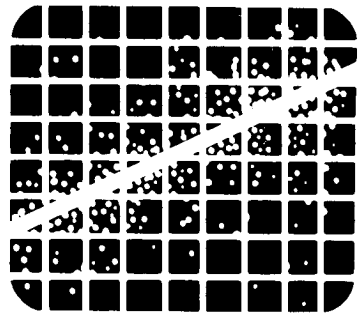
SynTrend™ *

Graphing, Statistical Analysis & Forecasting™

By Brian Lee, Randy Lert and Ron Conley



A Graphics and Statistics Package for Home and Business Management. Includes both SynGraph and SynStat.

synapse

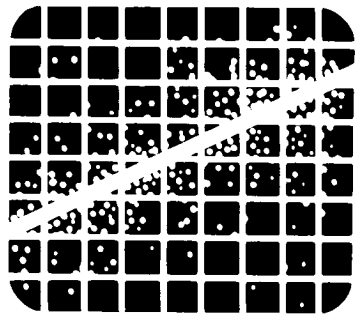
*Developed Exclusively by Synapse® for ATARI®

Atari, Inc., 1312 Crossman Ave., P.O. Box 61657, Sunnyvale, CA 94086
Made in the U.S.A.

SynStat™ *

Easy Statistical Analysis

By Randy Lert and Ron Conley



Requires ATARI Home Computer with minimum 48K RAM memory and disk drive. Optional: printer.

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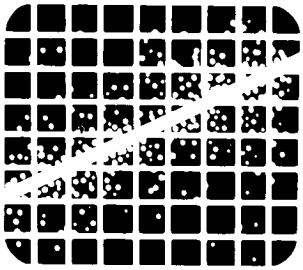


1 General Introduction

SynStat™ is an easy-to-use statistical program for quickly and easily analyzing financial trends for your home, business, or schoolwork. *SynStat* has been carefully designed for clarity and flexibility, with easy to understand commands, error messages, and clearly designed screens and menus.

SynStat is a powerful forecasting and planning tool. With it you will be able to perform descriptive analyses on variables, perform simple and multiple regressions and write out files for graphing. *SynStat* files can be converted to the Data Interchange Format (DIF™) which allows them to be displayed with *SynGraph*™. *SynStat* is also fully compatible with *SynCalc*™ and *SynFile+*™, thereby providing a complete applications package for the ATARI home computer owner.

How To Use This Manual

This manual has been divided into five sections. These sections are designed to give a clear presentation of the material and easy access to the information and specifications required to run the program. Both the computer novice as well as the seasoned professional will find this program and manual easy to use and understand. As many examples as possible have been included to make the instructions and examples clear.

SECTION ONE contains an overview of the program and information about your equipment needs. It covers getting the program started (loaded) with an explanation of the keyboard and some of its special keys and functions.

SECTION TWO is a tutorial. We found, after extensive testing, that the best way to introduce a program is through a step-by-step creation of a demonstration statistical analysis. This allows you to go through the program in a methodical fashion, learning to use the various features as they appear in sequence. In reading the instructions, please try all the examples as they are described (even if you are not sure that you will be using them). This will familiarize you with the overall operation of the program, making the routine functions quick and easy.

SECTION THREE contains information on Data Interchange Formats (DIF) and sharing data with *SynGraph*, *SynCalc*, *SynFile+* and *VisiCalc**.

SECTION FOUR is the Reference Section. Here you will find information on column transformations (performing calculations) and other program utility functions which can be performed by *SynStat*.

SECTION FIVE is the Appendix and contains advice on what to do if *SynStat* won't load, [redacted] the procedure for obtaining back-up copies of your program disk, a bibliography, an error message index, a glossary and general index.

Before starting it is a good idea to take a look through the Glossary in the back of the manual. Please read through the definitions to make sure that they are used in the same way to which you are accustomed. Every effort has been made to keep the language as close to spoken English as possible. If you should encounter any unfamiliar words or do not understand a particular function while using the program, the glossary can be a handy reference.

*VisiCalc is a registered trademark of VisiCorp.

The error message index is an explanation of messages or warnings which may appear on your screen while you are using the program. This index will suggest how you might correct the situation which has caused the error message to appear.

Overview Of The Program

SynStat is a completely menu-driven statistical program with many applications and features. In addition to its many uses in the home and office, its calculating, projection, and analysis features combine to make it a powerful, versatile and handy tool for the calculation, manipulation and storage of data. You will find *SynStat* to be as easy to use as a pocket calculator, utilizing the electronic screen capabilities of the personal computer.

The program has two sections. The first section (Manipulate Data) is for creating data files with the information that you want to analyze or for editing existing data files. The second section (Analyze Data) allows you the choice of a descriptive analysis on your data files or the calculation of simple or multiple regressions.

SynStat has been designed for first-time users as well as experienced statisticians. *Syn-Stat*'s completely menu driven interface guides the first-time user through the operations in a step-by-step manner, leaving very little in terms of its operation to your imagination. However, if you are new to statistics, you may want to refer to a statistics textbook to fully understand and utilize *SynStat*'s advanced capabilities.

You will quickly learn the basics of operating *SynStat* by carefully following the tutorial in this manual. As you become more familiar with its operation, features and

applications, you will be able to perform more sophisticated analyses.

We hope you enjoy working with *SynStat* and the exciting world of analysis and forecasting which will be opened up to you.

What You Will Need

1. An ATARI home computer.
2. An ATARI disk drive (up to 4).
3. The program diskette, enclosed in the inside front cover pocket of the manual.
4. At least 48K of memory.
5. A TV set or other video monitor. A black and white set will work.
6. A set of blank diskettes for storing data.

OPTIONAL: A printer if you wish to generate hard copies.

The ATARI Keyboard

The ATARI keyboard is very similar to a typewriter keyboard, although the placement of special characters in some instances is different. The shift key on the ATARI keyboard works like the typewriter shift key. That is, you hold down (SHIFT) in order to obtain uppercase letters when you are in the lowercase mode or to type characters that appear on the top line of a key that has more than one character on it. For example, to type $, you hold down (SHIFT) and hit the key on the top row with the 4 and the $ on it. Note that unlike the typewriter keyboard, the characters * and + do not require the shift key.

A Word On Diskettes

You cannot be too careful when it comes to handling diskettes. Each diskette is a small magnetically coated plastic disk sealed in a protective square cover. Through the oval cut-out in the square cover, you can see the magnetic surface of the actual diskette.

Take careful note of the following guidelines for the handling of diskettes:

1. NEVER TOUCH THE EXPOSED MAGNETIC SURFACE with your fingers or any implement.
2. Protect the diskette from dust by storing it in the paper sleeve it comes in.
3. Keep it at least six inches from magnetic fields, such as those generated by a TV.
4. Extremes of temperature (such as in a car trunk on a warm day) could destroy a diskette, and you would lose your data, or the program.
5. Don't bend, staple or write on the square cover with a hard pen or pencil (use only soft felt tip pens).

Loading The Program

Introduction

Two disks are required to run *SynStat*: the program disk (which is provided), and a blank floppy disk to store your data files. Format the blank disks using the format option in *SynStat* (this procedure will be explained later).You always load the program disk into the computer using disk drive 1. With two disk drives, the data disk goes into drive 2. Operating the program with one disk drive involves

swapping the program disk and the data disk back and forth from drive 1 as needed. *SynStat* will run with as many as four disk drives.

The Write Protect Notch on a Disk

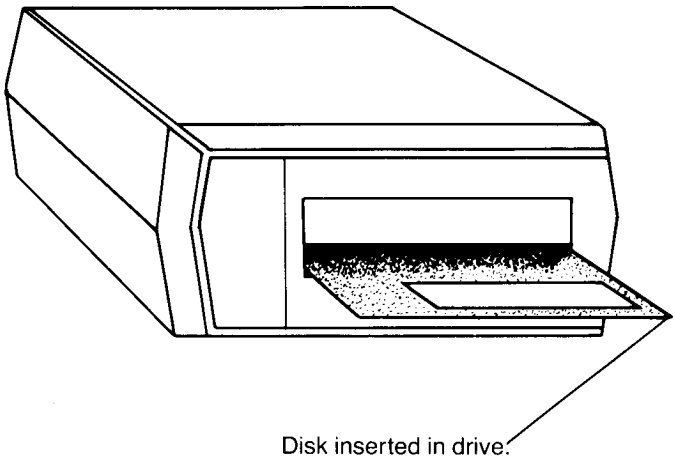
Disks have a "write protect" notch on the side of the jacket which, when covered with tape, prevents the disk from being written on. Do not cover the notch with a write protect label unless you are certain you do not want to store any more data on the disk.

Starting the System

Make sure you have REMOVED the ATARI BASIC cartridge from the cartridge slot and then check the disk drive(s). Make sure that the busy light is not on. Open the door on each disk drive (if you have more than one) and remove any diskettes that might be present. Leave the drive door(s) open for the time being. You will be inserting the program diskette later.

If your equipment is turned off, begin by turning on your TV set. Then turn on your disk drive. The drive motor will start up and run for a few seconds. When it stops, the BUSY light will go out, but the power light will remain lit.

Take the program diskette from the pocket on the inside front cover of the manual. Remove it from the paper sleeve and grasp the diskette by the label edge with the label side up. Carefully insert it into drive 1, with the label edge entering last (see illustration). Gently push the diskette all the way in. Close the drive door by pushing its handle down, until you hear the door click shut.



Disk inserted in drive.

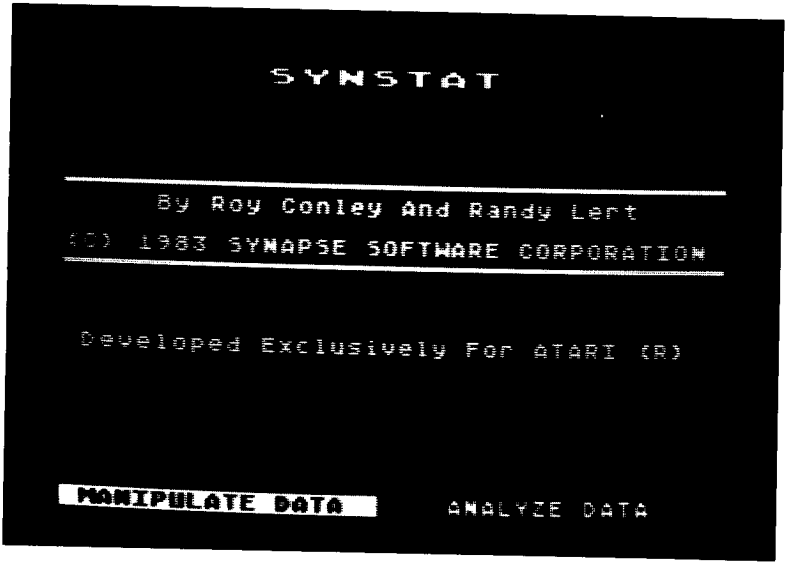
REMEMBER: Programs will only load from a disk drive with a DRIVE CODE number of 1. See your disk drive manual for details on setting the DRIVE CODE number.

Now, turn the computer on by pushing the power switch to the ON position.

NOTE: If your computer is an ATARI 600XL™/800XL™ series machine, you must disable ATARI BASIC. This is accomplished by holding down [OPTION] while the program is loading.

If your computer was already on, turn it off, pause a moment then turn it back on. The drive takes about half a minute to load the program.

As the program loading is completed, the Main Menu Screen appears and should look like this:



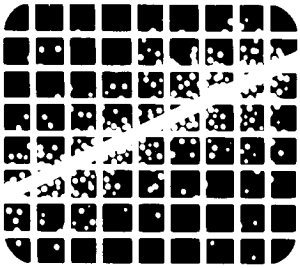
If your screen does not look like the one above, remove your program diskette from the drive. Turn off the computer and start over, using the same instructions above. If after

If you have two or more disk drives, you can leave the program disk in drive one and place a blank data disk into drive 2, 3, or 4. If you have one disk drive, remove the program disk and place a blank data disk in drive one. *SynStat* has been written to run with as many as four disk drives. With two disk drives or more, your system will automatically alternate between reading the program disk and the data disk as required.

If your data disk has not been used with *SynStat* before, it will need to be formatted. This is explained in the next section.

At this point we will summarize the steps for loading the program:

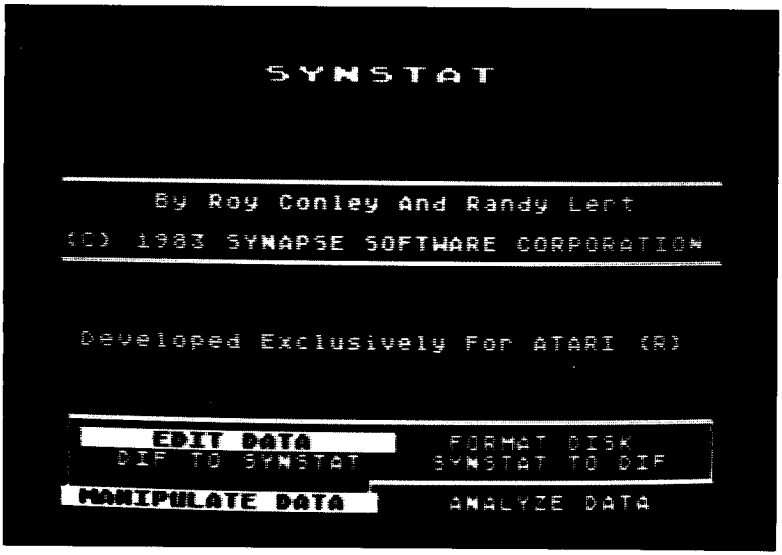
1. Remove any cartridges from the cartridge slot.
2. Turn on your monitor and disk drive, but not your computer.
3. Wait until the disk drive busy light is off.
4. Insert program disk and close drive door securely.
5. Turn on your computer, disabling ATARI BASIC if you have an ATARI 600XL/800XL series machine.



Main Menu Screen

Once the Main Menu appears on the screen you may select between MANIPULATE DATA or ANALYZE DATA. Using the (CTRL) and the arrow keys will move you from MANIPULATE DATA to ANALYZE DATA.

Experiment moving back and forth between MANIPULATE DATA and ANALYZE DATA using the (CTRL) and arrow keys, if you like. Now, with the cursor positioned over MANIPULATE DATA, press (RETURN). The MANIPULATE DATA sub-menu appears on your screen.



As you can see your options on this sub-menu are: EDIT DATA (which includes entering data for the first time),

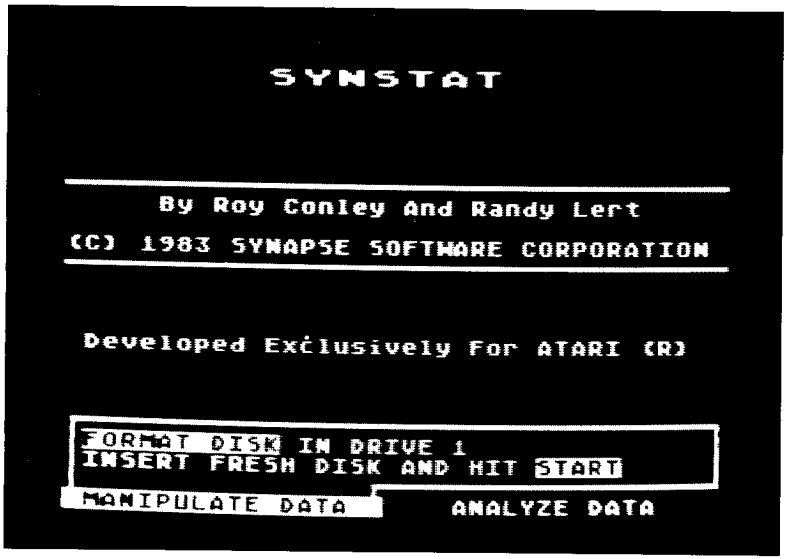
FORMAT DISK, DIF to *SynStat* and *SynStat* to DIF. All of these features will be discussed in this manual.

Before beginning Lesson One, make sure you have a blank disk to store the file which we will be creating. If you have an unformatted disk, it should not contain any files or information that you want to keep as formatting the disk will erase everything that is presently on it.

Formatting A Data Disk

With a blank disk in drive one, select FORMAT DISK from the MANIPULATE DATA sub-menu and press (RETURN).

The screen changes and you will see the prompt:



Make sure that there is nothing you want to save on the disk you are going to format, as formatting will erase everything on the disk.
PRESS (START) to continue.

When *SynStat* has finished formatting the disk, the MANIPULATE DATA sub-menu will reappear on your screen.

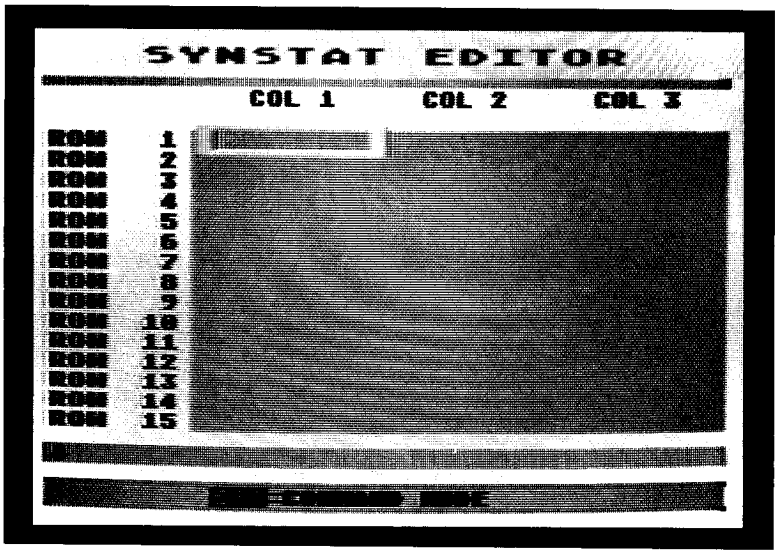
Lesson One

Edit Data

This operation is used for creating new files and for editing existing files. Since you need data files in order to do analyses, we will begin this tutorial by entering data to create a file. This file will reflect gross sales, automobile expenses, and telephone expenses for a hypothetical salesperson. We will use *SynStat*'s calculating abilities in Lesson 2 to total the automobile and telephone expenses. In Lesson 3 we will show you how to analyze the data and come to meaningful conclusions with regard to how our salesperson has been spending his time.

Remove your data disk and re-insert the program disk into drive one. Position the cursor over EDIT DATA and **PRESS** (RETURN).

The screen changes and you see the message LOADING EDITOR at the top of the screen. After about 30 seconds you are presented with the Edit screen, which looks and operates like a spreadsheet with a capacity of up to 1000 cells.

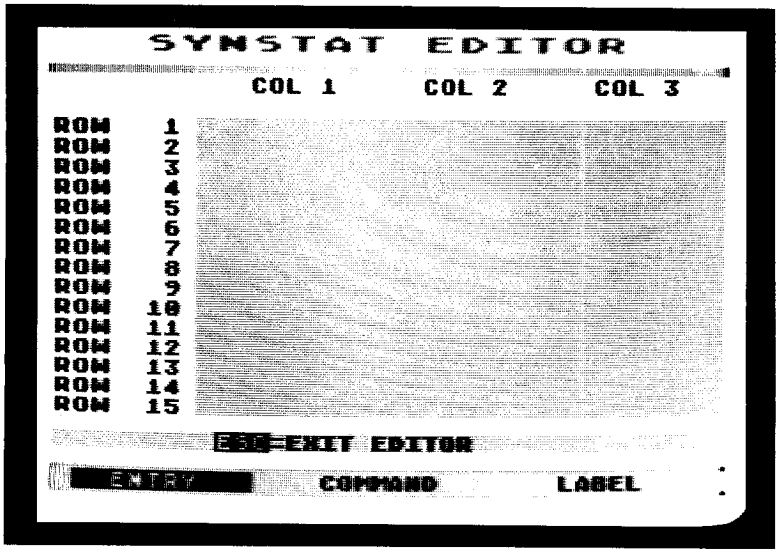


Edit Screen

The cursor rests at the top-left corner of the worksheet and is moved with (CTRL) and the arrow keys.
PRESS (ESC) to go into Command Mode.

Notice that the bottom two lines on the screen changed when you pressed (ESC). First, the yellow line turned to grey (the line with the arrow indicator at the left edge), the bottom line turned from grey to yellow and presented the Command Menu, and the cursor jumped from the worksheet to highlight the first option on the Command Menu, ENTRY.

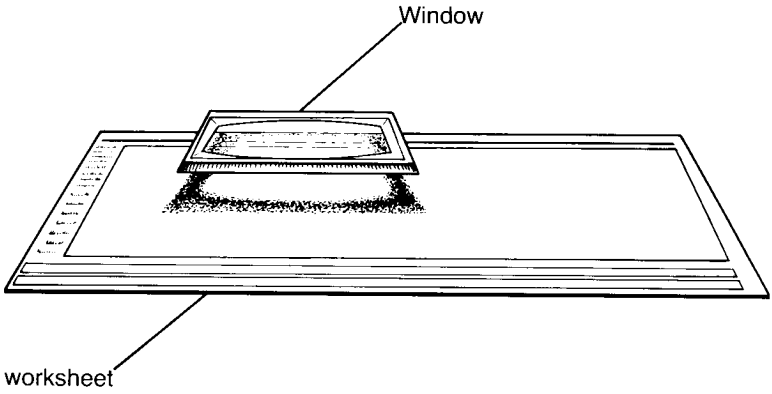
The Command Menu is displaying three menu options: ENTRY, COMMAND, and LABEL. With these three operations, you will be able to enter data, load and save files, manipulate columns, format decimal places, shift columns, calculate logarithms, move the cursor directly to Column 1, Row 1, or enter labels onto the screen.



PRESS (RETURN) to move out of Command Mode.

Notice the bottom line returns to its original grey color, the line above it is yellow again, and the cursor returns to its home position on the worksheet (Column 1, Row 1).

The worksheet contains 12 columns. Think of it as a ruled paper awaiting entries on your desk. Each entry is placed at an address describing its column and row location. This is called its cell location or cell address. Since the entire worksheet is too large for your screen display, the worksheet is displayed a section at a time. It is like looking through a window onto a portion of a landscape. Depressing (CTRL) and the arrow keys causes the sheet to scroll, bringing into view the desired portions as the previously displayed sections scroll off the screen.



Window over worksheet

Scrolling

If you have been following the directions so far, your screen should be displaying the worksheet with the yellow cursor in the upper-left corner and the bottom line grey with the one above it yellow. If you are still in Command Mode (the bottom line is yellow and the one above it is grey and the cursor is resting at ENTRY), press RETURN to return to the worksheet.

Notice the arrow indicator at the left edge of the screen on the yellow line. It should be pointing down. Depress CTRL → and watch it change direction. The cursor also jumped over to Column 2, Row 1. To continue moving the cursor in the same direction, you can press RETURN or continue to use the arrow keys. Keep pressing RETURN until you come to the far right edge of the worksheet. Now press CTRL ← to change the direction of the arrow indicator and press RETURN until the cursor is back at its original position, Column 1, Row 1.

