontal axis length is not already at the maximum, select the Data & Format Settings Menu and increase the axis length to make room for more bars. (You may also need to increase the page width, using the Printer/Plotter Settings Menu.) If the bars are grouped, you may be able to fit all the data onto the chart by switching to stacked format if your data contains no negative values. Otherwise, return to the Data Handling Menu and delete some of your data.

WARNING: TOP TITLE SHORTENED TO FIT! PRESS "ESC".

You are trying to generate a chart, but the top title you supplied either did not fit within the requested frame or did not fit within the page width. The rightmost letters of the title are deleted. Press (ESC) to continue. If you save the chart, you can then change the title through the Chart Text Editor Menu.

WARNING: UNEQUAL ITEM COUNTS IN DATA FILES! PRESS "ESC".

You are trying to generate a grouped or stacked bar chart, but the data files do not contain the same number of values. Press (ESC) to continue. (The shorter files are extended with zeros.)

WARNING: UNEQUAL NO. OF VALUES! PAIRS USED.PRESS "ESC".

You are trying to generate a scatter chart, but the data files for the horizontal and vertical axes do not contain the same number of values. Only the paired values (the number of values in the shorter file) are used. Press (ESC) to continue.

WARNING: n VALUES REQUESTED BUT ONLY m WERE ON FILE

You are requested more values than are available on the input file. Only m values were converted and written to the output file.

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