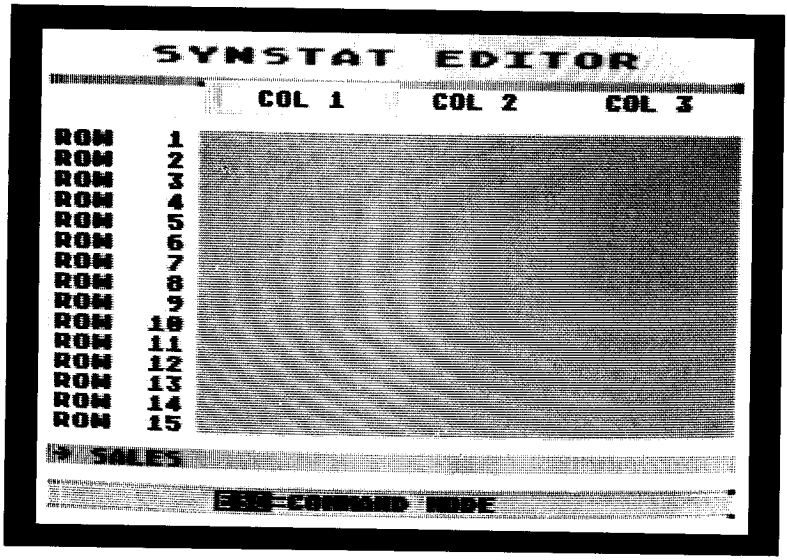
This feature is known as *SynStat*'s scrolling feature and will allow you to quickly make multiple entries onto your worksheet. With this feature you can work across the page from right to left and then change directions and work back across the page from left to right. You can also work down one column, change directions, and work back up the next column.

Labels

For the purposes of this tutorial we will build three data files showing sales revenues in the first column and automobile and telephone expenses in the next two columns. In Lesson Two we will calculate total expenses in column 4.

In order to begin constructing the worksheet, the first thing to do is enter a label for column 1 — Sales. Make sure the worksheet cursor is positioned in column 1.
PRESS (ESC) to call up the Command Menu
Select LABEL with (CTRL) and the arrow keys
PRESS (RETURN).

You are now ready to begin entering labels.
ENTER: SALES



You can use the (DELETE/BACK SPACE) key to correct any typing errors you may make before you press the return key.
PRESS (RETURN).

Your Label, SALES, appears at the top of Column 1 and the cursor has jumped over to Column 2, awaiting your next entry.
ENTER: AUTOEXP for automobile expenses
(You can use up to 7 characters for your label).
PRESS (RETURN).

Now the label AUTOEXP appears at the top of Column 2 and the cursor has jumped over to Column 3.
ENTER: TELEXP for telephone expenses.
PRESS (RETURN).

The label TELEXP appears at the top of Column 3 and the cursor has jumped over to Column 4.
ENTER: TTLEXP for total expenses.
PRESS (RETURN).

Your screen should now have four labels across the top: SALES, AUTOEXP, TELEXP, and TTLEXP.

Top of Col

You can move the cursor to the top of a column with TOP OF COL
PRESS (ESC) to call up the Command Menu.
Select COMMAND with the (CTRL) and arrow key (←)
PRESS (RETURN).

The Command sub-menu will pop up on your screen. The cursor rests at the top selection, +-/*, which operates column transformations. This feature allows you to perform computational operations and will be discussed fully in the section on Performing Calculations in Lesson 2 and in the section on Column Transformations in the Reference Section of this manual.

The Command sub-menu has eight options. Each of these options will be discussed fully in their appropriate sections. For now we are just interested in TOP OF COL which is at the top of the right column.

Move the cursor over to TOP OF COL by pressing (CTRL) and (→) once.
PRESS (RETURN) and your display screen shifts to the top of the column which the cursor is positioned in.
PRESS (ESC) and you are in the Command Menu.

Move the cursor to ENTRY:
PRESS (RETURN) again and your cursor is returned instantly to the top of the column. Use (CTRL) and the arrow keys to move the cursor to Column 1, Row 1.

Data Entry

Now that we have set up our columns, it is time to enter the data. The cursor should be positioned at Column 1, Row 1, which is where we are going to start making the data entries.

When the Edit Line is yellow, you can enter the data onto the worksheet by typing the figures directly from the keyboard and pressing (RETURN). We will move down each column as we make these entries, so remember to use (CTRL) and the arrow keys to point the arrow indicator down and then use (RETURN) to enter the data you've typed in (you may want to re-read the section on Scrolling if you have forgotten how to use arrow keys and (RETURN) to move the cursor).

If the edit line is grey, however, you cannot make data entries directly onto the worksheet without first selecting ENTER from the Command Menu and pressing (RETURN). This will jump the cursor back to the worksheet and make the edit line yellow again ready for your data entries. The procedure is then the same. You type the entry from the keyboard and press (RETURN).

Our first entry for SALES will be $40,000.
ENTER: 40000
PRESS (CTRL) (↓).

The cursor jumps down to Row 2 and the arrow indicator is now pointing down and displays 40000.00. The default format is 2 decimal places.

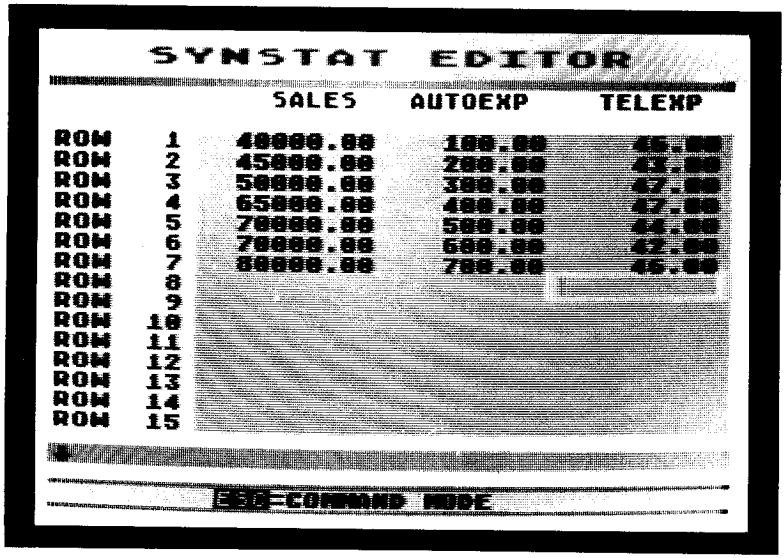
ENTER: 45000
PRESS (RETURN).

The cursor jumps down to Column 1, Row 3. Continue to make your data entries for SALES in the same manner as follows:
ENTER: 50000
PRESS (RETURN).
ENTER: 65000
PRESS (RETURN).
ENTER: 70000
PRESS (RETURN).
ENTER: 70000
PRESS (RETURN).
ENTER: 80000
PRESS (CTRL) (→).

The cursor is now positioned at Column 2, Row 7. You can continue from here to enter your data for AUTOEXP from the bottom of the column to the top.
ENTER: 700
PRESS (CTRL) (↑).
ENTER: 600
PRESS (RETURN).
ENTER: 500
PRESS (RETURN).
ENTER: 400
PRESS (RETURN).
ENTER: 300
PRESS (RETURN).
ENTER: 200
PRESS (RETURN).
ENTER: 100
PRESS (CTRL) (→).

The cursor is now positioned at Column 3, Row 1. You can continue from here to enter your data for TELEXP from the top of the column down to the bottom.

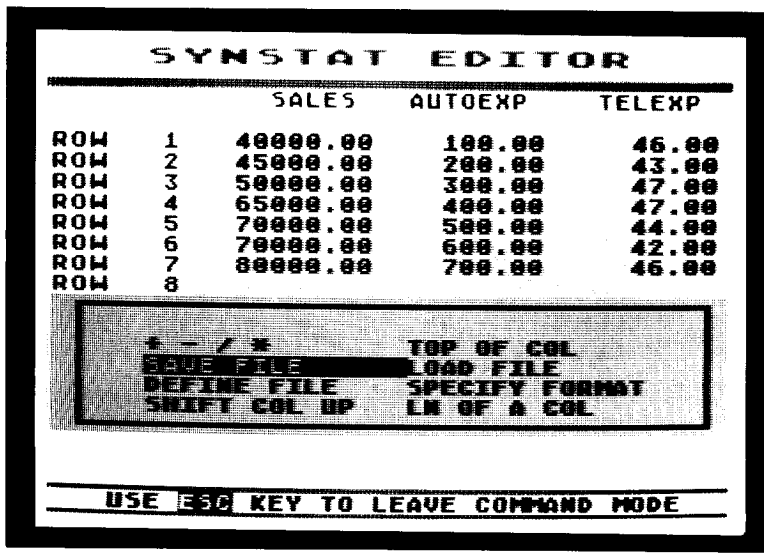
ENTER: 46
PRESS (CTRL) (↓).
ENTER: 43
PRESS (RETURN).
ENTER: 47
PRESS (RETURN).
ENTER: 47
PRESS (RETURN).
ENTER: 44
PRESS (RETURN).
ENTER: 42
PRESS (RETURN).
ENTER: 46
PRESS (RETURN).



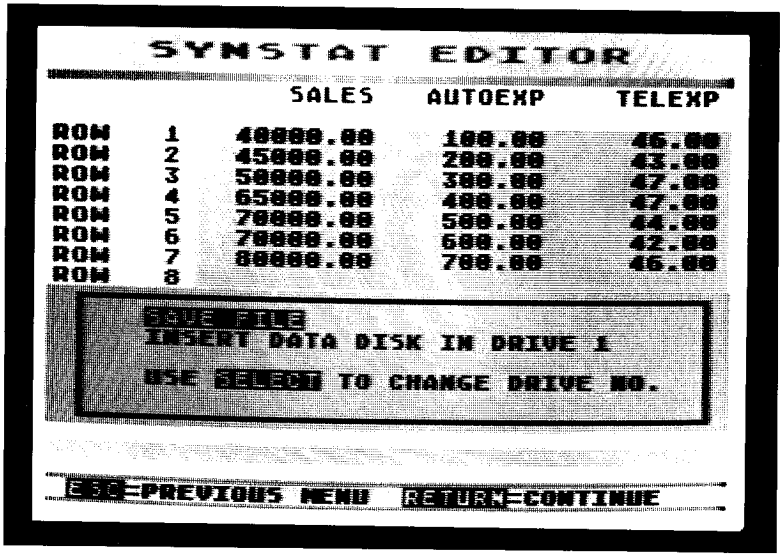
Save File

Now that we have entered our data onto the worksheet, the next step is saving the file. Files can be saved on formatted disks only. See the beginning of this manual for instructions on formatting a data disk.
PRESS (ESC) to call up the Command Mode.
Use the (CTRL) and arrow key (→) to select Command.
PRESS (RETURN).

The Command sub-menu appears at the bottom of your screen allowing you eight possible command options. Use (CTRL) (↓) to move the cursor to SAVE FILE and press (RETURN).



The sub-menu changes and you are instructed to insert a data disk into drive 1. Insert the blank disk that you formatted earlier into disk drive 1.

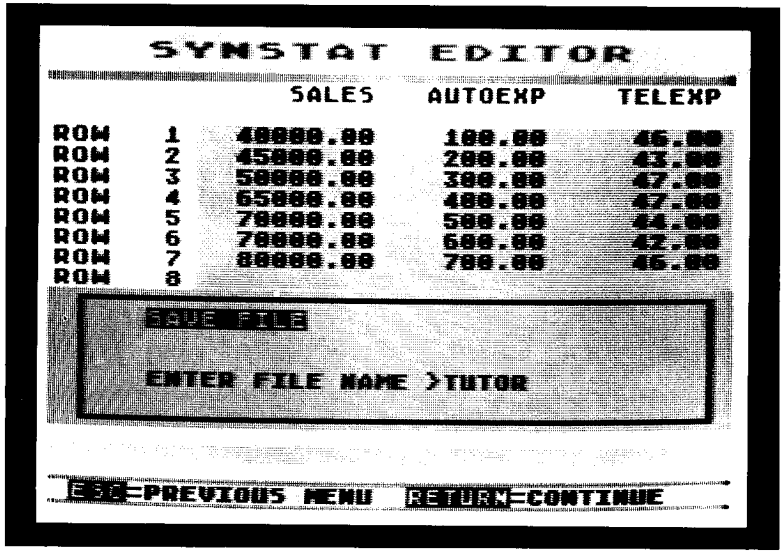


If your system is running on more than one disk drive, you can place your data disk into drive 2, 3 or 4 without having to remove the program disk from disk drive 1. Then press (SELECT) to change the drive indicator from disk drive 1 to disk drive 2, 3 or 4.

PRESS (RETURN).

You now need to enter a file name under which you want to store your data. *File names cannot exceed 7 characters in length.* They cannot include graphic symbols, punctuation marks, spaces or other special symbols. The first character of the file name must be a letter of the alphabet. *SynStat* makes two copies of the file and automatically affixes the extensions .DAT and .IDX to them. The .IDX extension indicates an index file containing the data plus some general information about the file as a whole (e.g., number of conversions). The .DAT extension indicates the file containing the actual data.

ENTER: TUTOR
PRESS (RETURN).



When your disk drive stops whirring,
PRESS (ESC) for the Command Menu.
PRESS (ESC) again.

Message appears "Insert Program Disk in Drive 1 and Press Start"
PRESS (START).

Saving Your Work

SynStat will save you hours of time with its convenient operation and easy-to-use calculating features. At times, the information you are working on will be very important to you and the time you have spent reaching your calculations irreplaceable. To guard against infrequent occurances such as power failures, learn to periodically save your worksheets as you go. This could save you

hours of time that would otherwise be spent re-entering and recalculating your lost data.

As you work, think of how long it has been since you last saved the sheet. If you have spent more time than you would wish to lose if something went wrong, or if you have new results which might be difficult to reconstruct, then it's time to save the sheet again.

To keep track of several versions of the same information on diskette, you can append a sequential number to the file name you use when you save the sheet. SALES1 can become SALES2, so that you will have both files to look at and compare.

SynStat makes a backup copy of your files with the .BAK extension when you try to save a file with the same name as one already on the disk. The "old" one is renamed "Backup" until the save is complete to avoid losing data. Upon successful completion of Save, the backup file is deleted.

Should you attempt to leave the worksheet without having first saved your work, you will be presented with a warning message letting you know that if you proceed you will lose your data.

Making Backup Copies Of Diskettes

Saving your work periodically on diskette is only the first step in protecting your time and calculations. A diskette is a safe and reliable medium for storing information. However, a diskette can be harmed even in ordinary use. It could be scratched or it may pick up grease or dust. It may be damaged by heat, exposed to a magnetic field or accidentally be re-formatted, thus erasing its contents. Diskettes will eventually wear out. The average lifetime of

a diskette is about 40 hours of use (when the disk drive BUSY light is on, the diskette is in use). To protect yourself, you should always make extra copies of your important files on separate backup diskettes.

A very important thing to know at this point, is that when you go to make copies of your data disks for backups you must use the ATARI DOS II *duplicating* option and not the ATARI DOS II *copy* option to do this. The ATARI DOS II copy option will scramble the files on the copied disk in such a way that *SynStat* will not be able to read it from the disk. Using the DOS duplicating option, however, will copy the disk files in such a way that *SynStat* will not have any trouble reading the files from the duplicated disk.

Lesson Two

Load File

If you are beginning a new session now, you will need to load the file created in Lesson One into your computer's memory. To do this, first load *SynStat* into your computer according to the instructions in Section One. The cursor is positioned over MANIPULATE DATA. Press (RETURN) to call up the sub-menu. Select EDIT DATA by pressing (RETURN). When EDIT has loaded, check that the disk drive BUSY light is off and carefully remove the program diskette from the disk drive and set it aside for now.
PRESS (ESC) to call up the Command Menu.
Select COMMAND from the menu using (CTRL) (→)
PRESS (RETURN).
Select LOAD FILE from the sub-menu using (CTRL) (→) (↓).
PRESS (RETURN).

Now take the data diskette where you stored your file and insert it into drive 1 (if you are using one disk drive) or into disk drive 2, 3, or 4 (if you have more than 1 disk drive). If your data disk is in drive 2, 3 or 4, use (SELECT) to change the drive indicator to 2, 3, or 4.
PRESS (RETURN).
ENTER: TUTOR for the file name.
PRESS (RETURN).

The worksheet from Lesson One will appear on your display screen in a few seconds.
PRESS (ESC) and you will be in the Command Menu.

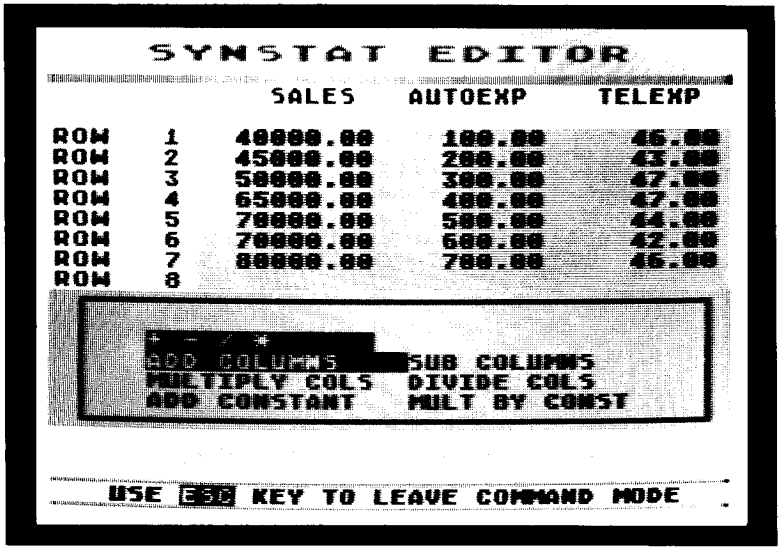
Performing Calculations

Now that we have created our data file, we will perform calculations in order to generate our column of Total Expenses (Column 4) for statistical analysis in Lesson 3.

Your cursor should be resting on the COMMAND selection in the Command Menu. If it is not, use (ESC) or (CTRL) and the arrow keys so that it is.
PRESS (RETURN).

The sub-menu cursor is now resting at the top option in the first column: +-/*. This option is known as column transformations and allows you to perform mathematical operations with your columns.
PRESS (RETURN).

The next sub-menu appears and contains six possible mathematical functions: Add Columns, Multiply Columns, Add Constant, Subtract Columns, Divide Columns, and Multiply by Constant.

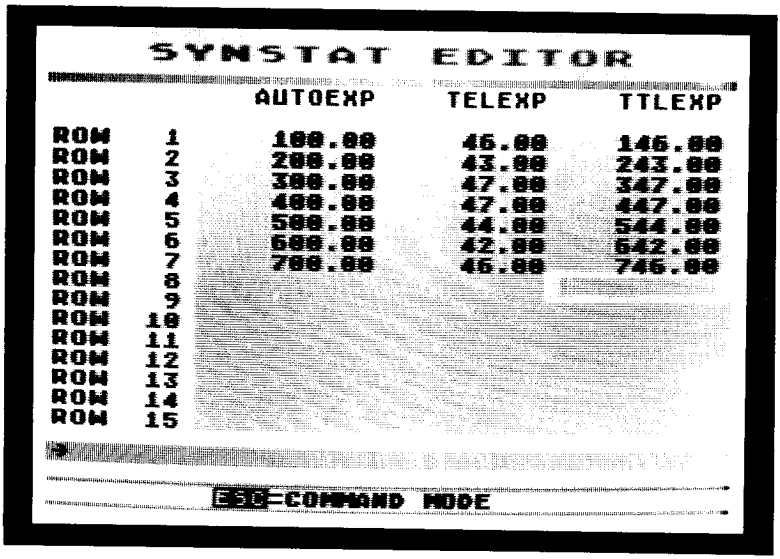


These features are explained in the Reference Section of this manual under Column Transformations. For the purposes of this tutorial, we will demonstrate the Add Columns feature. Since the cursor is resting on this option, simply,
PRESS (RETURN).

The Add Columns selection screen is now on your display containing the default selections of Sales plus Sales equals Sales. What this means is that until you use the arrow keys to change the columns, this menu fills in the blanks with the data from wherever the cursor was positioned on the worksheet.
PRESS (CTRL) and (↑) once to change the first entry to AUTOEXP.
PRESS (CTRL) and (→) once to jump the cursor to the second position.
PRESS (CTRL) and (↑) until TELEXP appears in the second position.

PRESS [CTRL] and [→] once to jump the cursor to the third and last position.
PRESS [CTRL] and [↑] until TTLEXP appears in the third position.
PRESS [RETURN] and watch your screen.

The Message PLEASE WAIT appears on your screen, then the Column Transformations sub-menu appears on your screen. To see if the figures were properly entered for TTLEXP,
PRESS [ESC] to get into the Command sub-menu.
PRESS [ESC] again to get into the Command Menu.
Use [CTRL] [←] to select ENTRY.
PRESS [RETURN].
Use [CTRL] [→] and press [RETURN] twice to scroll the screen so that Column 4 TTLEXP is in view.



Your screen should display TTLEXP with the data figures derived from adding Columns 2 and 3 (AUTOEXP and TELEXP) together.

The next step is to resave your file with the new data figures for total expenses.
PRESS [ESC] to call up Command Menu.
Select COMMAND with [CTRL] [→].
PRESS [RETURN].
Select SAVE FILE with [CTRL] [↓].
PRESS [RETURN].

Insert your data disk if it is not already in the proper disk drive (drive 1, 2, 3, or 4, depending on how you have your system set).
PRESS [RETURN].
ENTER: TUTOR again.
PRESS [RETURN].

Your screen will display the message that the file already exists and that it is creating a backup file. When the new file has been saved, remove the data disk (if you have one disk drive), insert your *SynStat* program disk and,
PRESS [ESC] twice.
PRESS [START].

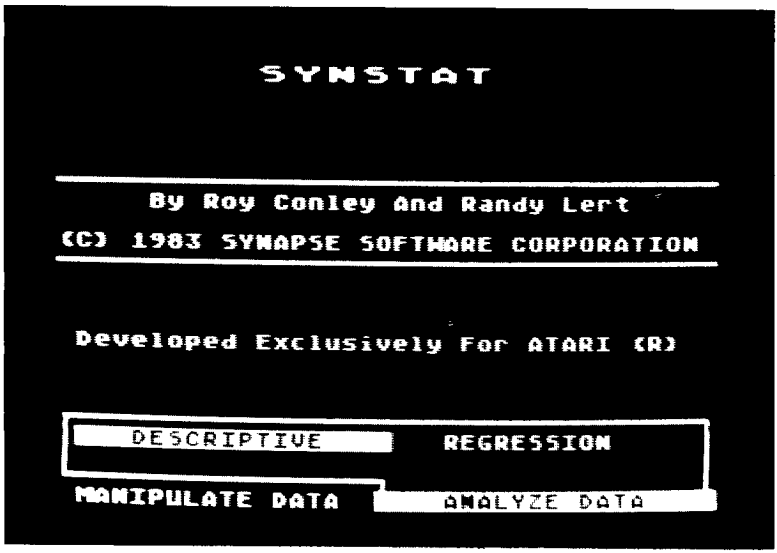
This will take us back to the Main Menu screen. We are now ready to begin some data analysis.

Lesson 3

Analyze Data

Descriptive Analysis

With the Main Menu on your display screen, use the [CTRL] [→] to select ANALYZE DATA.
PRESS [RETURN].



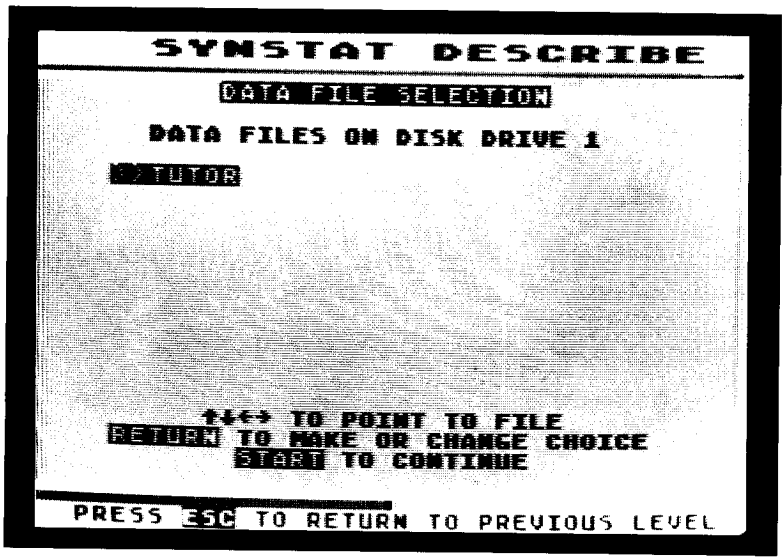
The ANALYZE DATA sub-menu appears allowing you two analysis options: DESCRIPTIVE analysis and REGRESSION analysis. In the first part of this lesson we will cover DESCRIPTIVE analysis and in the second part, REGRESSION analysis.

The cursor is resting over DESCRIPTIVE, so simply **PRESS** (RETURN).

The message PLEASE WAIT will appear on your screen and then the Describe sub-menu will appear on your display. You will be asked to insert your data disk or use (SELECT) to indicate the disk drive where your data disk is located (drive 2, 3, or 4). Do whatever is appropriate for your system (either insert your data disk or indicate the drive number where the data disk is located).
PRESS (START).

The next screen gives you a listing of the files on the data disk you inserted. Since we have created only one file so

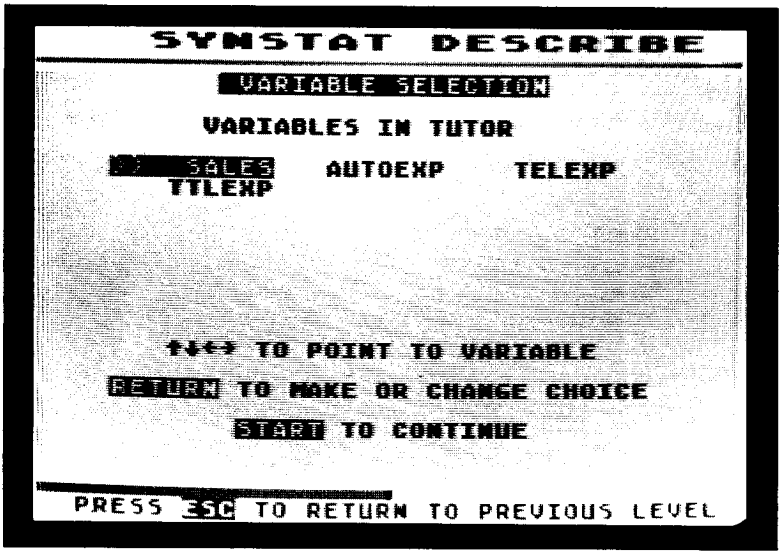
far, the name TUTOR is the only one displayed and the cursor is resting next to it. In this case you do not need to use the arrow keys to point to the file name you need as the cursor is already pointing to it.
PRESS (RETURN).



The file name TUTOR is now in inverse video on your screen. Should you decide at this point that you do not wish to select TUTOR you can use the arrow keys to select another file and press (RETURN). The original selection will turn back to regular video, and your new selection will appear in inverse video. However, for the purposes of our tutorial, we want to maintain our selection of the file TUTOR, so:
PRESS (START) and the Variable Selection Screen will appear on your display.

This screen lists all the variables in the file that you just loaded into your computer's memory. You can select one

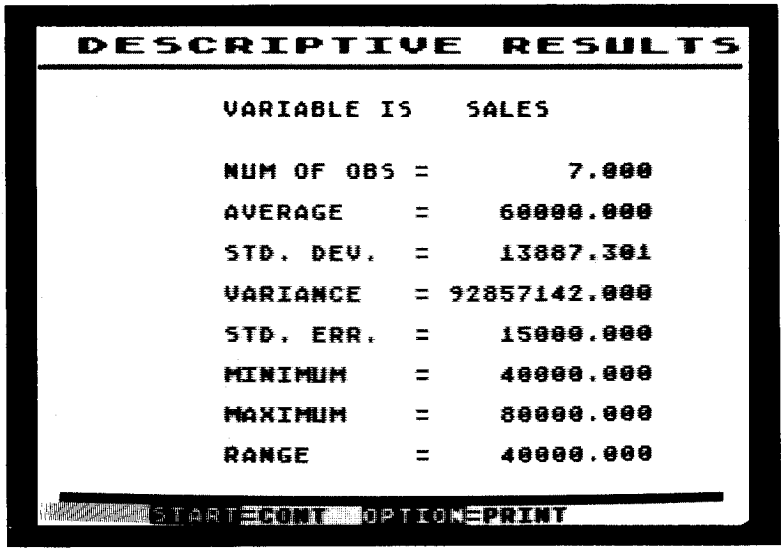
variable (one column of data) on which *SynStat* will make a descriptive analysis for you.



We will select SALES for the descriptive analysis so all you have to do is to press (RETURN) and then (START), since your cursor is already resting next to SALES. Do so and watch your screen.

Once again, if you decide that you wish to select a different variable and you have not yet pressed (START), you can point to another one with the arrow keys and then press (RETURN).

The message LOADING DATA appears on your screen and then you will see the Descriptive Results.



Num of Obs

The first line: NUM OF OBS stands for the number of observations in the file. That is, we had 7 entries in each column, therefore the number of observations is 7.

Average

The average is the total of the observations divided by the number of the observations: 40,000 + 45,000 + 50,000 + 65,000 + 70,000 + 70,000 + 80,000 divided by 7 (60,000).

Std. Dev.

This is the standard deviation and represents the average amount that the numbers were different from the Average. This figure will tell you if something unusual has occurred in a particular month or cycle by how large this number is in comparison to the average.

Variance

This number is the square of the standard deviation and allows you to analyze samples from two or more quantitative populations. This is an advanced statistics function and you may want to refer to a statistics book for more information.

Standard Error

This figure is useful when your variable has less than 30 observations as it gives you an estimate of the standard deviation that will be accurate for a small sample.

Minimum

This is the smallest data entry for the variable entered.

Maximum

This is the largest data entry for the variable entered.

Range

This is the Maximum value minus the Minimum value.

Print Descriptive Analysis

Press (OPTION) to generate a hard copy of this screen.

If you would now like to have a descriptive analysis of another variable or go on to a regression analysis, **PRESS** (START).

The Describe Menu will appear again. Your options at this point are:

1) Insert another disk (this will only be relevant when you have *SynStat* files on more than one data disk),
2) Press (START) to go on to the next screen and enter another variable (such as Autoexp or Telexp),
3) Insert the program disk and press (ESC) to return to the Main Menu or
4) Shut your machine off and put your materials away.

If you wish to continue the tutorial at this point and go on to regression analysis, insert the program disk and press (ESC) for the Main Menu.

Regression Analysis

Regression is the most common statistical technique utilized to confirm or deny a hypothesis concerning the relationship that exists between two or more variables. As is true with most statistical methods, regression is used to make statements about a population based on a sample of data. With the sample data that we have been using in our tutorial, we will provide an example of regression analysis that could be useful to our hypothetical salesperson. In the process we will provide a quick tutorial on the nature of the regression itself. However, for those who wish to truly understand the power of regression as a tool, we urge that you consult a textbook on statistics or regression (the Appendix contains a listing of some suggested statistics books for reference). You should also be aware of the fact that the regression routine in *SynStat* provides far more powerful and sophisticated regression analyses than will be covered in this tutorial. Those users already familiar with regression analysis will see this in the output. The novice user should not feel concerned about this as one can still gain a great deal of useful information interpreting the results as shown.

As you recall, we have already entered data for our salesperson on his monthly sales as well as his monthly telephone and automotive expenses. We will now use this data to run a sample regression and to explain the output of the program. We mentioned earlier that regression is the technique used to confirm or deny a hypothesis that two or more variables are related to one another. More specifically, we use regression to estimate the linear relationship that exists between two variables. What this means in the case of two variables is that we will be estimating the equation of a straight line that best fits a scatter plot of these two variables. (You may use *SynGraph* to do such a scatter plot of the two variables, if you like. Simply use the *SynStat* to DIF conversion routine and select the scatter plot option of *SynGraph* — more on this later).

In the case of our salesperson, let's say that we would like to analyze the relationship between monthly sales and monthly automotive expenses. Our hypothesis is that when monthly auto expenses increase, our monthly sales increase as well. This is plausible, as the most likely cause for an increase in automotive expense is that our salesperson drove more miles. If he drove more miles, we assume that he made more sales calls. And, if he made more sales calls, hopefully he wrote more orders and therefore sold more of his product. This is exactly the kind of question that we can use the techniques of regression to answer.

We need to establish some terminology before proceeding. When we engage in regression analysis we refer to the independent variable and the dependent variable or variables. If we think of regression as attempting to establish a cause and effect relationship, then the independent variable is the one that we think causes the

dependent variable to change. Therefore, in the case of our salesperson, the independent variable is automotive expense and the dependent variable is sales. Another way of saying this is to state that sales depend on the level of automotive expense. Our salesperson can control (to some extent) his automotive expenses by regulating the amount that he drives. He cannot control the level of sales. Thus, in regression, the variable that we can control is the independent variable and the one that we cannot control is the dependent variable. In other words, changes to the variable "Sales" depend on changes to the independent variable such as Auto or Phone expenses.

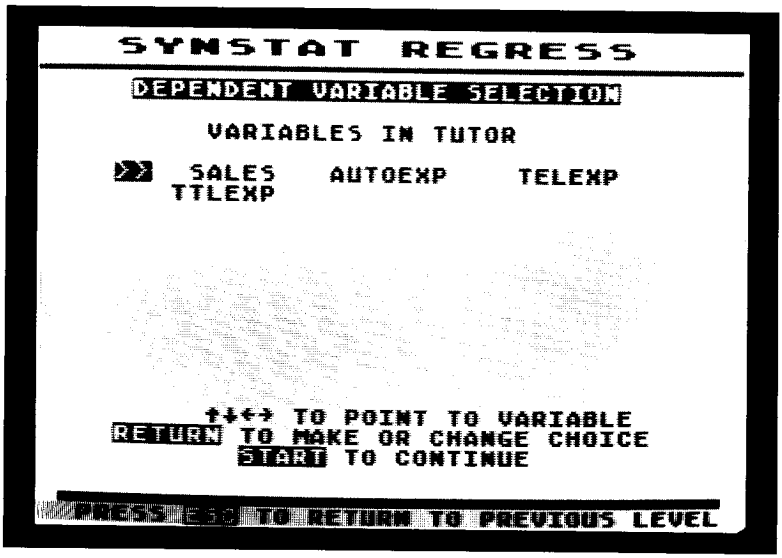
To begin our regression analysis, go to the Main Menu.

Select ANALYZE DATA with (CTRL) (→).
PRESS (RETURN).
Select REGRESSION with (CTRL) (→).
PRESS (RETURN).

After a few moments the Regress sub-menu will appear on your display. You will be asked to insert your data disk or use (SELECT) to indicate the disk drive where your data disk is located (drive 2, 3, or 4). Do whatever is appropriate for your system and:
PRESS (START).

The next screen gives you a listing of the files on the data disk you inserted. Since we have created only one file so far, the name TUTOR is the only one displayed and the cursor is resting next to it. In this case you do not need to use the arrow keys to point to the file name you need as the cursor is already pointing to it.
PRESS (RETURN).

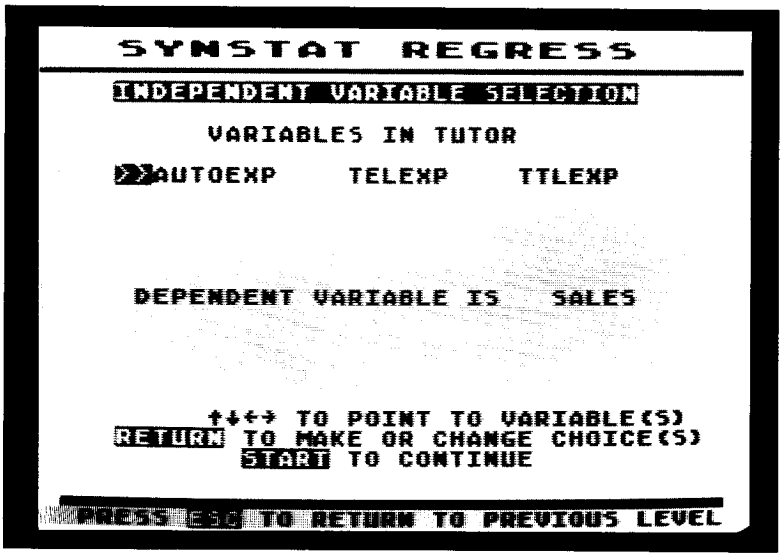
The file name TUTOR is now in inverse video on your screen. Should you decide at this point that you do not wish to select TUTOR, you can use the arrow keys to make another selection and press (RETURN) to change your choice. However, for the purposes of our tutorial, we want to maintain our selection of the file TUTOR, so:
PRESS (START) and the the Dependent Variable Selection Screen will appear on your display.



This screen lists all the variables in the file that you just loaded into your computer's memory. You can select one variable (one column of data) for your dependent variable. As we mentioned earlier, our dependent variable in this case is Sales.

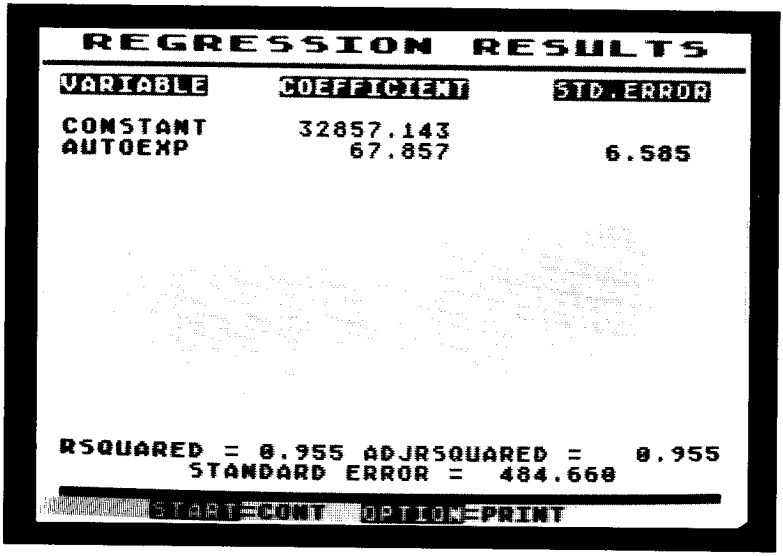
IMPORTANT: Your data files for both dependent and independent variables *must* contain the same number of data values in order to perform regression analysis.

Since the cursor is already resting next to Sales, all you have to do is press (RETURN). Do so and watch your screen. The name Sales turns to inverse video and the message DEPENDENT VARIABLE IS SALES appears on your screen. Now press (START). The Independent Variable Selection Screen appears on your display.



The Independent Variable Selection Screen contains the remaining variables, as well as a line informing us that our dependent variable is Sales. Since the cursor is resting next to the variable Autoexp, all you have to do is press (RETURN). Now press (START). The program will indicate that data is being loaded, after which it will indicate that it is calculating. When the beeper sounds, the calculating is done and we are ready to analyze our regression. Since the Independent Variable Selection Screen allows you to choose more than one variable (this will be covered in the next section on multiple regressions), to cancel a choice and make another, use the arrow keys to choose another independent variable. Before pressing (RETURN), you must

cancel your original choice by going back to it with the arrow keys and hitting (RETURN) to cancel it.



This first screen provides almost all of the information required for the novice statistician to analyze his regression. Notice that under the column labeled VARIABLE we see the terms CONSTANT and AUTOEXP. The value of the constant is the base amount of sales that we have when AUTOEXP is equal to zero. However, in this particular case none of our data included an auto expense of zero, and this value is of little meaning.

Moving over to the column labeled COEFFICIENT, we see the number 32857.143 across from CONSTANT and the number 67.857 across from AUTOEXP. This means that the equation of our estimated line representing the relationship between sales and auto

expenses says that monthly sales is equal to 32857.14 dollars plus 67.85 dollars for every dollar that we spend on automotive expense.

The column labeled STD. ERROR is for more advanced analysis. Please refer to a text book on statistics for further information.

At the bottom of the screen we see the term RSQUARED = .955. This is the measure of the closeness of fit of our relationship. A value of 1 would indicate a perfect fit. That is to say, our estimated equation predicts sales perfectly. A value of zero would indicate no fit at all. In other words, a value of zero would tell us that our hypothesized model is invalid. The term ADJRSQUARED next to RSQUARED is required when we have more than one independent variable and merely adjusts our calculated RSQUARED to take this fact into account. Therefore, it adds no new information in this case.

NOTE: If you have a printer hooked up to your system you may press (OPTION) to generate a hard copy of this screen.

PRESS (START) to go to the next screen.

This screen is entitled Analysis of Variance. This is useful information for the more advanced statistician and is used for comparing several means. You may want to consult a statistics textbook for an explanation. Briefly, Analysis of Variance tells us how well the regression is explaining the process under study. In our example, Regression Analysis has given us an idea of Sales as a function of the given variable auto expense. Analysis of Variance will tell us the statistical significance of the overall regression equation.

NOTE: Pressing (SELECT) will take you back to the previous screen and pressing (OPTION) will generate a hard copy of this screen.

PRESS (START) to go to the next screen.

This screen is entitled Partial Correlation Coefficients Squared, Dependent Variable with Independent Variables. This information is useful only in the case of more than one independent variable.

A correlation coefficient is a measure of how closely two variables move together. That is, if a coefficient is 1, it means that every time one variable moves so does the other by proportional amount. If the cofficient is -1, every time one varable moves up, the other goes down by a proportional amount. If the correlation is 0, it means they behave randomly and that there is no relationship between their respective movements.

Partial correlation coefficients are used in multiple regression to measure how much one of the independent variables is correlated with the dependent variable when all other independent variables are held constant. This indicates the sensitivity of the dependent variable to movements in each of the independent variables. From the partial correlation coefficients you can determine the relative importance of each independent variable in the regression equation.

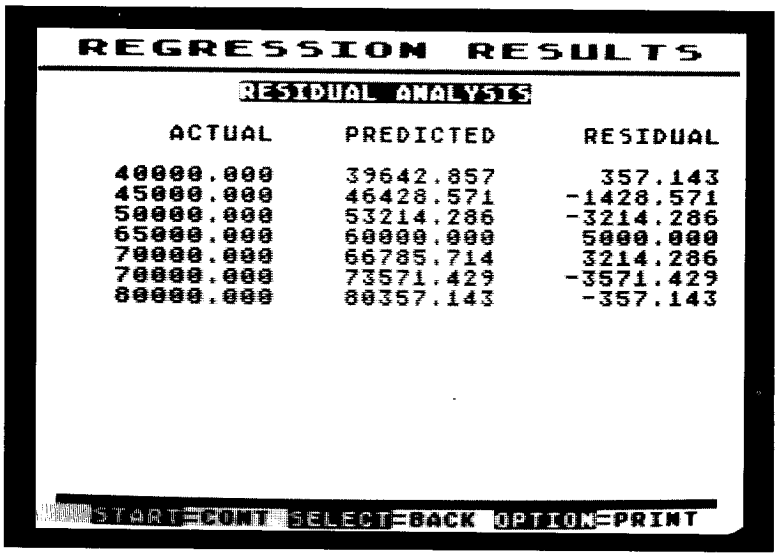
NOTE: Pressing (SELECT) will take you back to the previous screen and pressing (OPTION) will generate a hard copy of this screen.

PRESS (START) to go to the next screen.

This screen is entitled Correlation Matrix of Independent Variables. Once again this is useful in the case of more than one independent variable.

NOTE: Pressing (SELECT) will take you back to the previous screen and pressing (OPTION) will generate a hard copy of this screen.

PRESS (START) to go to the next screen.



This screen is entitled Residual Analysis. The subheadings are ACTUAL, PREDICTED, and RESIDUAL.

In the ACTUAL column we see the actual sales volume that we entered into our data file.

Under the PREDICTED column, we see the level of sales our regression equation predicts for the level of automotive expense we entered. The RESIDUAL column merely subtracts the predicted from the actual.

This screen is useful in that we are able to see how far away our predictions are from the actual value of the variable. As you can see, in this case we have a very close fit, which confirms what we noted with the high RSQUARED.

NOTE: Pressing (SELECT) will take you back to the previous screen and pressing (OPTION) will generate a hard copy of this screen.

PRESS (START).

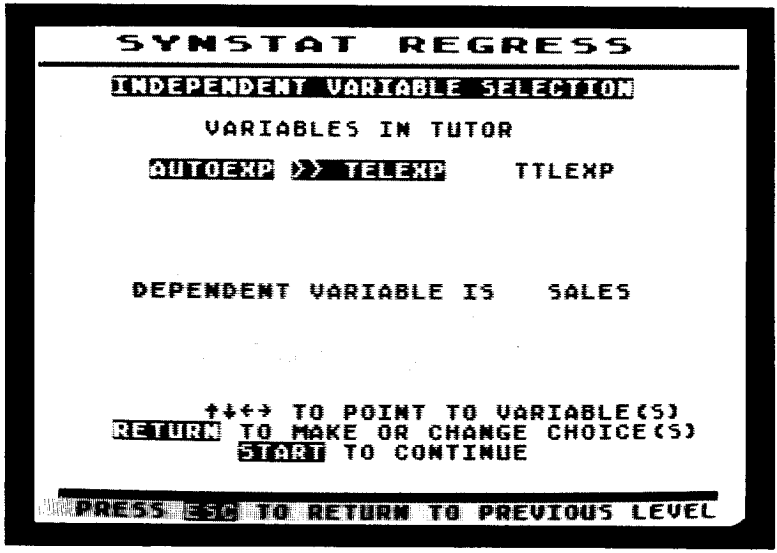
This time we are returned to the opening screen requesting us to insert a data disk. If you wanted to analyze a file on another data disk, you could insert that data disk now and press (START) to continue. However, since we only have the one data disk, we will leave it in the disk drive and perform a multiple regression on our file TUTOR.

Multiple Regressions

PRESS (START).
PRESS (RETURN) to select TUTOR.
PRESS (START) for the Dependent Variable selection screen.
PRESS (RETURN) to select Sales.
PRESS (START) for the Independent Variable selection screen.

The procedure is exactly the same as before, but this time the Independent Variables will be both Autoexp and Telexp.

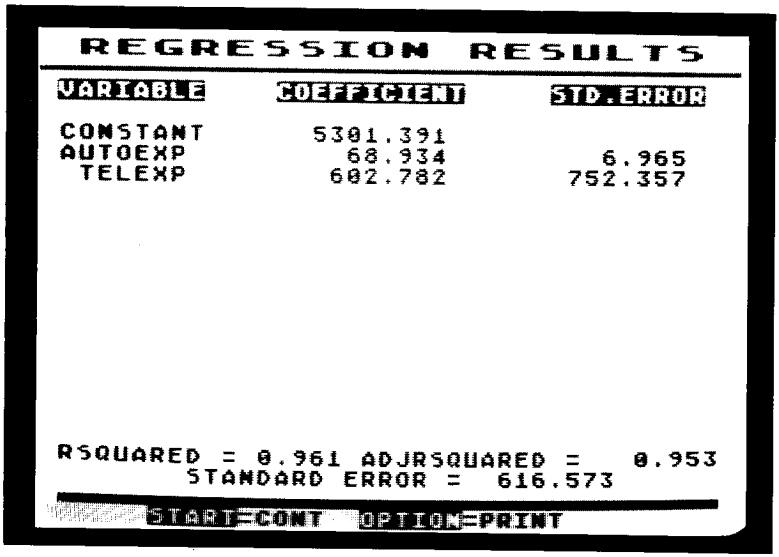
PRESS (RETURN) to select Autoexp.
PRESS (CTRL) (→) to point to Telexp.
PRESS (RETURN) to select Telexp.
PRESS (START) to calculate.



SynStat will allow you to choose up to 11 independent variables. However the calculation time for that many variables may be up to several minutes depending on how large your data files are.

IMPORTANT: All variables *must* have the same number of data points in order to perform a multiple regression analysis.

The messages LOADING DATA and CALCULATING appear on your screen as before. When the beeper sounds, the calculating is done and we are ready to analyze our multiple regression.



Notice that both Autoexp and Telexp appear under the column labeled VARIABLE. The constant term is 5301 dollars (ignoring cents), the coefficient on Autoexp is 68 dollars, and the coefficient on Telexp is 602 dollars.

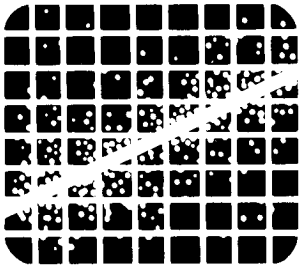
Notice that the value of ADJRSQUARED is now less than the .955 we calculated last time (.953). This is not a big difference, but indicates that the inclusion of telephone expense has not improved our prediction of sales by very much. (In fact it has not helped at all).
PRESS (START) until you come to the screen entitled Correlation Matrix of Independent Variables.

Here you will see that the correlation between Autoexp and Telexp is -0.193. This means that when Autoexp goes up, Telexp goes down. If you think about it, that makes sense because we cannot make phone calls when we are driving.

The point is that in order to fully understand a model with more than one independent variable, we need to understand the relationship the two independent variables have with one another.

As an exercise you should run a regression between sales and telephone expenses. You will see that telephone expense is a very poor predictor of sales. We could use this information to conclude that our salesperson is much more effective in person than on the phone, or that his product is not the kind that sells well over the phone. In any event, regression analysis has helped us by suggesting that our salesman place more of his time and resources in driving to his customers and visiting them rather than calling them. This is the kind of conclusion that use of statistics can help us reach and what makes it such a powerful tool.

We urge you to consult a good textbook or to take a class at your local college to bring the full power of statistics to bear on your decision making process.



Data Interchange Format

On the Manipulate Data sub-menu there are two options: DIF to *SynStat* and *SynStat* to DIF. These options allow you to use a data disk which you created with another program with *SynStat* and to use a data disk you created with *SynStat* with a compatible program.

DIF to *SynStat*

This option allows you to use a data file created with *SynCalc*, *SynFile+*, VisiCalc, or *SynGraph* and is found on the Manipulate Data sub-menu.

Use CTRL and the arrow keys to select DIF to *SynStat* and press RETURN. Then insert the data disk containing the file you want to load into your disk drive and press START. Your screen will display a listing of the files on that disk. Select the ones you want using CTRL and the arrow keys and pressing RETURN. After entering the *SynStat* file name, the data from the selected files will then be converted to *SynStat* format. Each selected DIF file will be converted to a column in the *SynStat* file. Once converted, the new file can be edited or analyzed.

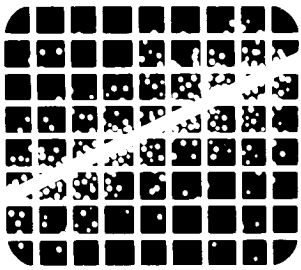
If the disk does not contain any DIF files, the message "No DIF Files On Disk" will appear on your screen.

SynStat to DIF

This option will format a data file that you created with *SynStat* so that it can be loaded into another program and used (for example, *SynGraph*, *SynCalc* or *SynFile+*).

Use CTRL and the arrow keys to select *SynStat* to DIF and press RETURN. Then insert the data disk containing the file you want to load into your disk drive and press START. Your screen will display a listing of all the files on the disk. Select the file you want to format and press RETURN. Press START to continue.

Next your screen will display a listing of all the column labels in that file with a blank line after each one. Remember, a file name can only be up to 8 characters, alphanumeric only and must begin with a letter. Enter names for each column and press RETURN after each entry. When you have finished, press START to save. Each column in your *SynStat* file is converted to a separate DIF file.



Command Sub-Menu

The Command sub-menu has eight features which can be used to perform various operations on your data files. In the Tutorial we have already used the Save File option to save the file you created, the Load File to reload the file into your computer's memory, the Column Transformation option to perform the calculations, and Top of Col to move the cursor to the top of a column. Here we will briefly discuss the other options of the Command sub-menu so that you will have an understanding of how to use them.

Column Transformation (+-/*)

There are eight possible operations in the Column Transformation sub-menu. A step-by-step demonstration of how to use the Add Columns feature of this menu was presented in the Tutorial in the section on Performing Calculations. The other seven operations are used in a similar manner: simply supply the information requested on the screen and follow the prompts. This section will give you a brief description of each operation in the Column Transformation sub-menu.

Add Columns

This function will allow you to add the data in one column to another column and cause the results to appear in a third column. Use [↓] [↑] to specify the column numbers and the [→] [←] to jump the cursor to the next selection. Press [RETURN] and the figures will appear on the worksheet in the specified location.

Multiply Columns

With Multiply Columns you will be able to multiply the numbers in one column each against the numbers in another column and have the results appear in a third column. Use the (↓) (↑) to specify the column numbers and the (→) (←) to jump the cursor to the next selection. Press (RETURN) and the figures will appear on the worksheet in the specified loaction.

Add Constant

Add Constant will allow you to add a constant number to a column of numbers. Since the values appear in place of the original numbers in the column and not in a new column, it is important to be certain of the constant value you wish to add.

Use the arrow keys to select the column you want to add the constant to. Press (RETURN) and another screen will appear asking you to indicate the constant value to be added. Type in the number and watch it appear on the yellow edit line next to the arrow indicator. Press (RETURN) and the constant value is added to the numbers in the column.

This feature of pressing (RETURN) twice is a safeguard to make sure that the correct constant value is going to be added to the column to protect you from making irretrievable errors.

Subtract Columns

This function will allow you to subtract the data in one column from another column and have the results appear in a third column. Use the (↓) (↑) to specify the column numbers and the (→) (←) to jump the cursor to the next

selection. Press [RETURN] to cause the figures to appear on the worksheet in the specified location.

Divide Columns

This function will allow you to divide the data in one column by another column and have the results appear in a third column. Use the [↓] [↑] to specify the column numbers and the [→] [←] to jump the cursor to the next selection. Press [RETURN] to cause the figures to appear on the worksheet in the specified location.

Multiply by Constant

Multiply by Constant will allow you to multiply a column by a constant value. Since the multiplied values appear in place of the original numbers in the column and not in a new column, it is important to be certain of the constant value you wish to multiply by. If the maximum value of a cell is exceeded, asterisks (***) replace the data.

Use the arrow keys to select the column you want to multiply. Press [RETURN] and another screen will appear asking you to indicate the constant value to multiply by. Type in the number and watch it appear on the yellow edit line next to the arrow indicator. Press [RETURN] and the numbers in the column are multiplied by the constant value.

This feature of pressing [RETURN] twice is a safeguard to make sure that the correct constant value is going to be used to multiply the numbers in the column to protect you from making irretrievable errors.

Define File

SynStat allows you to define your worksheet by determining how many columns you want the worksheet to contain. Space for 12 Columns and 83 rows is automatically allocated. However by using the arrow keys you can decrease the number of columns you want your worksheet to have. When you decrease the number of columns the number of rows increases. Pressing [RETURN] sets the column and rows to your specifications and brings you back to the Command sub-menu.

Shift Column Up

This feature is used in advanced statistics and basically serves the purpose of shifting your data up relative to adjacent columns. This can be used for lagged regression analysis.

Top of Col

This feature will return your cursor to the top of the current column. Simply select this option with [CTRL] and the arrow keys and press [RETURN]. The worksheet will shift so that the top portion is in view on your display screen. Now press [ESC] to bring up the Command Menu. Use [CTRL] and the arrow key [←] to select ENTRY and press [RETURN]. The cursor will appear at the top of the column.

Load File

In order to load an already existing data file into memory, you must use the arrow keys to select Load File, press [RETURN] and follow the instructions on the sub-menu. You will be prompted to insert the data disk containing the file you want into the disk drive and indicate with [SELECT]

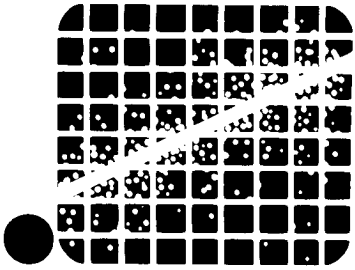
which disk drive the data disk is in. Press (RETURN) and the data will be entered onto the worksheet on your screen. If you inserted the wrong data disk into the disk drive, however, and the file you want is not there, *SynStat* will let you know by displaying the message: FILE NOT FOUND. Simply find and insert the correct data disk and repeat the procedure.

Specify Format

This feature allows you to specify decimal place precision in certain columns selected by you. Use the arrow keys to place the cursor over Specify Format and press (RETURN). By pressing the arrow keys, you can change the number on the screen to correspond to the column number to be affected. Then press (RETURN) and use the arrow keys to indicate the number of decimal places you want shown in the selected column. Press (RETURN) again and the column in question will be formatted to the decimal precision you chose.

LN Of a Col

This is another advanced statistics feature. It allows you to take the logarithm of a column. Again, use the arrow keys to place the cursor over Ln of a Col and press (RETURN). Press the arrow keys to indicate which column you want affected and press (RETURN).

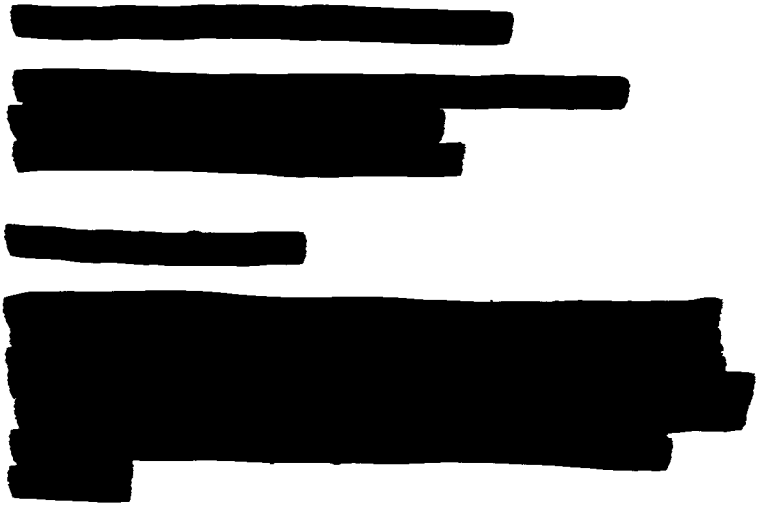


SynStat *Won't Load*

If *SynStat* won't load, check the following:

A. Make sure there are no cartridges in the cartridge slot.
B. All cables must be in place.
C. At least 48K of RAM must be installed.

At this point it most likely has something to do with your disk drive. If you have more than one drive, try loading from the other one (don't forget to set the disk address to 1). Also try loading other programs from your disk drive (sometimes this will work, but because of speed variations, you still won't be able to load *SynStat*).



Bibliography

Wonnacott, Thomas H. and Ronald J., *Introductory Statistics for Business and Economics*, John Wiley & Sons, Inc., 1977

Richards, Larry E. and LaCava, Jerry J., *Business Statistics Why and When*, McGraw Hill, Inc., 1978

Error Messages

The following is a listing of the error messages you may encounter while operating *SynStat*. This listing gives you a detailed explanation of why the error message occurred and how you can correct it. In most instances you will find that the error messages are self-explanatory. However, you will find this index helpful in many ways, as it will further clarify the situations causing error messages to appear, their causes, and cures.

File Not Found

You entered the file name incorrectly (mistyped it).

No Data Files On Disk

You have inserted a data disk which does not contain the file you are attempting to load. Insert correct data disk.

No File Has Been Selected

The procedure for selecting a file when you are loading from a disk is to point the cursor at the file name with the arrow keys, press RETURN to select the file and then press START to load the file. If you forgot to press RETURN before you pressed START this message will appear. Make your selection again and this time be sure you press RETURN before pressing START.

No Variable Has Been Selected

The procedure for selecting a variable when performing regression analysis is to point the cursor at the file name with the arrow keys, press RETURN to select the file and then press START to load the file. If you forgot to press RETURN before you pressed START this message will appear. Make your selection again and this time be sure you press RETURN before pressing START.

Unexpected Error Reading Disk Drive — Wrong Disk

You have inserted a data disk with data files for another program or have inserted a program disk of another program.

Wrong Disk In Drive

You either have the program disk in the drive when you are performing operations that require the data disk or you have the data disk in the drive when performing operations that require the program disk.

Additional Error Messages

Error	Indicates	Explanation and Suggestions
2	Insufficient Memory	Make sure you have the required amount of RAM. If you are sure that you meet the minimum RAM requirements and the error persists, you may have a hardware problem.
3	Value Error	An attempted calculation has been made using a value which is out of range. This may be caused by an illegal data value.
11	Floating Point Overflow/ Underflow	Calculation resulted in a divide by zero or a reference to a number with absolute value less than 1E-98 or greater than or equal to 1E-98.
136	End of File	Encountered premature ending of data file. This may indicate a bad disk file and can be caused by media failure or hardware problem.

138	Device Timeout	Requested peripheral device did not respond within the required time. Check to be sure your disk drives, printer, etc., are properly connected and that they are turned on. If the problem still persists, you may have a hardware problem.
139	Device NAK	The peripheral device cannot respond. Check your cables for proper connection.
140	Serial Frame Error	Device to computer communication is garbled. this is very rare and is fatal. If it occurs more than once, have your hardware checked.
141	Cursor Out of Range	Attempted to locate the cursor outside the valid range.
142	Serial Bus Overrun	Data is being sent to the computer too fast. This is very rare and is fatal. If this persists, have your hardware checked.
143	Checksum Error	Garbled data is being sent over the Serial Bus. If this persists, have your hardware checked.

144	Device Done Error	Device is unable to execute the command and can be caused by: 1. Attempting to write to a write protected disk. 2. Attempting to write to a disk formatted in another density. 3. Media failure causing a bad sector on the disk. 4. Hardware problem.
162	Disk Full	There is no more room left on the disk. Try using a different disk to save your data.
164	File Number Mismatch	The sector links in your file are bad. this can be remedied using a sector editor program like DISKFIX from the ATARI Program Exchange.
165	File Name Error	The file name entered contains illegal characters. Valid characters are A-Z, 0-9, and the the first character must be a letter of the alphabet.
169	Directory Full	The space allocated for the directory has been filled. Use another data disk.
170	File Not Found	Attempted to access a file not in the directory. Make sure you have correctly entered the file name and are accessing the correct drive.

173	Bad Sectors at Format Time	Encountered bad sectors while formatting the disk. Try another disk. If the problem persists, have your disk drive checked.

Glossary

Analyze: The study and determination of relationships of the component parts of a whole.

Average: Equaling an arithmetic mean.

Basic: Beginner's All-purpose Symbolic Instruction Code.

Block: Any group of data handled as a single unit by a program.

Boot: The process of initializing the computer for use by automatically clearing memory and loading the first few instructions, which initiates all other instructions. This gets the computer started.

Cell Address: The cell address is the column letter and row number of the cell (i.e. C10: Column C, Row 10).

Characters: Letters of the alphabet, numbers, punctuation marks, graphic symbols or any combination thereof.

Column Transformations: The programing feature of *SynStat* that allows mathematical computations between columns.

Coordinate: A set of numbers used in specifying the location of a point on a line.

Data: Information of any kind.

Data Diskette: The diskette upon which your data is stored.

Data File: A system of information organization on disk.

Default: Condition which exists when no instructions to the contrary are given to the terminal.

Delete: Erasing or changing data in a file.

Descriptive Analysis: The summarization and presentation of data in order to facilitate their use.

DIF: Data Interchange Format

Disk: Same as diskette.

Disk Drive: A device that rotates magnetic disks and accesses its data by means of a read/write head.

Diskette: The 5¼ inch magnetic storage medium on which data is stored.

DOS: Disk Operating System. A utility program that comes with your ATARI computer. See your ATARI manual for details.

Error Message: Any of a number of prompts which appear on your screen when you have attempted a function out of its proper order, pressed the wrong key or incorrectly inputted a Command.

File: A collection of data on disk.

File Name: A File Name is the label for a file which gives some indication of the file's contents. For example: Finances, Budget, Sales, etc.

Formatting: Preparing a new disk for information storage. Formatting a disk causes any information on that disk to be erased.

Function: A computation built into the computer that can be called for by the program.

Input: To transfer data from outside the computer onto your disk or into the computer. This is a data transferring operation.

Inverse Video: Normally your screen display is black characters on a grey background. Inverse video is when the characters are grey against a black background.

Label: A label is a title designation for a column or row that indicates the contents or nature of the data in that column or row.

Load: Putting a created file into the system for changes, modifications, printing or retrieval.

Maximum: The greatest value in a set of numbers.

Mean: A value that lies within a range of values.

Memory: Where information is stored in the computer.

Menu: A list of options available in the program.

Menu Driven: A program operated by a program-generated list of options.

Minimum: The least value of a set of numbers.

Multiple Regression: A statistical technique for confirming or denying a hypothesis concerning the relationship that exists between three or more variables.

Operation: The practical application of various options of the software, i.e., Edit Data, Analyze Data, Descriptive, or Regression.

Output: The transfer of data from inside the computer to outside, such as to a printer.

Program: A sequence of software instructions given to a computer for the performance of certain functions or tasks. A program must be in the language that the particular computer understands.

RAM: Random Access Memory

Range: A series of cell blocks in either a straight row or column.

Read: The inputting of data from the diskette to the computer

Scrolling: Moving text vertically or horizontally on a CRT screen so that portions which do not fit on the screen at one time can be viewed.

Simple Regression: A statistical technique for confirming or denying a hypothesis concerning the relationship that exists between two variables.

Special Characters: A character that can be displayed by a computer but is neither a letter nor a numeral.

Punctuation marks are special characters. So are the ATARI graphics symbols.

Standard Deviation: An indicator of the way a probability function is centered around its mean.

Standard Error: The standard deviation of the probability function or a random variable.

Sub-Menu: A menu generated within the Command Menu.

Variance: The square of the standard deviation.

Write: The transfer of data to a magnetic diskette.

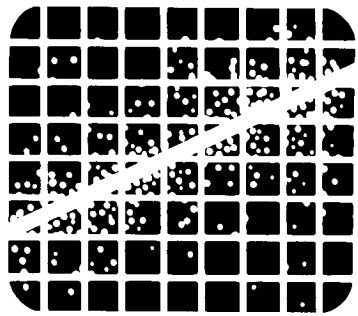
Write-Protect: A disk that is protected from having data written to it.

Index

SynGraph™ *

Hi Res Color Graphing

By Brian Lee



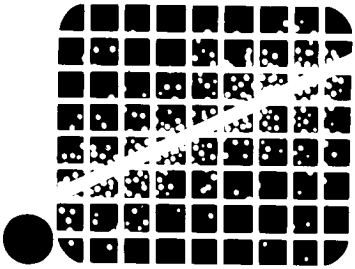
Requires ATARI Home Computer with minimum 48K RAM memory, BASIC and disk drive. Optional: printer.

synapse

*Developed Exclusively by Synapse® for ATARI®

Atari, Inc., P.O. Box 61657, Sunnyvale, CA 94088
Made in the U.S.A.

Contents



1 General Introduction

SynGraph is used to create clearly labeled, high resolution, color-coded graphs from data entered in *SynGraph*™, *SynStat*™, *SynFile+*™, *SynCalc*™, or *VisiCalc**. You can choose from four commonly used graphing methods: line graph, bar graph, scatter plot, or pie chart, to represent your data. *SynGraph* has been carefully designed for clarity and flexibility. You can rescale and relabel a graph, display up to three factors at a time on the same graph, save the graphs for viewing later, or output to a compatible printer.

How To Use This Manual

This manual has been divided into four sections. These sections are designed to give a clear presentation of the material and easy access to the information and specifications required to run the program. Both the computer novice as well as the seasoned professional will find this program and manual easy to use and understand. As many examples as possible have been included to make the instructions and examples clear.

SECTION ONE contains an overview of the program and information about your equipment needs. It covers getting the program started (loaded) and an explanation of the keyboard and some of its special keys and functions.

SECTION TWO is a tutorial. We found, after extensive testing, that the best way to introduce a program is through step-by-step creation of demonstration graphs. This allows you to go through the program in a methodical fashion,

*VisiCalc is a registered trademark of VisiCorp.

learning to use the various features as they appear in sequence. In reading the instructions, please try all the examples as they are described (even if you are not sure that you will be using them). This will familiarize you with the overall operation of the program, making the routine functions quick and easy.

SECTION THREE contains information on Data Interchange Formats (DIF™) and sharing data with *SynStat*, *SynFile+*, *SynCalc* and *VisiCalc*.

SECTION FOUR is the Appendix and contains advice on what to do if SynGraph won't load, [redacted] the procedure for obtaining back-up copies of your program disk, the error message index, a slide show program, glossary, and general index.

Before starting, it is a good idea to take a look through the glossary in the back of the manual. Please read through the definitions to make sure that they are used in the same way to which you are accustomed. Every effort has been made to keep the language as close to spoken English as possible. If you should encounter any unfamiliar words or do not understand a particular function while using the program, the glossary can be a handy reference.

The error message index is an explanation of messages or warnings which may appear on your screen while you are using the program. This index will suggest how you might correct the situation which has caused the error message to appear.

Overview Of The Program

You will find that once you become familiar with *SynGraph* you can generate graphs quickly and easily. Prompts at

the top and bottom of the command screens clearly indicate what the next entry should be.

Working with *SynGraph* is essentially a two-step process. First, you create data files which will be combined and used for creating the graphs. Second, you create graphs by deciding what kind of graph you want to make and with which files. With *SynGraph* you can create four different kinds of graphs from your data: line graph, scatter plot, bar graph, and pie chart. The line graph, scatter plot, and bar graph can display up to three different sets of data (factors) for comparing against one another on the same graph. The pie chart is created from a single data file and compares the data points against others within the same data file. All the graphs are clearly labeled and color-coded for viewing ease. You may choose labels for the X- and Y-axes, the title of your graph, the names of the factors you are graphing, and any other labels you may need. You have the option of displaying the X and Y coordinates in whole numbers (integers) or in decimal notation. Also among the many visual features of *SynGraph* are the gridding options which allow you to choose horizontal, vertical, or horizontal and vertical grids in addition to the non-grid background.

You can generate and save graph images for later display. You may even decide to display the same data on two or more different types of graphs or with two or more different scalings, as this can give you a different interpretation of the same information.

General Approach

As with any application, set-up of your objectives must be the first step. What do you wish to graph? How are you going to graph it? There is no substitute for planning

ahead. Try to anticipate any future needs and objectives before setting up your data files and creating your graph.

What You Will Need

1. An ATARI home computer.
2. An ATARI disk drive (up to 4).
3. An ATARI BASIC Cartridge (ATARI 600XL™/800XL™ computers have ATARI BASIC built in).
4. The program diskette, enclosed in the inside front cover pocket of the manual.
5. At least 48K of memory.
6. A TV set or other video monitor. A black and white set will work.
7. Blank formatted diskettes (use the SynStat formatting feature or ATARI DOS II's formatting command).

OPTIONAL: A printer capable of printing bit graphics. The following printers are fully supported for printing the graphs:

A. NEC 8023A/C-ITOH Prowriter
B. Epson Mx or Fx series with GrafTrax.

The ATARI Keyboard

The ATARI keyboard is very similar to a typewriter keyboard, although the placement of special characters in some instances is different. The shift key on the ATARI keyboard works like the typewriter shift key. That is, you hold down (SHIFT) in order to obtain uppercase letters when you are in the lowercase mode or to type characters that appear on the top line of a key that has more than one character on it. For example, to type $, you hold down (SHIFT) and hit the key on the top row with the 4 and the $ on it. Note that unlike the typewriter keyboard, the characters * and + do not require the shift key.

A Word On Diskettes

You cannot be too careful when it comes to handling the diskettes. Each diskette is a small magnetically coated plastic disk sealed in a protective square cover. Through the oval cut-out in the square cover, you can see the magnetic surface of the actual diskette.

Take careful note of the following guidelines for the handling of diskettes:

1. NEVER TOUCH THE EXPOSED MAGNETIC SURFACE with your fingers or any implement.
2. Protect the diskette from dust by storing it in the paper sleeve it comes in.
3. Keep it at least six inches from magnetic fields such as those generated by a TV.
4. Extremes of temperature (such as in a car trunk on a warm day) could destroy a diskette, and you would lose your data, or the program.
5. Don't bend, staple or write on the square cover with a hard pen or pencil (use only soft felt tip pens).

Loading The Program

Introduction

Two disks are required to run *SynGraph*: the program disk (which is provided), and a blank floppy disk on which to store your data files and any graphs you may want to keep for later viewing. If you are going to store a lot of graphs, more than one blank floppy disk may be needed. The data disks can be formatted using the SynStat formatting feature (see the SynStat manual under "Formatting a Data Disk") or ATARI DOS II (see your ATARI DOS II manual for details).

Always load the program disk into the computer using disk drive 1. With more than one disk drive, the program disk goes in drive 1 and the remaining drives can be used for data storage. Operating the program with one disk drive involves swapping the program disk and the data disk back and forth from drive 1 as needed.

The Write Enable Notch on a Disk

Disks have a "write enable" notch on the side of the jacket which, when covered with tape, prevents the disk from being written on. Do not cover the notch with a write protect tab on the data disks unless you are certain you do not wish to store any more data on the disk.

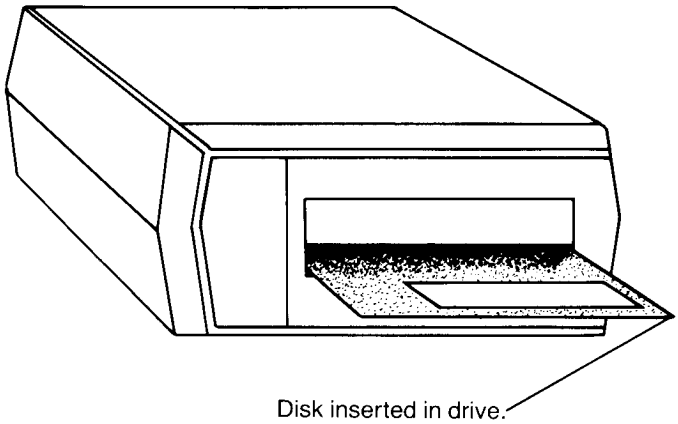
Starting the System

Make sure you have inserted the ATARI BASIC cartridge into the cartridge slot if you do not have an ATARI 600XL/800XL computer, and then check the disk drive(s). Make sure that the busy light is not on. Open the door on each disk drive (if you have more than one) and remove any diskettes that might be present. Leave the drive door(s) open for the time being. You will insert the program diskette later.

If your equipment is turned off, begin by turning on your TV set. Then turn on your disk drive. The drive motor will start up and run for a few seconds. When it stops, the BUSY light will go out, but the power light will remain lit.

Take the program diskette from the pocket on the inside front cover of the manual. Remove it from the paper sleeve and grasp the diskette by the label edge with the label side up. Carefully insert it into drive 1, with the label edge entering last (see illustration). Gently push the diskette all the way in. Close the drive door by pushing its handle

down, until you hear the door click shut.



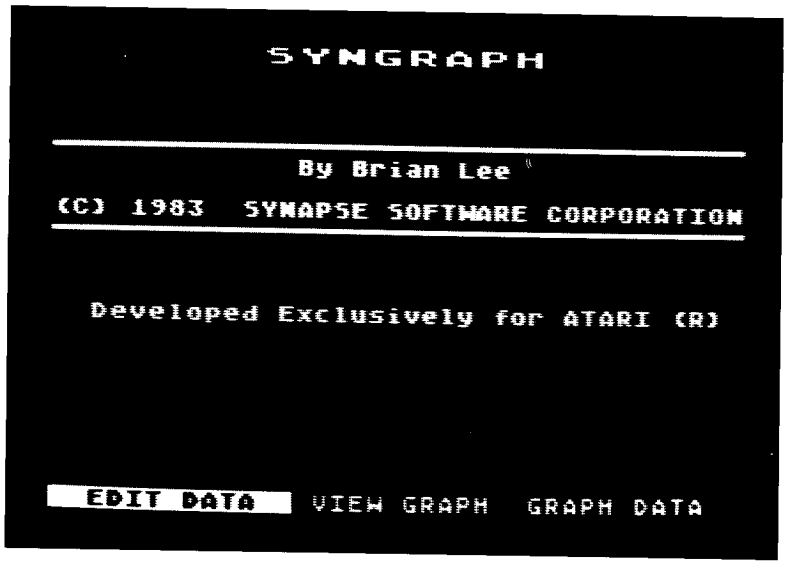
Disk inserted in drive.

REMEMBER: Programs will only load from a disk drive with a DRIVE CODE number of 1. See your disk drive manual for details on setting the DRIVE CODE number.

Now, turn the computer on by pushing the power switch to the ON position. If you have an ATARI 600XL/800XL computer, do **not** disable the built-in BASIC.

If your computer was already on, turn it off, pause a moment then turn it back on. The drive takes about half a minute to load the program.

As the program loading is completed, the Main Menu Screen appears and should look like this:



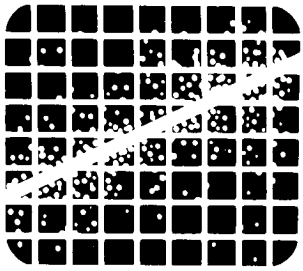
If your screen does not look like the one above, remove your program diskette from the drive. Turn off the computer and start over, using the same instructions previously given.

If you are using only one drive, when the program has loaded correctly and the BUSY light is off, open the drive door and gently remove your program diskette. Put it back in its sleeve (label showing) and keep it handy as you will need to swap it and the data disk back and forth as you move between entering or editing your data and generating graphs. If you have two or more disk drives, leave the program disk in drive one and insert a data disk into drive 2.

At this point we will summarize the steps for loading the program:

1. Make sure an ATARI BASIC cartridge is installed in the cartridge slot if you do not have an ATARI 600XL/800XL computer.
2. Turn on your monitor and disk drive, but not your computer.
3. Wait until the disk drive busy light is off.
4. Insert program disk and close drive door securely.
5. Turn on your computer.

If you have an ATARI 600XL/800XL computer, do not disable the built-in ATARI BASIC.



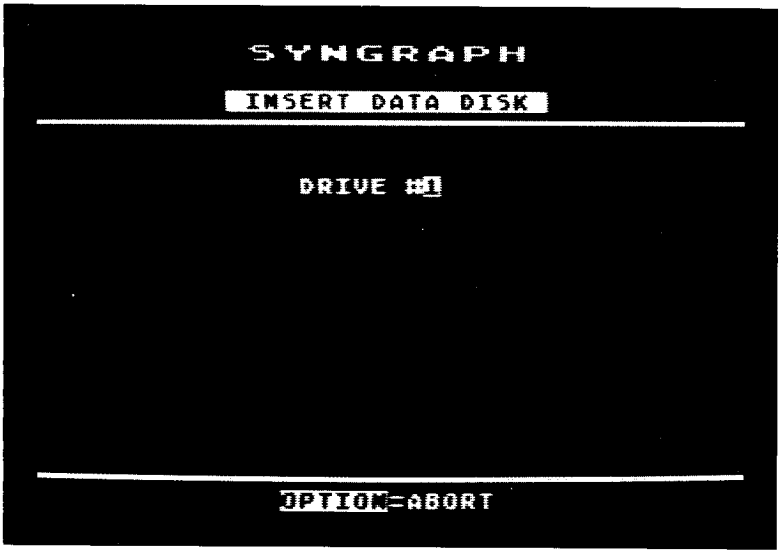
Main Menu

Once the Main Menu appears on the screen you are in a position to select whether you want to enter or edit data, view a saved graph, or generate a graph. By using CTRL and the arrow keys, you can move the white cursor back and forth to indicate your selection. Do this now:
PRESS CTRL and ←→↑↓.

You will notice that only the ← and → work on this screen. The other two keys, ↑ and ↓, will come into use later on.

Edit Data

This operation is used for creating new files and for editing existing files. Since you need data files to generate graphs, we will begin this tutorial by entering data. Make sure that the cursor is positioned over EDIT DATA and:
PRESS RETURN.



The screen changes and you are instructed by a prompt at the top of the screen to:

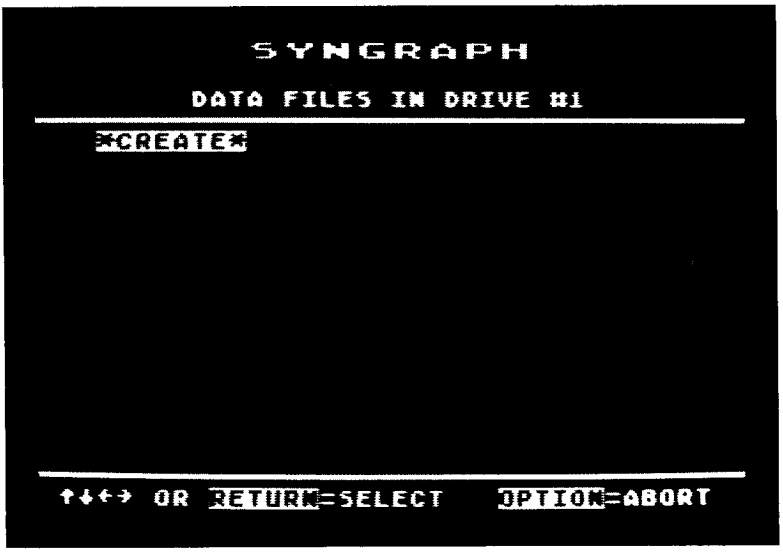
INSERT DATA DISK

Insert a formatted data disk and then enter the drive number where the data disk is located (1 - 4). If you only have one disk drive you will have to switch the *SynGraph* program disk and data disks back and forth. The program will prompt you if you forget. Once entered, *SynGraph* will remember which drive is your data drive until you change it.

ENTER: 1, 2, 3, or 4 for disk drive number as appropriate.

1 is the default drive number. If you have only one drive, you can simply press (RETURN).

The screen changes to display the File Selection screen:



This screen lists all *SynGraph* compatible files. The *CREATE* option is used to create new data files. Since there are no files on your data disk, the screen should simply display the *CREATE* option with the white cursor positioned over it.

To create a new file:
PRESS (RETURN).

A prompt will appear near the bottom of the screen asking you to:

ENTER FILE NAME: _____

For purposes of our demonstration, we will create three files for graphing. Let's assume that you are operating a small retail business and want to graph your daily gross

income and number of customers. The first file, then, will be entitled CUSTOMER.
ENTER: CUSTOMER on the blank line of the prompt for a file name.
PRESS (START).

NOTE: File names can be up to 8 characters long and consist of the letters A-Z or the numbers 0-9. The first character must be a letter.

The next screen which appears is the Data Entry screen. It provides blanks for up to 15 entries at a time. The current file name is shown in the upper-left corner of your screen. *SynGraph* will allow up to 100 data entries per file. After entering data you can press (SELECT) to immediately save the data, (START) to continue to enter more data, or (OPTION) to cancel the data entry process. If you press (OPTION) the program will exit without saving any changes. Be sure not to leave any lines unintentionally blank, as *SynGraph* will assume a blank line is the end of your data entries. Pressing (START) will present another data entry screen if you have filled the current one; otherwise it will save your data. Any data entered after a blank line will be lost. Positive values can range from 1.0 E-9 to 9.9 E+9. Negative values can range from −9.9 E+9 to −1.0 E−9.

Fill in the following data entries and press (RETURN) to get to the next line after each entry.

#1	75
#2	90
#3	87
#4	95
#5	78
#6	82
#7	85
#8	93
#9	97
#10	86

NOTE: *SynGraph* will only accept numbers, decimal points and the upper case E for exponential notation. Dollar signs and other special characters will not be allowed by the program.

Check your entries over carefully. If you have made any entry errors, go back and change them by pressing (RETURN) or using (CTRL) and the arrow keys until the cursor is positioned on the line with the error. Then retype your entry.

When everything looks correct:
PRESS (SELECT) to save your data.

Once the program has saved your data, it will display the File Selection screen again.

The large white cursor should be positioned over CUSTOMER. You can use (CTRL) (→) to move from CUSTOMER to *CREATE* if you want to experiment. Now make sure the cursor is positioned over CUSTOMER and:
PRESS (RETURN).

The file you just created will appear on the display. If you want to make any additions or corrections to this file, you can do so now. Notice that it reads EDIT DATA at the top

of the screen instead of ENTER DATA as it did before. For the purposes of this tutorial:
PRESS (OPTION) to return to the File Selection screen.

Move the cursor to *CREATE* with (CTRL) and (→), since we are going to create another data file.
PRESS (RETURN).

Now you are being asked for another file name.
ENTER: REVENUES on the blank line and:
PRESS (START) to continue.

This file will represent the amount of money found in the cash register at the end of each day during the period.

You are now presented with another Data Entry screen for entering your sales data. Make the following entries, pressing (RETURN) after each one.

#1	**90.82**
#2	**80.75**
#3	**95.45**
#4	**75.57**
#5	**60.69**
#6	**77.83**
#7	**80.04**
#8	**87.36**
#9	**92.58**
#10	**75.36**

After checking your entries over carefully:
PRESS (SELECT) to save the data.

SynGraph saves the data you enter in what is called Data Interchange Format or DIF™ for short. We'll talk a little more in the reference section about DIF files. For now, you simply need to know that data entered in *SynGraph* is

automatically compatible with *SynCalc*, *SynFile+*, *SynStat*, and *VisiCalc*.

Once again, the program will display the File Selection screen. Now you have two files listed on the File Selection screen plus the *CREATE* option. The cursor is positioned over the first entry, CUSTOMER. If you want to check your revenues file, use the arrow keys to move the cursor over to REVENUES and press (RETURN) as before.

Otherwise, move the cursor over *CREATE* and:
PRESS (RETURN).

Once again you are being asked for a new file name.
ENTER: AUGUST on the blank line and:
PRESS (START).

ENTER: the following data on the Data Entry screen:

#1	**8**
#2	**9**
#3	**10**
#4	**11**
#5	**12**
#6	**13**
#7	**15**
#8	**16**
#9	**17**
#10	**18**
#11	**19**
#12	**20**
#13	**22**
#14	**23**
#15	**24**

These values will correspond to the days in August on which we made observations of the number of customers and sales. We have entered more dates than necessary to

allow room to update the REVENUE and CUSTOMER files as time passes.
PRESS (START) to continue.

When you press (START) to continue, you are presented with another Enter Data screen since the previous screen was filled with data.

ENTER: the following data on the blank screen:

#16 25
#17 26
#18 27

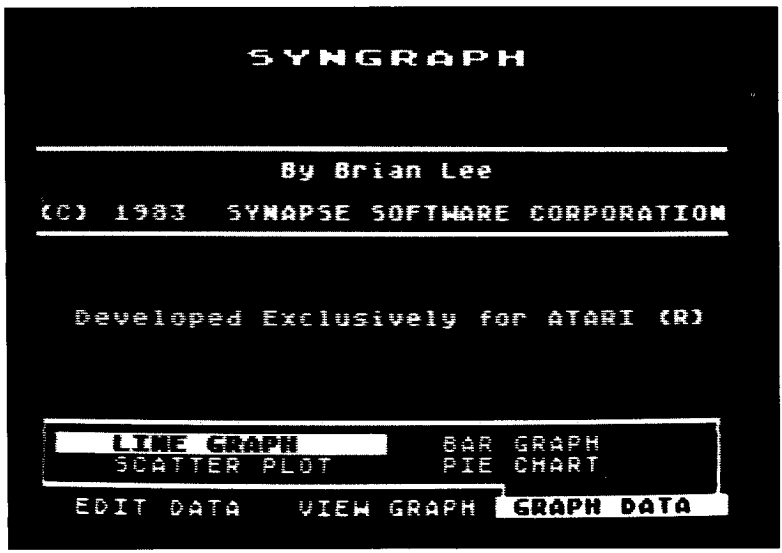
PRESS (SELECT) to save the file.

From the File Selection screen, press (OPTION) to go to the Main Menu.

Graphing

You should now be looking at the Main Menu. With (CTRL) and (→) move the large white cursor over the option GRAPH DATA.
PRESS (RETURN).

The screen display now looks like this:



Selecting GRAPH DATA from the Main Menu has generated a sub-menu listing the graphing options: Line Graph, Bar Graph, Scatter Plot and Pie Chart.

With (CTRL) and the arrow keys you can move the large white cursor on the Sub-Menu to any of the four possible graphing options. Experiment with this if you like and then place the cursor over LINE GRAPH when you are finished.

(Pressing (ESC) will exit the Sub-Menu and put you back in the Main Menu as before.)

Line Graph

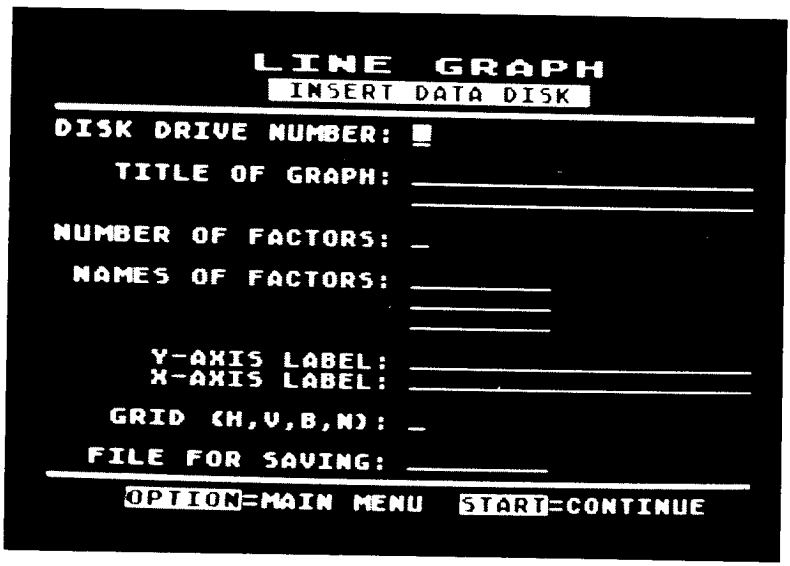
The first graph we will generate from the data files will be a line graph. Make sure the GRAPH DATA sub-menu is on your screen with the cursor resting over Line Graph. If you

are using only one disk drive, remove the data disk and insert the program disk.

With the program disk in drive one and the cursor over LINE GRAPH:
PRESS (RETURN).

The LINE GRAPH program will load in about 30 seconds.

You will be presented with the Parameter Entry screen:



This screen allows you to title your graph, assign names to factors, enter labels, and decide whether or not you want a grid.

If you are using one drive, remove the program disk and insert your data disk. You are ready to begin entering your specifications for the line graph.

ENTER: the disk drive number where your data disk is located if you wish to change it.
PRESS RETURN.

The next line is for entering a title for the graph. It may be left blank if you do not want a title. If you would like a title, you can use up to 40 characters. The cursor will wrap around to the second line as you enter your title. When the title appears on the graph, it will be on one line and centered.
ENTER: MONTH OF AUGUST for the title.
PRESS RETURN.

Next you will be asked for the number of factors you are going to include on this graph. The number of factors is the number of sets of data to be displayed on the graph. Each factor will be represented by a different colored line. Your entry can be either 1, 2, or 3.
ENTER: 2.
PRESS RETURN.

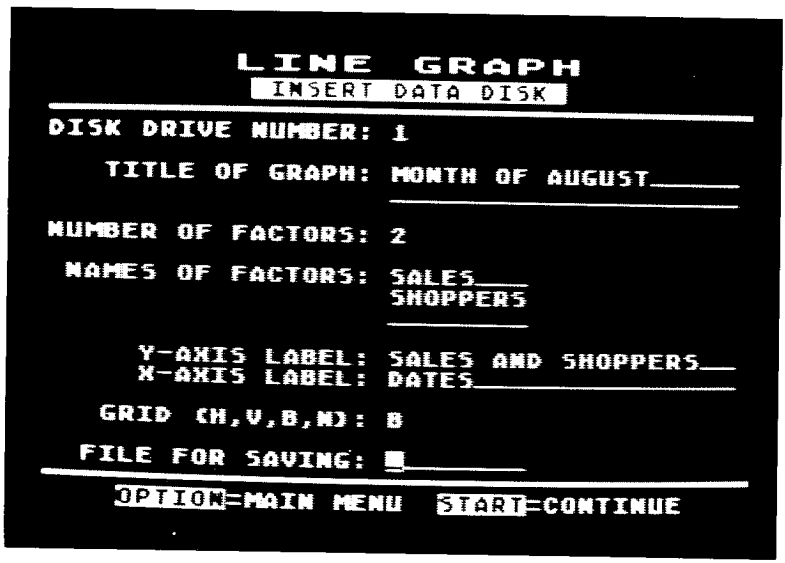
We will graph sales and customers on the Y (vertical) axis and August dates along the X (horizontal) axis. This will give us two factors on the graph: 1) Amount of sales by date, and 2) Number of customers by date.

Now you can label the factors, so that it will be easy to tell at a glance what is being represented on the graph. Factor names are limited to 8 characters. If you do not designate labels, *SynGraph* will label the factors for you as A & B (and C if you used a third factor).
ENTER: SALES on the first line.
PRESS RETURN.
ENTER: SHOPPERS on the second line.
PRESS RETURN twice.

The cursor should be on the Y-axis label line. Now you can designate labels for the X- and Y-axes. These labels can be up to 20 characters long. If they are left blank, your graph will simply show the X- and Y-axes without labels.
ENTER: SALES AND SHOPPERS for the Y-axis.
PRESS (RETURN).
ENTER: DATES for the X-axis.
PRESS (RETURN).

Under Grid, you have four options:
1. A Horizontal grid can be selected by entering: H.
2. A Vertical grid can be selected by entering: V.
3. You can have Both horizontal and vertical grids by entering: B.
4. You can choose to have No grid at all by entering: N.

ENTER: B for both horizontal and vertical.
PRESS (RETURN).
So far, the filled-in Parameter Entry screen should look like this:



If you want to save this graph for later use, you can enter a name under which you want to save the graph on a disk. Approximately 8 graphs can be saved on one disk. If you simply press (START) without entering a file name, the default file name of GRAPH will be entered just before the display changes to the next selection screen. To enter a file name, simply type in a word 8 characters or less that gives you some indication of the nature of your file (i.e., something like SALES or CASH). *SynGraph* will automatically affix the file extension of .SCR to the file name, designating it as a screen image file. To recall the graph, refer to the section on Viewing Saved Graphs.

For the purposes of this tutorial:
ENTER: SALES.

This will be for the file for saving. We will later recall this graph using the View Graph option in the Main Menu.

Default Values/Line Graph

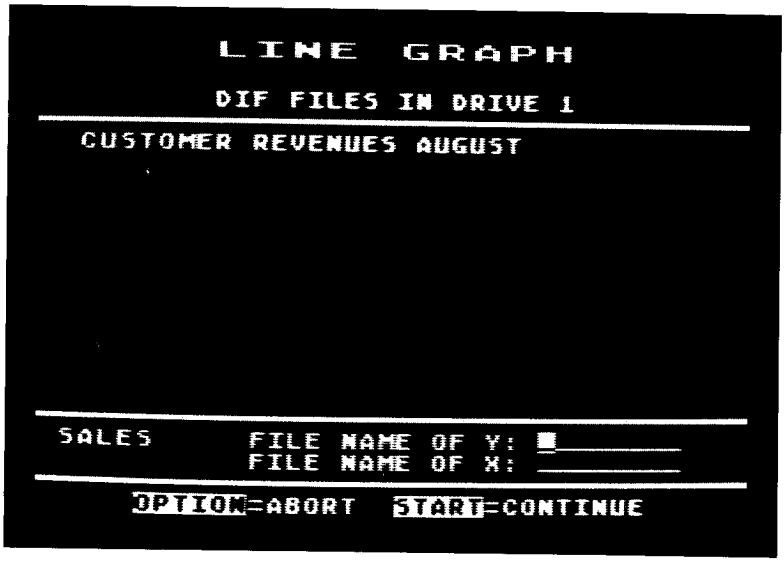
If you choose to leave some or all of the entries blank, *SynGraph* will enter the following default values:

PROMPT	DEFAULT VALUE
Disk Drive Number:	**Last Entered Drive #**
Number of Factors:	**1**
Names of Factors:	**A, B, and C as appropriate**
Grid:	**N for no grid**
File for Saving:	**GRAPH**

The title of the Graph and the X and Y axes labels are left blank by default.

Factor Selection Screen

After depressing (START) to enter your labels and other designations on the first screen, you will be presented with the Factor Selection screen:



From this screen, you can select which data files (listed in the center part of the screen) you are going to graph.

The cursor is positioned near the bottom of the screen awaiting your designation for the first factor, SALES. Since sales is one of the factors to be plotted along the Y-axis, and dates are going to be displayed along the X-axis, you should:

ENTER: REVENUES for the File Name of Y.
PRESS (RETURN).
ENTER: AUGUST for the File Name of X.

SynGraph will take the data in the REVENUES file and use it for the Y-coordinates and will take the data in the AUGUST file and use it for the X-coordinates.
PRESS (START) to continue.

Now you need to enter the file designations for the second factor you are graphing, SHOPPERS. Since shoppers will also be plotted on the Y-axis against the dates on the X-axis, you should:
ENTER: CUSTOMER as the file name of Y.
PRESS (RETURN).
ENTER: AUGUST as the file name of X.
PRESS (START).

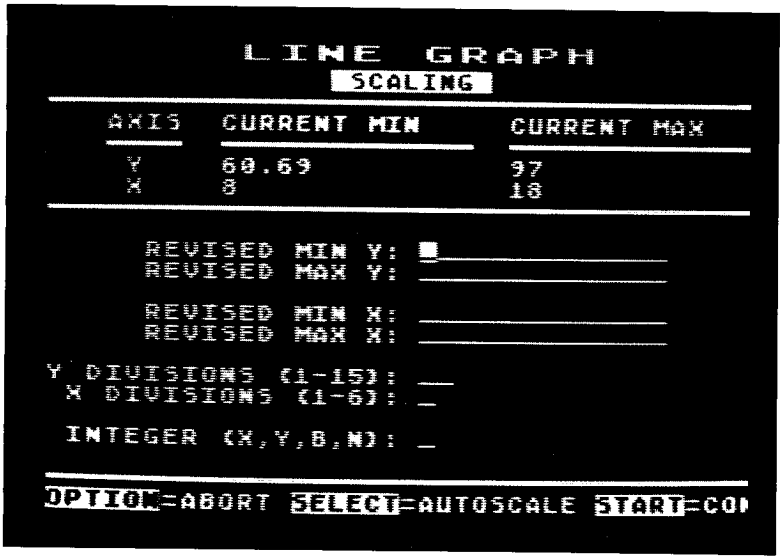
SynGraph will take the data in the CUSTOMER file and use it for the Y-coordinates and will take the data in the AUGUST file and use it for the X-coordinates.

Default Values/Factor Screen

You must always specify a file for the Y-coordinates, but it is not necessary to specify a file for the X-coordinates. If you leave the X-coordinate file specification blank, *SynGraph* will default the X-coordinate data to 1 through the number of data points in your Y-file. That is, if you have ten items in your Y-file, *SynGraph* will plot the first item against 1, the second item against 2, and so on to the last item against 10.

Scaling Screen

After depressing (START) (above), the Scaling screen should appear as follows:



Normally the X- and Y-axes begin from the lowest data value and range up to the largest number in the file. Therefore, since we assigned the dates file (AUGUST) to the X-axis for both factors, the minimum is 8 for the X-axis, the earliest date in the file, and the maximum for the X-axis is 18, the latest date in the file that matches up to the number of data entries in the CUSTOMER and REVENUES files. The CUSTOMER file contained the largest value of the two files assigned to that axis (REVENUE and CUSTOMER). Therefore, the maximum assigned to the Y-axis is 97. The minimum value for the Y-axis is 60.69, which is the lowest value between the two files being plotted on the Y-axis.

The options on the Scaling screen allowing you to revise these minimum and maximum values will allow you to rescale your graph. For instance, you may want the Y-axis to show values up to $100, or you may want the X-axis to carry over to August 31 to show the end of the month, instead of up to the 18th as it is at present. In any event, the main thing to remember is that a revised minimum must be lower than the current minimum and a revised maximum must be higher than the current maximum.

NOTE: Changing the values for current maximum and current minimum does not change the data in your file.

Autoscale

If you want *SynGraph* to automatically scale your screen, simply press (SELECT) without making any entries. *SynGraph* will use the current minimum and maximum values as default values.

SynGraph will handle maximum numbers up to 99.9 for both the X- and Y-axes before going into exponential notation. So, if you revise the maximum for the Y-axis to 100, it will be written as 10 with all the numbers preceding in their exponential form as well. A special notation (E + 1) will appear at the top of the screen to let you know that the axes coordinates are in exponential form. Exponentials can be up to plus or minus 9.

For this example, we will change the scaling on the X-axis to 31 by using the (RETURN) key to space down to the line:

REVISED MAX X:

Then:
ENTER: 31
PRESS RETURN.

The lines: Y DIVISIONS (1-15); and X DIVISIONS (1 - 6) ask you to decide how many divisions along the X- and Y-axes you wish to have. *SynGraph* will divide and label the X- and Y-axes into the number of increments you designate on these lines. These options default to 10 for the Y-axis and 5 for the X axis.

For the purposes of this tutorial, simply press RETURN twice.

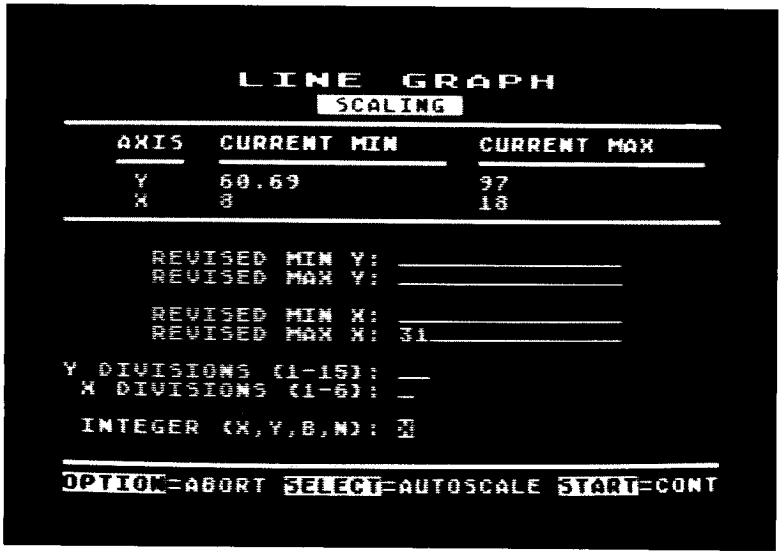
The prompt **INTEGER (X, Y, B, N)** is referring to whether you want the increments on the X- and Y-axes to be in whole numbers (integer) or in floating decimal notation.

The options are:
1. Entering: X will put the X-axis in whole numbers (integers).
2. Entering: Y will put the Y-axis in whole numbers.
3. Entering: B will put Both axes in whole numbers.
4. Entering: N will put Neither axis in whole numbers.

The default is N for neither.

Since the X-axis is dates, it makes sense to designate that axis as whole numbers only. The Y-axis in this example could be either way. For the purposes of this example, we will leave the Y-axis in decimal numbers.
ENTER: X on the Integer Line.

Now the X-axis will be whole numbers, leaving the Y-axis in decimal notation.



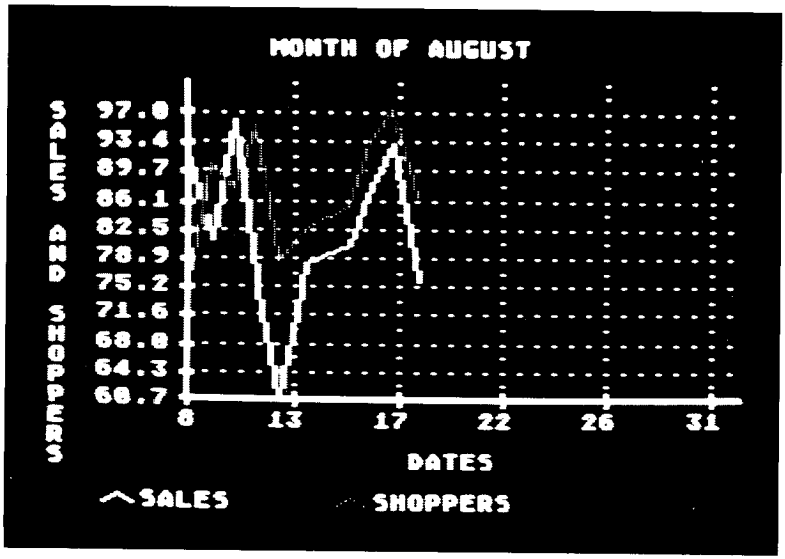
Default Values/Scaling Screen

By simply pressing (START) without making any entries on the Scaling screen, *SynGraph* will default to:

The current minimums and maximums for the X- and Y-axes.
Y Divisions of 10.
X Divisions of 5.
N for no integer format.

PRESS (START).

The next screen will generate your graph:



Congratulations! You've just created your first graph. Take a well deserved moment to admire your handiwork. Both lines appear to move in unison, suggesting a high degree of correlation between traffic and sales (not too surprisingly). You may also notice that the values on the X-axis seem a bit strange. This is because the number of X divisions chosen did not lend itself to an even division of the range of X values. This can be remedied by either changing the number of X divisions or the minimum and maximum X values on the scaling screen. In just a moment we will fix the X-axis to be more presentable.

Print, Save, or Continue

With your newly created line graph on the screen display:
PRESS (SPACE BAR).

On the bottom of the screen a new prompt line will appear:

OPTION = **PRINT** SELECT = **SAVE** START = **CONT**

Print

If you wanted to Print your graph and have a compatible printer, make sure it is properly connected, turned on, and then:
PRESS OPTION.

You would then be asked to select the type of printer you have connected to your system. If you changed your mind about printing, you could press ESC to exit. After selecting the type of printer, *SynGraph* would begin printing your graph. When *SynGraph* has completed printing your graph, the prompt line will reappear at the bottom of your screen.

For now, let's go on to saving the graph.

Save

Since we want to save the graph to a disk for later viewing, **PRESS** SELECT.

You will be asked to insert the data disk into your disk drive and press RETURN. If you changed your mind about saving the graph, pressing ESC will exit the operation. Press RETURN to save your graph to the file you specified on the Parameter Entry screen with the .SCR extender. When the graph has been saved, the original prompt line will reappear at the bottom of the screen. If you encounter an error while saving, you will be returned to the prompt line. Be careful not to over fill your data disk.

Continue

PRESS (START) to Continue.

The prompt line will change again:

(SELECT) = **RE-SCALE** (START) = **RE-START**

Depressing (SELECT) will take you back to the Scaling screen where you can set new parameters for the same graph.

Depressing (START) will take you back to the Parameter Entry screen where you can generate another line graph if you want.

As an example, we will rescale the graph just created so that there will be exponential notation on the Y-axis and to correct the X-axis problem.
PRESS (SELECT).

You should now be back at the Scaling screen.

Re-scaling Line Graph

You should now be looking at the same Scaling screen you used to set the original parameters for this graph.

On the REVISED MIN Y line:
ENTER: 0

On the REVISED MAX Y line:
ENTER: 100

This will rescale the Y-axis to values from 0 - 100.

On the REVISED MAX X line:
ENTER: 18

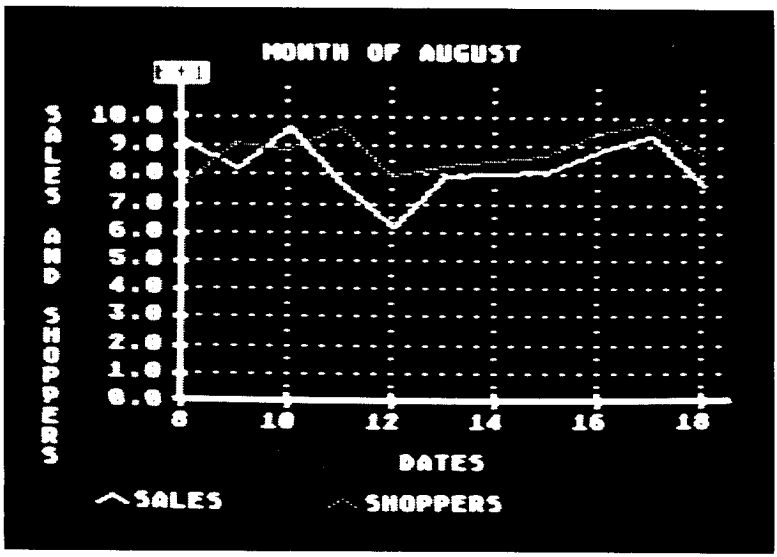
This will rescale the X-axis out to 18 and even out the divisions.

Let the Y divisions and X divisions default to the values of 10 and 5 for now, by leaving them blank.

(Press RETURN until you come to the INTEGER line).

Again, we will designate the X-axis in integer form, so:
ENTER: X on the Integer line.
PRESS START to generate the graph.

Your rescaled graph should now appear as follows:



Notice that the X-axis values now appear correctly spaced for their values.

As you can see, adjusting the minimum, maximum and number of divisions on the scaling screen can make your graph much easier to read.

Exponential Notation

This explanation is based on the graph generated in the previous section, Re-scaling Line Graph. If you have not just completed working the line graph example and rescaling of the graph, you may want to review that section before reading on.

Notice that the rescaled line graph is essentially the same as the original graph, except that the Y-axis scaling has changed. The numbers are in exponential form. Since we rescaled the Y-axis to a minimum of 0 and a maximum of 100, the bottom most number on the Y-axis is 0. The number next to the E+ at the top-left corner of the graph actually represents the number of times that 10 must be multiplied times the displayed values (10 X 1). The top-most number, 10, is actually 100 since 10 E+1 represents 100 (10 X 10). Since we allowed the Y-divisions to default to 10 on the Scaling screen, *SynGraph* divided the Y-axis into ten equal increments. Doing this has made the Y-axis easy to read. The disadvantage to this type of scaling in this particular case is that you have less accuracy in reading the Y-coordinates for the dollar amounts in the REVENUE file. However, to get a general picture of the number of customers in the store and their spending habits, this scaling can give you a clear picture of the trends. The data points are plotted in the same way as on the first graph, except that their placement (distance from top and bottom of graph) is slightly higher, since the Y-axis scale was extended from 60.69 down to 0.

This example should give you an idea of how you can use rescaling to change the presentation of a graph. By adjusting the scaling and number of divisions, you can create a graph that provides a more suitable representation of your data.

Re-Starting A Graph

When a graph is displayed on the screen, the prompt line can be turned on and off by pressing the space bar.
PRESS [SPACE BAR] to turn on the prompt line.
PRESS [START] to continue.
PRESS [START] to re-start.

The prompt line will now show:

[OPTION] = **MAIN MENU** [START] = **CONTINUE**

You can press [OPTION] to exit to the Main Menu. Make sure your program disk is in disk drive 1 and:
PRESS [OPTION].

The Main Menu will appear in a few seconds.

If you did not have the program disk in drive 1 when you pressed [OPTION], you will be prompted to do so and then press [START].

Viewing Saved Graphs

You should now be looking at the Main Menu. Using [CTRL] and the arrow keys, move the cursor to the View Graph option and:
PRESS [RETURN].

You will then be presented with a Drive Selection screen like the one you saw when first entering data. Enter the

appropriate drive number or press (RETURN) to use the displayed drive number.

If you are using one drive, you will be prompted to remove the program disk and to insert the data disk. Do so, and:
PRESS (RETURN).

The next screen will show the current data files in the designated drive. Since we only have one such file saved under SALES the cursor will appear over it. If more files existed, you would be able to move the cursor to the desired file using (CTRL) and the arrow keys.

For now, simply press (RETURN) to select SALES as the graph to view. Over the next few seconds, the graph you originally designed will materialize on the screen. This graph will remain on the screen until you touch a key on

the keyboard. You will then be returned to the File Selection screen.
PRESS: any key.
PRESS [OPTION] to return to the Main Menu.

Scatter Plot

The scatter plot is similar to a line graph, except that the points are not connected by lines. Usually scatter plots contain many points clustered within the graph. This type of graph is often used for purposes of correlation analysis and forecasting of trends. A scatter plot can display up to 3 factors, each with up to 100 data values.

With our already existing data files, we can create a simple scatter plot by generating a graph with the sales (REVENUE file) plotted against shoppers (CUSTOMER file).

Make sure your program disk is inserted in drive 1 and that the Main Menu is displayed.

Position the cursor over GRAPH DATA (use [CTRL] and [→]) and:
PRESS [RETURN].

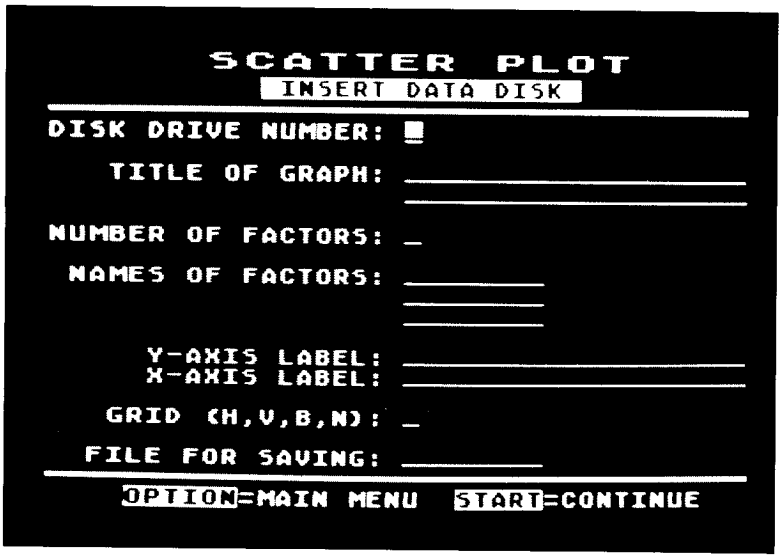
This will generate the GRAPH DATA sub-menu.

Using [CTRL] and the arrow keys, position the cursor over SCATTER PLOT and:
PRESS [RETURN].

After a few moments the Scatter Plot Parameter Entry screen will appear.

Insert your data disk (unless you are using two or more disk drives). You are now ready to begin entering the specifications for generating a scatter plot graph.

The Scatter Plot Parameter Entry screen is the same screen used for the line graph and is filled in the same way.



ENTER: the disk drive number where your data disk is located, if it is necessary to change it.
PRESS RETURN.

On the next line you can enter a title for the graph. It may be left blank if you do not want a title. If you do, titles can use up to 40 characters. The cursor will wrap around to the second line as you enter the title. When the title appears on the graph, it will be on one line and centered.

ENTER: DAILY BUYING ANALYSIS
PRESS RETURN.

On this particular graph, there will be only one factor: CUSTOMER plotted against REVENUE as the X- and Y-coordinates.

Next to NUMBER OF FACTORS:
ENTER: 1
PRESS (RETURN).

For the FACTOR NAME:
ENTER: PURCHASE
PRESS (RETURN).

Press (RETURN) two more times so that you are on the line Y-AXIS LABEL.
ENTER: SALES
PRESS (RETURN).

For the X-AXIS LABEL,
ENTER: SHOPPERS
PRESS (RETURN).

This time we will not use a grid.
ENTER: N opposite the Grid prompt.
PRESS (RETURN).

If you are going to save this graph for later use, you can enter a name under which you want to file the graph on a disk. If you simply press (START) without entering a file name, the default file name of GRAPH will be entered just before the display changes to the next selection screen. To enter a file name, simply type in a word 8 characters or less that gives you some indication of the nature of your file. *SynGraph* will automatically affix the file extension of .SCR to the file name.

For the purposes of this tutorial:
PRESS (START) without entering a file name.

Default Values/Scatter Plot

If you choose to leave some or all of the entries blank, *SynGraph* will enter the following default values:

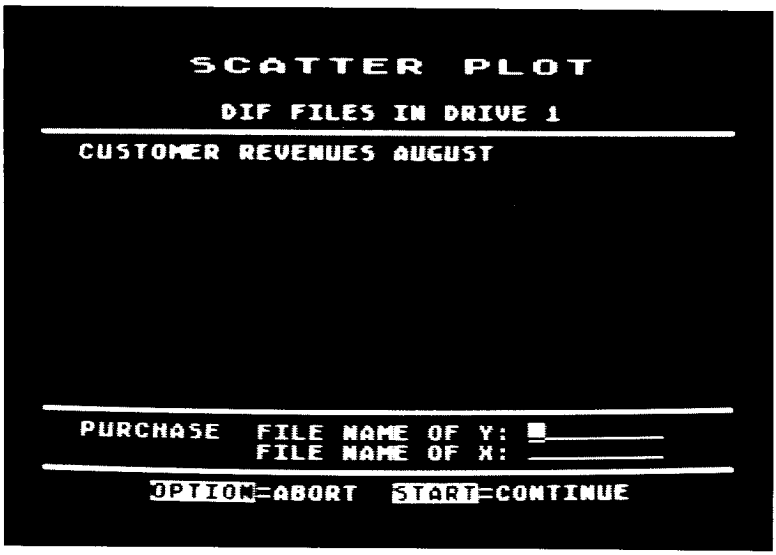
PROMPT	DEFAULT VALUE
Disk Drive Number:	**Last entered drive #**
Number of factors:	**1**
Names of factors:	**A, B, and C as appropriate**
Grid:	**N for no grid**
File for saving:	**Graph**

The title of the graph and X- and Y-axes labels are blank by default.

If you enter 2 or 3 next to NUMBER OF FACTORS, press (RETURN) and then press (START) to generate the default values, *SynGraph* will designate A & B or A, B, and C for the Factor Names.

Factor Selection Screen

After having depressed (START) to enter your choices from the Scatter Plot Parameter Entry screen, the Factor Selection screen should now be displayed.



From this screen you will designate the data files to be used as the X- and Y-coordinates for plotting the factor: PURCHASE.

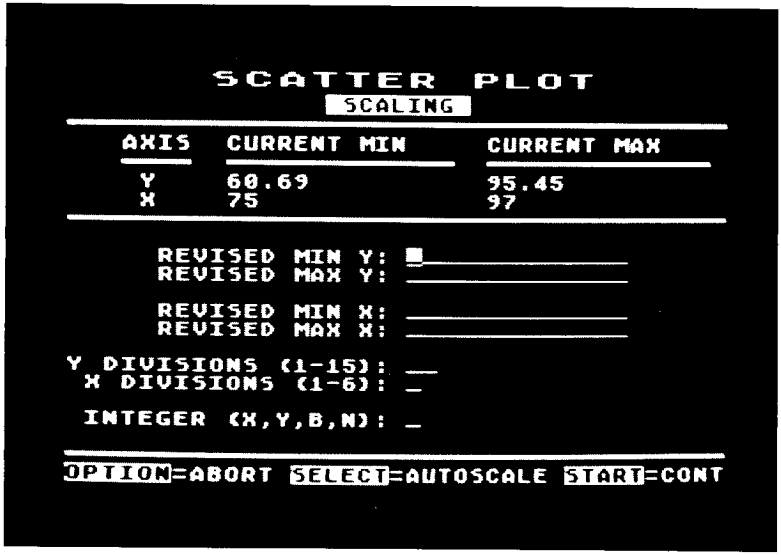
Since we want to plot sales along the Y-axis:
ENTER: REVENUES for the FILE NAME OF Y.
PRESS (RETURN).
ENTER: CUSTOMER for the FILE NAME OF X.
PRESS (START).

Default Values/Factor Screen

As with the Line Graph program, you should always specify a file for your Y-coordinates, but it is not necessary to specify one for the X-coordinates. If you leave the X-coordinate specification blank, *SynGraph* will default the X-coordinate data to 1 through the largest number of data points in your Y file.

Scaling Screen

After depressing (START) (above), the Scaling screen should appear as follows:



Normally the X- and Y-axes begin from the lowest data value and scale up to the largest value in the file. Because we assigned the CUSTOMERS file to the X-axis, the minimum is 75 for the X-axis. Since this is the lowest number of customers. The maximum for the X-axis is 97, the largest number of customers. The REVENUE file contained sales figures ranging from $60.69 to $95.45. Therefore, the maximum assigned to the Y-axis is 95.45 and the minimum value for the Y-axis is 60.69.

The options on the Scaling screen allowing you to revise these minimum and maximum values can be used to rescale your graph. For instance, you may want the Y-axis to show values up to $100, or you may want the X-axis to show values up to 100 shoppers. In any event, the main

thing to remember is that a revised minimum must be lower than the current minimum and a revised maximum must be higher than the current maximum.

SynGraph will handle maximum numbers of up to 99.9 for both the X- and Y-axes before going into exponential form. So, if you revise the maximum for the Y-axis to 100, it will be displayed as 10 with all the numbers preceding in their exponential form as well. A special notation (E+1) will appear at the top of the screen, so you will know that the axes coordinates are in their exponential notation. Exponentials can range from 10 to the -9 to 10 to the +9 power.

With this graph, we will change the minimums and maximums for both the X- and Y-axes. This will generate exponential notation along both axes.

Opposite REVISED MIN Y:
ENTER: 50
PRESS (RETURN).

Opposite REVISED MAX Y:
ENTER: 100
PRESS (RETURN).

Opposite REVISED MIN X:
ENTER: 50
PRESS (RETURN).

Opposite REVISED MAX X:
ENTER: 100
PRESS (RETURN).

We will use the default values of 5 and 10 for the increment divisions of the X- and Y-axes. Remember, this

tells *SynGraph* to divide and label the X- and Y-axes into the number of increments you specify.
PRESS (RETURN) twice.

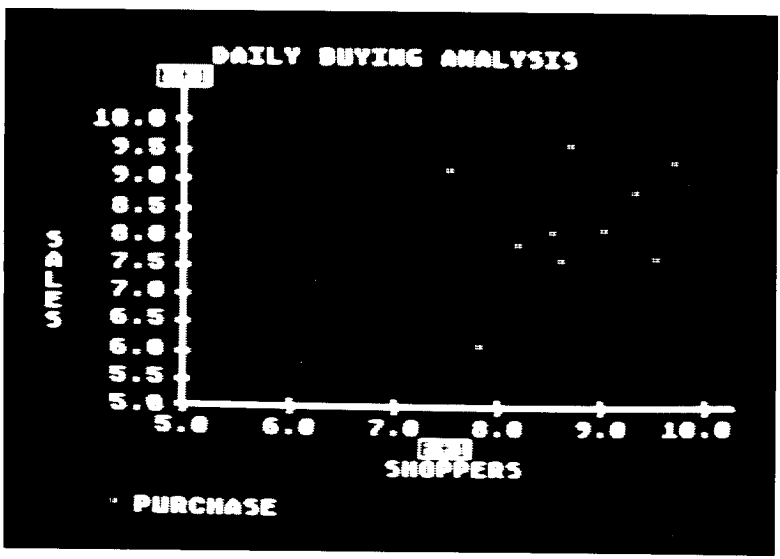
We will use the floating point format for both axes. Since this is the default format, simply:
PRESS (START).

Default Values/Scaling Screen

By simply depressing (START) without making any entries on the scaling screen, *SynGraph* will default to:

The current minimums and maximums for the X- and Y-axes.
Y Divisions of 10.
X Divisions of 5.
N for no integer format.

The next screen will generate your graph.



On this graph the axes are expressed in exponential notation. The rescaling has caused the graph to begin at 50 and to extend to 100 on both axes. Again, the numbers 5 to 10 actually represent 50 to 100 on both axes. The E+1 notation indicates that you should read these numbers as exponentials. The exponential notation 5 E+1 actually represents 50 and the exponential notation 6 E+1 actually represents 60. This extends along both axes up to 10 E+1 which represents 100.

There appears to be some correlation between sales and customer traffic since the plotted values lie along a somewhat linear pattern. By looking for some sort of pattern in the plotted points, you might find some indication of a relationship between the two data sets.

Print, Save or Continue

With your newly created scatter plot displayed on the screen:
PRESS (SPACE BAR).

On the bottom of the screen a new prompt line will appear:

(OPTION) = **PRINT** (SELECT) = **SAVE** (START) = **CONT**

Print

If you wanted to print your graph and you have a suitable printer connected to your system, make sure it is properly connected, turned on, and then:
PRESS (OPTION).

You will be asked to select the type of printer you have connected to your system. At this point you can press (ESC) to exit this operation if you change your mind. After selecting the printer type, *SynGraph* will begin printing

your graph. When printing is completed, the prompt line will reappear at the bottom of the screen.

Save

If you want to save your graph to a disk for later use:
PRESS (SELECT).

You will be asked to insert the disk on which you want to save the graph and to press (RETURN). Doing so will save the graph with the name you specified on the Scatter Plot Parameter Entry screen (or defaulted to the name GRAPH) with .SCR attached. At this point you can press (ESC) to exit the operation. When the graph has been saved, the original prompt line will reappear at the bottom of the screen.

Continue

If you want to generate another graph or rescale this one:
PRESS (START).

The prompt line will change again:

(SELECT) = **RE-SCALE** (START) = **RE-START**

Depressing (SELECT) will take you back to the Scaling screen where you can set new parameters for the same graph.

Depressing (START) will take you back to the Scatter Plot Parameter Entry screen where you could generate another scatter plot if desired.

For now, from the "OPTION = **PRINT** SELECT = **SAVE** START = **CONT**" prompt:
PRESS START to continue.
PRESS START again to re-start. With the program disk in drive 1:
PRESS OPTION.

Bar Graph

SynGraph's Bar Graph option will display a series of vertical bars across the screen. *SynGraph* will take the designated data files and plot them on the Y-axis against the number of entries in each file on the X-axis. You can have up to 3 factors on the Bar Graph, all plotted simultaneously. As an added feature, when you are graphing 2 or 3 factors, you can choose whether to have them displayed as clustered side by side or to have them displayed in a stacked format (one factor on top of the other). *SynGraph* will display up to 32 single factor bars, up to 24 two factor bars, and up to 16 three-factor bars. Clustered bar graphs can display both positive and negative values. Stacked bar graphs can display only positive values.

With our existing data files, we can create a bar graph from the REVENUES and CUSTOMER file. We will get a comparison of volume of people through the store in relation to the volume of their purchases.

Make sure your program disk is inserted in drive 1 and that the Main Menu is on the display.

Using CTRL and →, move the cursor over GRAPH DATA and:
PRESS RETURN.

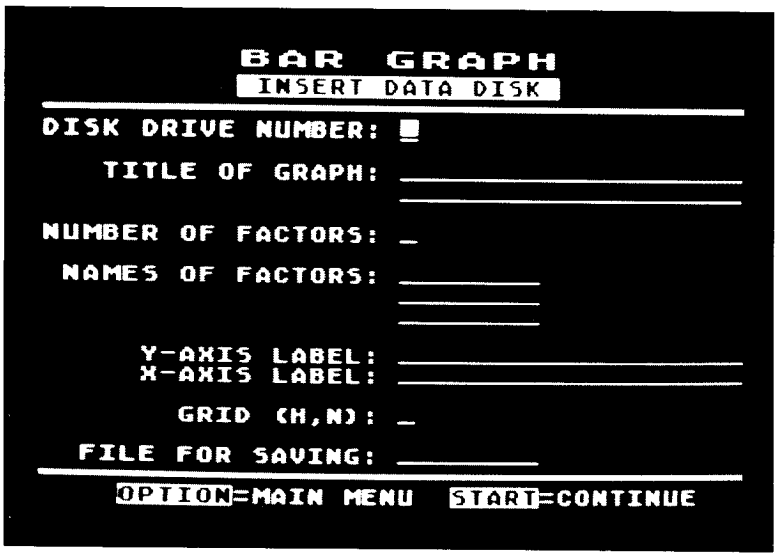
This will pop up the GRAPH DATA sub-menu.

Using CTRL and the arrow keys, position the cursor over BAR GRAPH and:
PRESS RETURN.

After a few moments, the Bar Graph Parameter Entry screen will appear.

Make sure your data disk is inserted in the appropriate drive. You are now ready to begin entering your Bar Graph specifications.

The Bar Graph Parameter Entry screen is similar to the one used for the Line Graph and the Scatter Plot programs and is filled in the same way. Notice that the grid options are only Horizontal or No grid.



ENTER: the disk drive number where your data disk is located if you need to change it.
PRESS RETURN.

On the next line you can enter a title for the graph. It may be left blank if you do not want a title. If you do, titles can use up to 40 characters. The cursor may wrap around to the second line as you enter the title. When the title appears on the graph, it will be on one line and centered.
ENTER: PURCHASES
PRESS (RETURN).

With this graph we will use two factors: SHOPPERS and SALES. This will generate two sets of color-coded bars.

Next to NUMBER OF FACTORS:
ENTER: 2
PRESS (RETURN).

For the FACTOR NAMES,
ENTER: SALES
PRESS (RETURN).
ENTER: SHOPPERS
PRESS (RETURN).

PRESS (RETURN) again so that you are on the line:
Y-AXIS LABEL
ENTER: SALES & SHOPPERS
PRESS (RETURN).

For the X-AXIS,
ENTER: DAYS
PRESS (RETURN).
ENTER: H for horizontal grid.
PRESS (RETURN).

If you are going to save this graph for later use, you can enter a name under which you want to file the graph on a disk. If you simply press (START) without entering a file name, the default file name of GRAPH will be entered just

before the display changes to the next selection screen. To enter a file name, simply type in a word 8 characters or less that gives you some indication of the nature of your file. *SynGraph* will automatically affix the file extension of .SCR to the file name.

For the purposes of this tutorial,
PRESS (START) without entering a file name.

Default Values/Bar Graph

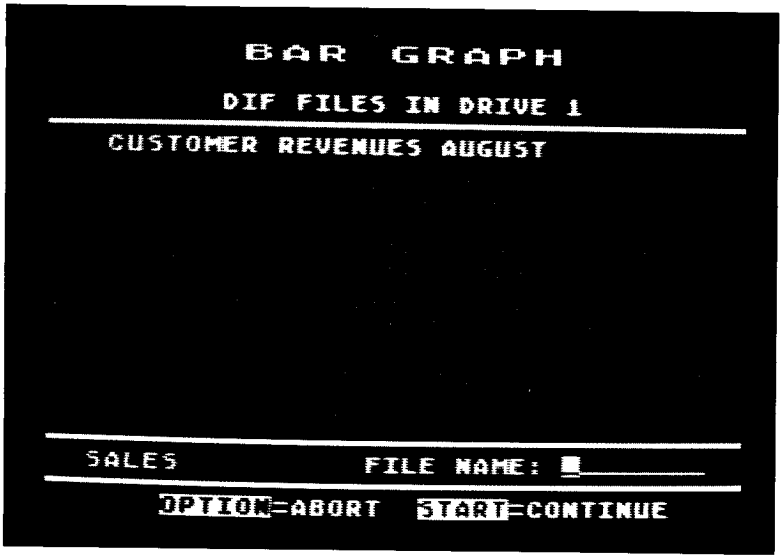
If you choose to leave some or all of the entries blank, *SynGraph* will enter the following default values:

PROMPT	DEFAULT VALUE
Disk Drive Number:	**Last entered drive #**
Number of Factors:	**1**
Names of Factors:	**A, B, and C as appropriate**
Grid:	**N for no grid**
File For Saving:	**GRAPH**

The title of the graph and X- and Y-axis labels are left blank by default.

Factor Selection Screen

After having depressed (START) to enter your designations from the Bar Graph Parameter Entry screen, the Factor Selection screen is displayed.

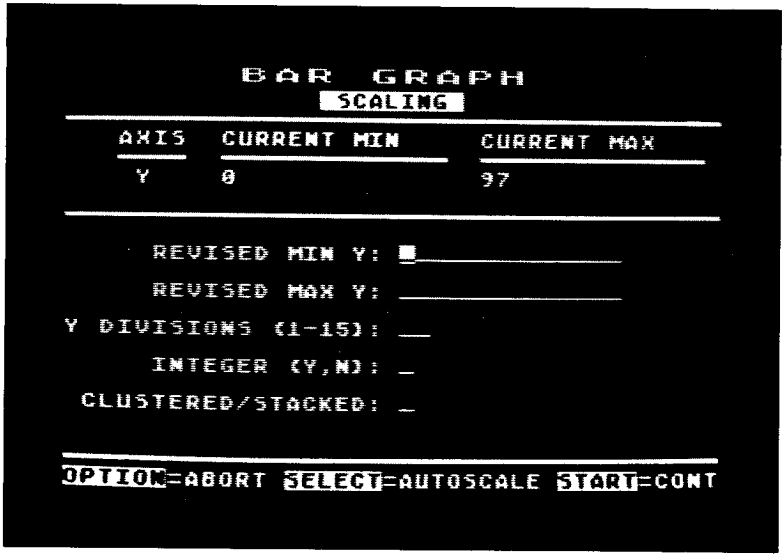


With this screen you will designate the file to be graphed. It is only necessary to specify one file since the X-axis values are handled sequentially.
ENTER: REVENUES
PRESS (START).

You are then prompted for the second factor: SHOPPERS
ENTER: CUSTOMER
PRESS (START).

Scaling Screen

After depressing (START), the Scaling screen should appear as follows:



As on the previous Scaling screens you are presented with the minimum and maximum values for the Y-axis. However, there is no listing for the X-axis. This is because the X-axis is a default value and is based on the number of data items in the Y-file. If your data consists of all positive values, then the minimum will be set to zero. If your data consists of all negative values, then the maximum will be set to zero. This is done to properly show the relative heights of each bar. If your data contains both positive and negative values, the minimum and maximum values will reflect the current range of your data. Remember that only the clustered bar graph will accept

negative data. If you attempt to specify an illegal entry, you will be prompted to re-enter.
PRESS (RETURN) to move to the Revised Max Y line.

To extend the Y-axis up to 100:
ENTER: 100
PRESS (RETURN).

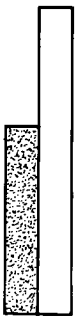
SynGraph will handle maximum numbers up to 99.9 before going into exponential form. If the Y-axis maximum is revised to 100, it will be written on the screen as 10. A special notation (E + 1) will appear at the top of the screen, so that you will know that the axis coordinate points are in exponential form.

The Y-Divisions will default to 10 which is what we want, so instead of placing an entry on that line, space down to the INTEGER line by pressing (RETURN).

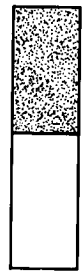
You can instruct *SynGraph* to use integer divisions on the Y-axis by entering: Y. Or you can designate floating decimal divisions on this axis by entering: N.

For the purposes of this example:
ENTER: N on the line opposite INTEGER.
PRESS (RETURN).

At this point you can choose whether you want the bar graph to be in a cluster pattern or stacked. The cluster pattern will produce the two factors next to each other in ten positions along the X-axis.



Cluster Graph



Stacked Graph

The stacked pattern will place the two factors one on top of the other. The second factor will be placed on top of the first, and the third (when there is one) will be placed on top of the second factor in ten positions along the X-axis.

For the purposes of this example:
ENTER: C for clustered.
PRESS (START) to go on to the next screen.

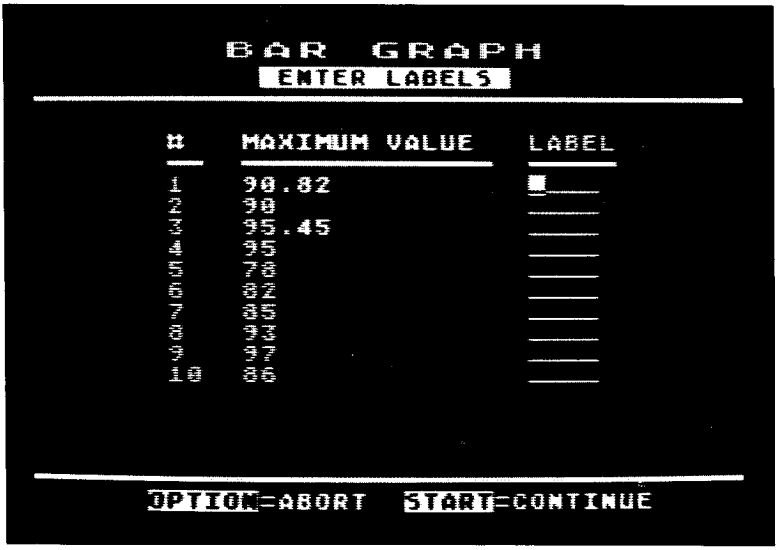
Default Values/Scaling Screen

By simply pressing (START) without making any entries on the scaling screen, *SynGraph* will default to:

The current minimum and maximum for the Y-axis.
Y-Divisions of 10.
No Integers: N.
A cluster pattern: C.

Bar Graph Label Screen

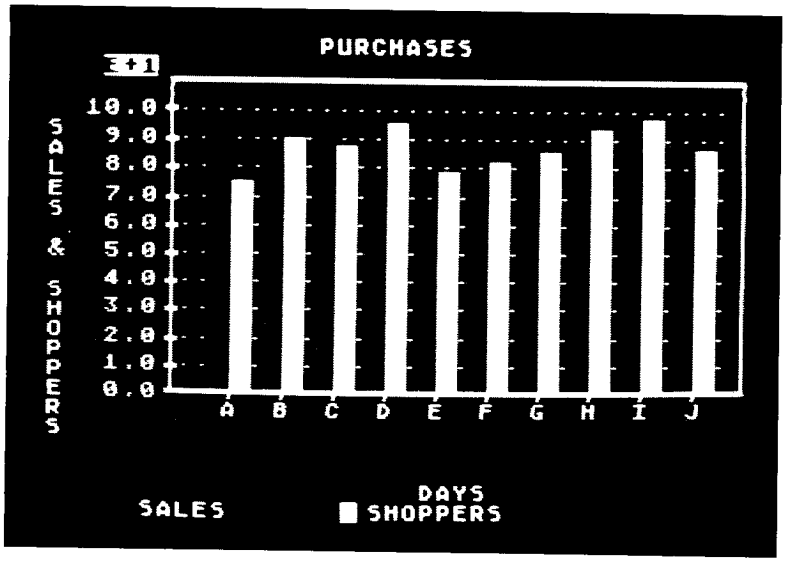
The next screen display is the screen for entering labels for each bar.



The numbers 1 through 10 on the left correspond to the X-axis coordinate points which were determined by the largest number of entries in the files. The middle column lists the highest value of the Y-coordinates that will be plotted. In the last column are blank lines where you can enter the labels you want to give each bar on the graph. Labels can be up to four characters in length. By Pressing (START), without making an entry, you will get the default labels of A-J as labels. If you leave a label entry blank, the program will enter a letter for you.

PRESS (START).

The next screen will generate your graph.



Print, Save or Continue

PRESS (SPACE BAR).

On the bottom of the screen a prompt line will appear:

(OPTION) = **PRINT** (SELECT) = **SAVE** (START) = **CONT**

Print

If you wanted to print your graph and you have a compatible printer connected to your system, make sure it is properly connected, turned on, and then:
PRESS (OPTION).

You will be asked to select the type of printer you have connected to your system. If you change your mind and would like to exit the operation, simply press (ESC). After

selecting the printer type, *SynGraph* will begin printing your graph. When *SynGraph* has completed printing your graph, the prompt line will reappear at the bottom of the screen.

Save

To save your graph to a disk for later use:
PRESS (SELECT).

You will be asked to insert the disk on which you want to save the graph and to press (RETURN). Do so. The graph will be saved with the name you specified on the Bar Graph Parameter Entry screen (or defaulted to the name GRAPH) with .SCR attached. When the graph has been saved, the original prompt line will reappear at the bottom of the screen.

Continue

To generate another graph or rescale this one:
PRESS (START).

The prompt line will change again:

(SELECT) = **RE-SCALE** (START) = **RE-START**

Depressing (SELECT) will take you back to the Scaling screen where you can set new parameters for the same graph.

Depressing (START) will take you back to the Bar Graph Parameter Entry screen where you can generate another bar graph.

We will now rescale the bar graph you just created, but this time in the stacked format.

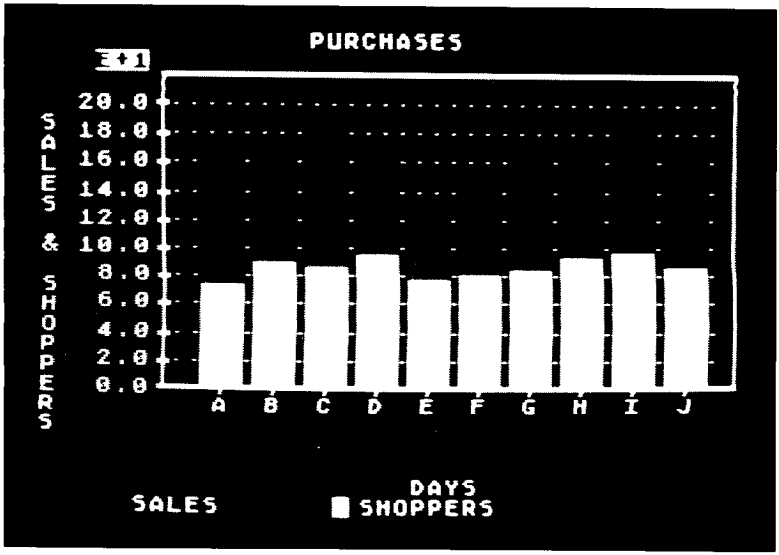
Creating a Stacked Bar Graph

The clustered bar graph you have just created from the CUSTOMER and REVENUE files can be converted to a stacked bar graph.
PRESS (SELECT).

You will be presented with the Scaling screen again. The current maximum at the top of the screen is listed as 97. However, since the bars will be stacked, the maximum will be greater than that. You can double the listed maximum of 97 and round it off for simplicity to 200. This is necessary because the graph will have to be rescaled for the factors being in stacked format, as they are going to extend higher on the Y-axis.
PRESS (RETURN) to skip the REVISED MIN Y line.
ENTER: 200 opposite REVISED MAX Y, and:
PRESS (RETURN) three times.
ENTER: S for stacked on the last line.
PRESS (START).

The Labeling screen will appear again so that you can enter new labels if you want to. For the purposes of this example, simply:
PRESS (START) to generate the default labels A to J.

The next screen will display your stacked bar graph as follows:



Notice that the Y-axis has rescaled up to 200, thus accommodating the added (stacked) values. Stacking the bars instead of clustering them changes the effect of the presentation.

Let's go back to the Main Menu and try the Pie Chart program. With the bar graph on your screen:
PRESS (SPACE BAR).

The prompt "(OPTION) = **PRINT** (SELECT) = **SAVE** (START) = **CONTINUE**" will appear on your screen.
PRESS (START) to continue.
PRESS (START) again to re-start.

Make sure the program disk is in drive 1 and:
PRESS (OPTION) to go to the Main Menu.

Pie Chart

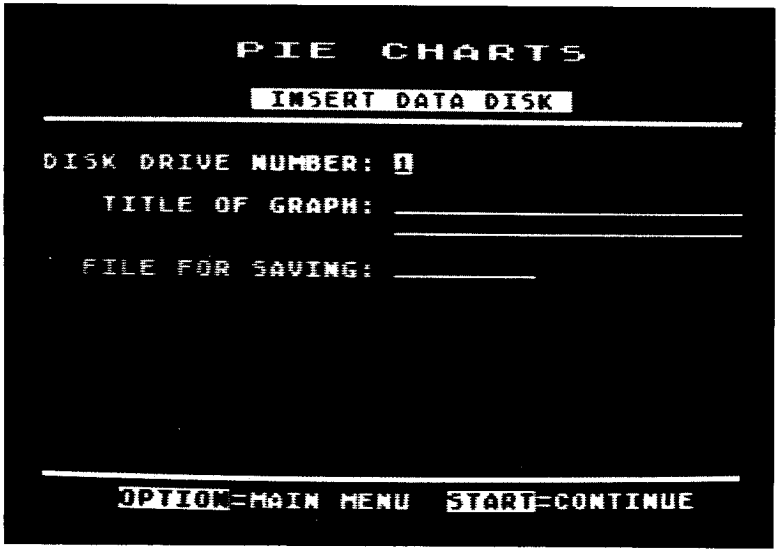
The last graphing option of *SynGraph* is the Pie Chart. Pie charts are used for viewing one file, comparing each data value in relation to the others in a circular (pie) format. *SynGraph* will also label your pie chart with the percent that each portion of the chart is of the whole. A pie chart can contain up to 12 slices.

For the purposes of this example, we will create a pie chart from the REVENUES file to compare daily sales.

Using (CTRL) and the arrow keys, move the cursor over to GRAPH DATA and:
PRESS (RETURN).

You should now have the GRAPH DATA sub-menu on the display. Again, use (CTRL) and the arrow keys to move the cursor to Pie Chart.
PRESS (RETURN) again to load the Pie Chart program.

When the Pie Chart Parameter Entry screen appears, make sure you have your data disk in the proper disk drive.



This Parameter Entry screen is shorter than those for the other graphing modules. This is because with a pie chart you are only graphing one factor; you do not have X- and Y-axes, and there are no grid options.
ENTER: the disk drive number where your data disk is located if you need to change it.
PRESS (RETURN).

You can give the pie chart a title or you can leave it blank. You can use up to 40 characters for the title. The cursor will wrap around to the second line as you enter the title. When the title prints on the graph, it will be on one line and centered.
ENTER: AUGUST SALES for the title.
PRESS (RETURN).

If you want to save this graph for later use, you can enter a name under which you want to save the graph on a disk. If you simply press (START) without entering a file name, the default file name of GRAPH will be entered just before the

display changes to the next screen. To enter a file name, simply type in a word 8 characters or less that gives you some indication of the nature of your file. *SynGraph* will automatically affix the file extension of .SCR to the file name.

For the purposes of this tutorial:
PRESS (START) without entering a file name.

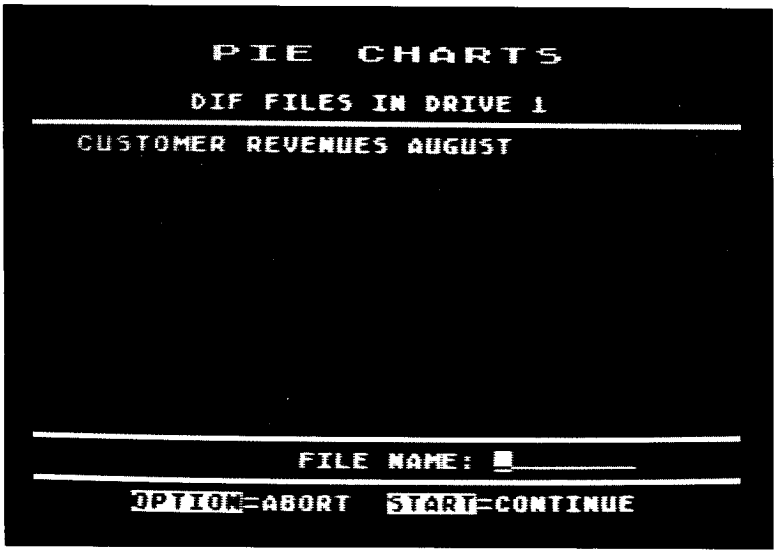
Default Values/Pie Chart

If you choose to leave some or all of the entries blank, *SynGraph* will enter the following default values:

PROMPT	DEFAULT VALUE
Drive Number:	Last entered drive #
File For Saving:	GRAPH

Factor Selection Screen

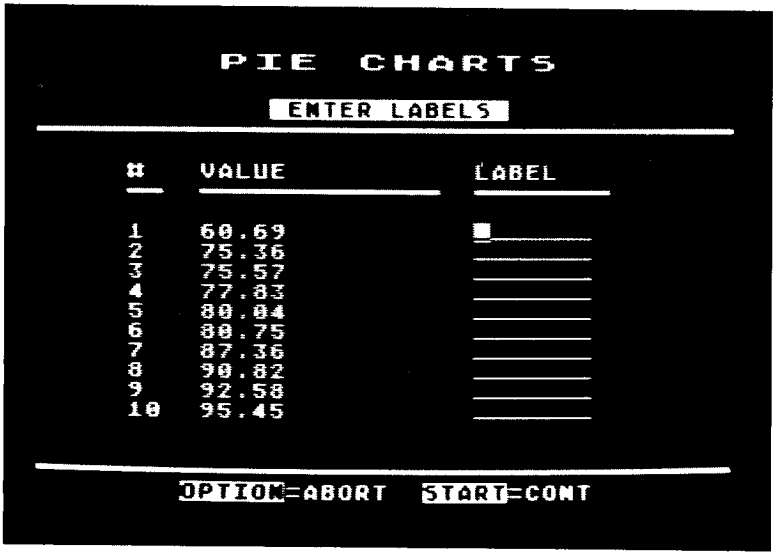
After pressing (START) to enter your selections from the previous screen, you will be presented with the Factor Selection screen. From this screen you will choose which file you want to use for the pie chart.



Next to the cursor at the bottom of the screen:
ENTER: REVENUES
PRESS (START).

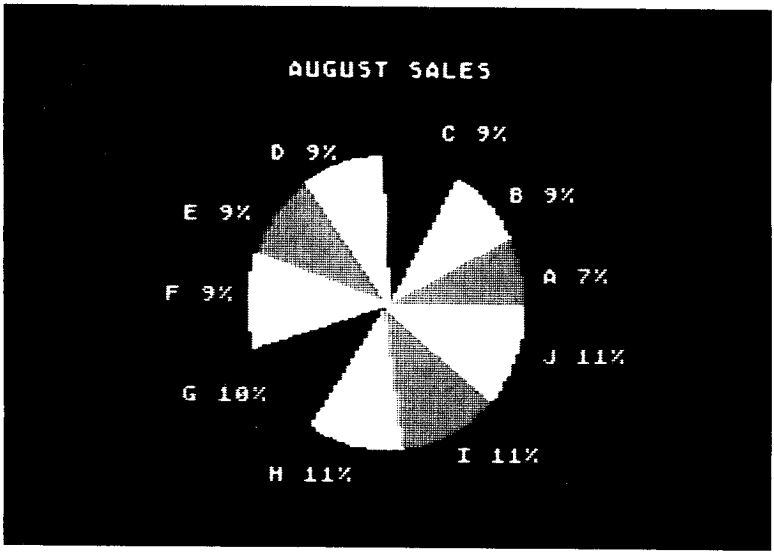
Pie Chart Label Screen

The next screen display is the screen for entering labels for each piece in the pie chart:



The numbers 1 through 10 in the left column correspond to the slice numbers. Since there are ten data entries in the REVENUES file, the pie chart will be divided into ten sections. The middle column represents the data values in the file. The third column with the blank lines is where you can enter labels for each section of the pie chart. Labels can be up to seven characters in length. By pressing (START) without making an entry, you will get the default values of A-J as labels.

Now, to generate your pie chart with the default labels:
PRESS (START).



The pie chart is color-coded in three alternating colors and clearly labeled. One word of caution is necessary. If a slice is less than 2% of the pie, *SynGraph* may have trouble positioning the labels. *SynGraph* sorts the data in ascending order to help avoid this problem. If a slice is less than 2%, *SynGraph* will give it a 2% slice and show its percentage as "<2%."

Print, Save, Continue

PRESS (SPACE BAR).

On the bottom of the screen a new prompt line will appear:

(OPTION) = **PRINT** (SELECT) = **SAVE** (START) = **CONT**

Print

If you wanted to print your graph and you have a compatible printer connected to your system, make sure it

is properly connected, turned on, and then:
PRESS (OPTION).

You will be asked to select the type of printer you have connected to your system. If you choose to exit the operation, you can press (ESC). After selecting the printer type, *SynGraph* will begin printing your graph. When *SynGraph* has completed printing your graph, the prompt line will reappear at the bottom of the screen.

Save

If you want to save your graph to a disk for later use:
PRESS (SELECT).

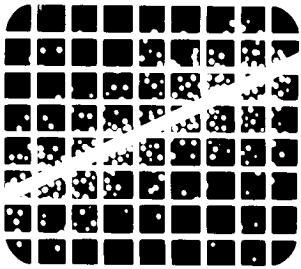
You will be asked to insert the disk on which you want to save the graph and to press (RETURN). You can exit the operation by pressing (ESC). The graph will be saved with the name you specified on the Pie Chart Parameter Entry screen (or defaulted to the name GRAPH) with .SCR attached. When the graph has been saved, the original prompt line will reappear at the bottom of the screen.

Continue

If you want to generate another graph:
PRESS (START).

You will find yourself at the Pie Chart Parameter Entry screen where you can create another pie chart from another file.

If you want to go back to the Main Menu, insert the program disk and press (OPTION).



3 Sharing Data

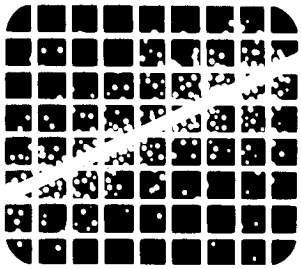
Sharing Information

SynGraph stores and reads its data in what is called Data Interchange Format (DIF™). DIF is a standard format adapted for the exchanging of data between different programs and even different computers. Since *SynGraph* only uses numeric data, non-numeric data is ignored.

Since *SynGraph* automatically stores and reads data in DIF format, data can be easily transferred. Each data file saved by *SynGraph* is stored as a column of values. Each DIF file read by *SynGraph* is considered as one set of values, regardless of the number of rows or columns in the data matrix.

SynCalc and *VisiCalc* allow you to save your data directly to disk in DIF format. When saving from *SynCalc* or *VisiCalc*, the row or column priority will determine the order in which the data is read by *SynGraph*. Be sure to save each set of data you wish to graph under separate file names. Specific sections in the *SynCalc* and *Visicalc* manual detail how to save data in DIF format.

SynFile + and *SynStat* data can also be graphed using *SynGraph*. Both *SynFile +* and *SynStat* use their own specific formats for storing data. However, both programs have conversion programs built in which allow you to convert their data files to DIF format. See your *SynFile +* or *SynStat* manual for more specific information.



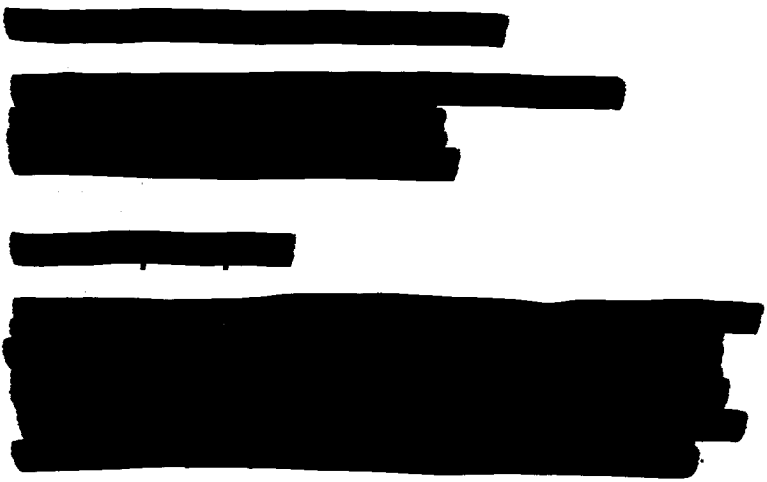
4 Appendix

SynGraph Won't Load

If *SynGraph* won't load, check the following:

A. An ATARI BASIC cartridge should be in the cartridge slot if you do not have an ATARI 600XL/800XL computer.
B. The cable between the computer and the disk drive should be in place.
C. At least 48K of RAM must be installed.

If it still won't load, it most likely has something to do with your disk drive. If you have more than one drive, try loading from the other one (don't forget to set the disk address to 1). Also try loading other programs from your disk drive (sometimes this will work, but because of speed variations, you still won't be able to load *SynGraph*).



Error Messages

Every effort has been made to handle errors automatically. Where possible, text messages have been provided. Below is a brief listing of Error Messages.

Error	Indicates	Explanation and Suggestions
2	Insufficient Memory	Make sure you have the required amount of RAM. If you are sure that you meet the minimum RAM requirements and the error persists, you may have a hardware problem.
3	Value Error	An attempted calculation has been made using a value which is out of range. This may be caused by an illegal data value.
11	Floating Point Overflow/ Underflow	Calculation resulted in a divide by zero or a reference to a number with absolute value less than 1E-98 or greater than or equal to 1E+98.
136	End of File	Encountered premature ending of data file. This may indicate a bad disk file and can be caused by media failure or hardware problem.

138	Device Timeout	Requested peripheral device did not respond within the required time. Check to be sure your disk drives, printer, etc., are properly connected and that they are turned on. If the problem still persists, you may have a hardware problem.
139	Device NAK	The peripheral device cannot respond. Check your cables for proper connection.
140	Serial Frame Error	Device to computer communication is garbled. This is very rare and is fatal. If it occurs more than once, have your hardware checked.
141	Cursor Out of Range	Attempted to locate the cursor outside the valid range.
142	Serial Bus Overrun	Data is being sent to the computer too fast. This is very rare and is fatal. If this persists, have your hardware checked.
143	Checksum Error	Garbled data is being sent over the Serial Bus. If this persists, have your hardware checked.

144	Device Done Error	Device is unable to execute the command and can be caused by: 1. Attempting to write to a write protected disk. 2. Attempting to write to a disk formatted in another density. 3. Media failure causing a bad sector on the disk. 4. Hardware problem.
162	Disk Full	There is no more room left on the disk. Try using a different disk to save your data.
164	File Number Mismatch	The sector links in your file are bad. This can be remedied using a sector editor program like DISKFIX from the ATARI Program Exchange.
165	File Name Error	The file name entered contains illegal characters. Valid characters are A-Z, 0-9, and the first character must be a letter of the alphabet.
169	Directory Full	The space allocated for the directory has been filled. Use another data disk.
170	File Not Found	Attempted to access a file not in the directory. Make sure you have correctly entered the file name and are accessing the correct drive.

173	Bad Sectors at Format Time	Encountered bad sectors while formatting the disk. Try another disk. If the problem persists, have your disk drive checked.

Slide Show

Graphs saved to disk from the various graphing programs can be recalled in sequence to provide a slide show like presentation. The following BASIC program will allow you to step through selected files by using CTRL and the ← → keys.

To use this program, first transfer your selected graph files to a separate disk. Next type in the following BASIC program, making the following changes (you do not need to type in the remark statements since they are for explanatory purposes only):

LINE	COMMENTS
120 FILES = 3	Change the value (3) to the total number of graphs in your slide show.
5000	Enter your graph file names in data statements starting with 5000 and increasing by 10. You should enter only one filespec per data statement. The filespecs: D: LINE.SCR D: BAR.SCR D: PIE.SCR are entered as examples.

When you've finished entering the program and the changes, save it to disk.
ENTER: RUN
PRESS (RETURN).

The first graph file will load in a few seconds. To advance to the next file, simply press (CTRL) (→). (CTRL) (←) will display the previous graph, and (RETURN) will start the show over again from the beginning.

Slide Show Program

```
2 REM This program reads files saved using SynGraph.
3 REM Screen image files are listed in DATA statements,
4 REM which start at line 5000 and proceed
5 REM by tens. The total number of file names stated
6 REM on line 120 must be tailored to your
7 REM specific slide show.
48 REM
49 REM Put machine code C10 call in memory.
50 FOR I=1536 TO 1542:READ BYTE:POKE
I,BYTE:NEXT I
60 DATA 104,104,104,170,76,86,228
99 REM
100 DIM FNAME$(15)
109 REM Set up graphics screen.
110 GRAPHICS 24:SETCOLOR 2,0,0
119 REM ***The # of file names @ 5000 goes here.***
120 FILES=3
129 REM File name DATA lines start @ 5000
130 LINE=5000
139 REM Point to the appropriate file.
140 RESTORE LINE
149 REM Read the file whose name is pointed to
150 READ FNAME$
```

```
159 REM If pointing at the end, point to the start.
160 IF FNAME$ = "END" THEN LINE = LINE -
(FILES*10):GOTO 140
169 REM If pointing at the start, point to the end.
170 IF FNAME$ = "START" THEN
LINE = LINE + (FILES*10):GOTO 140
179 REM Subroutine reads screen data
180 GOSUB 1000
189 REM Wait for keyboard entry.
190 OPEN #2,4,0, "K:":GET #2,A:CLOSE #2
199 REM [CTRL]-Right arrow means forward one.
200 IF A = 31 THEN LINE = LINE + 10:GOTO 140
209 REM [CTRL]-Left arrow means backwards one.
210 IF A = 30 THEN LINE = LINE-10:GOTO 140
219 REM And return means start over at the top.
230 IF A = 155 THEN GOTO 130
239 REM Others ignored (except BREAK), so loop.
240 GOTO 190
997 REM
998 REM Read file subroutine.
999 REM Open IOCB #1 to FNAME$
1000 CLOSE #1:OPEN #1,4,0,FNAME$
1009 REM Black background, bright plotting.
1010 SETCOLOR 2,0,0:SETCOLOR 1,0,13
1019 REM Turn off cursor.
1020 POKE 752,1
1029 REM Set up IOCB #1 (ICCOM = read binary
record).
1030 POKE 850,7
1039 REM Set ICBAL to screen ram.
1040 POKE 852,PEEK(88):POKE 853,PEEK(89)
1049 REM set ICBLL to max length.
1050 POKE 856,255:POKE 857,255
1059 REM Call subroutine C10 to read the data.
1060 X = USR(1536,16):CLOSE#1
1069 REM Beep when loaded.
```

```
1070 FOR I = 12 TO 0 Step -1:SOUND 0,80,10,I:FOR J = 1
TO 4:NEXT J: NEXT I
1080 SOUND 0,0,0,0
1090 RETURN
4988 REM
4989 REM *** File List ***
4990 DATA START
5000 DATA D:LINE.SCR
5010 DATA D:BAR.SCR
5020 DATA D:PIE.SCR
5030 DATA END
```

Glossary

Axes: The reference lines of a coordinate system (X and Y).

BASIC: Beginner's All-purpose Symbolic Instruction Code.

Boot: The process of initializing the computer for use by automatically clearing memory and loading the first few instructions which call other instructions. This gets the computer started.

Characters: Letters of the alphabet, numbers, punctuation marks, graphic symbols or any combination thereof.

Cluster: Two or more similar things grouped closely together.

Coordinate: A set of numbers used in specifying the location of a point on a line.

Data: Information of any kind.

Data Diskette: The diskette upon which your data is stored.

Data File: A system of information organization on disk.

Default: Condition which exists when no instructions to the contrary are given.

Disk: Same as diskette.

Disk Drive: A device that rotates magnetic disks and accesses its data by means of a read/write head.

Diskette: The 5-1/4 inch magnetic storage medium on which data and programs can be stored.

Error Message: Any of a number of prompts which appear on the screen when you have attempted a function out of its proper order, pressed the wrong key, or incorrectly entered an entry.

Exponent: A symbol written above and to the right of a mathematical expression to indicate the operation of raising to a power.

Factor: A set of coordinate points on a graph that are related by the fact that they are generated from the same file or set of files.

File: A collection of data on disk.

File Name: A label for a FILE by which it is accessed. It usually gives some indication of the contents.

Formatting: Preparing a new disk for information storage. Formatting a disk causes any information on that disk to be erased.

Grid: A network of uniformly placed horizontal and vertical lines.

High Resolution: The display on the television screen or monitor is composed of little dots known as a dot matrix. High resolution is the use of a large number of these dots to increase visual clarity.

Input: To transfer data from outside the computer onto your disk or into the computer. This is a data transferring operation.

Integer: The natural numbers, the negatives of these numbers and zero.

Load: Transferring software into the computer's memory for operational purposes.

Memory: Where information is stored in the computer.

Menu: A program-generated list of options usually presented on the display screen. Selections from a menu screen will cause the program to execute indicated procedures.

Output: The transfer of data from inside the computer to outside, such as to a printer.

Program: A sequence of software instructions given to a computer for the performance of certain functions or tasks. A program must be in the language that the particular computer understands.

Prompt: Signals which appear at the top of the screen indicating the necessity of further input or the location of an input.

RAM: Random Access Memory

Read: The inputting of data from the diskette to the computer.

Special Characters: A character that can be displayed by a computer but is neither a letter nor a number. Punctuation marks are special characters. So are the ATARI graphics symbols.

Sub-Menu: The menu generated within the Main Menu when (RETURN) is pressed with the cursor positioned over GRAPH DATA listing further program options.

Wraparound: When the cursor reaches the right edge of the screen, it disappears and "wraps around" to the beginning of the next line.

Write: The transfer of data to a magnetic diskette. *SynGraph* writes out records as they are entered.

Write-Protect: To protect a disk from having data written to it by covering the write-enable notch.

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