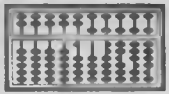
CHARTPLOT-64

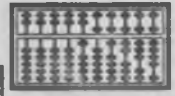
CHARTPLOT 64

Create Professional, Presentation-Quality Charts and Graphs on Plotters and Printers

YOU CAN COUNT ON Abacus Software



Abacus



(C) 1984 BC MICROSYSTEMS

CHARTPLOT

SN: 130292 MFD:

Abacus • 5370 52nd Street SE • Grand Rapids, MI 49508 • (616) 698-0330

CHARTPLOT 64/1520

Create Professional, Presentation-Quality
Charts and Graphs on Plotters and Printers

Abacus

Quietly Designing The Future...

5370 52nd Street SE • Grand Rapids, MI 49508
(616) 698-0330

COPYRIGHT NOTICE

WARRANTY

ABACUS Software makes no warranties, expressed or implied as to the fitness of this package for any particular purpose. In no event will ABACUS Software be liable for any real or consequential damages. ABACUS Software will replace any copy of the software which is unreadable if returned within 90 days of purchase. Thereafter it will charge a nominal fee for replacement.

If you are not satisfied with our software, you may return it in the original condition with your purchase receipt for a refund. We want you to be a happy customer.

Second Printing, May 1985
Chartplot 64/1520

Abacus Software
P. O. Box 7211
Grand Rapids, MI 49510

ISBN# 0-916439-20-8

PREFACE

Ever since I have been working with the VIC-20 and '64 (more than 3-1/2 years now) I have been fascinated with the capabilities for high-resolution graphics. After creating several programs to make such graphics easy, I developed CHARTPAK-64 to create line, bar and pie charts on the screen and printer.

The next obvious challenge was to adapt the same "user friendly" menu approach to use plotters to draw multi-color, large size charts easily. Getting the first program going wasn't too difficult. The biggest difficulty has been the very "user UNfriendly" world of interfaces, plotter commands sets and memory size constraints. This made a modular design the only way to go.

I'm happy with the results. We are indebted to the plotter and printer manufacturers who loaned equipment to us for this project. One of the largest efforts of this project was this manual, trying to include the maximum amount of information about interfaces, etc. but still keeping it easy to read and locate what you need to know.

This version of CHARTPLOT-64 includes a number of new plotters, printers, features, and improvements where a year of experience has indicated a better way of doing things. The biggest addition is the statistics calculation module. This can help you with the difficult job of INTERPRETING the raw numbers of the data. I just wish the '64 was bigger so we could do even more!

Abacus Software and I stand ready to support you in the use of this product. We don't know everything about every plotter and interface on the market, but can promise an honest effort to help solve your plotter problems.

As always, your comments and suggestions will be appreciated.

Roy C. Wainwright
Brogue, PA
April 1, 1985

TABLE OF CONTENTS

WHAT IS CHARTPLOT?

CHARTPLOT-64 is a program for the Commodore-64 which allows users to quickly and easily create charts from data. The plots are drawn on the '64 screen in the same proportion as the plotter so the user may adjust scales, bar widths, select chart types, etc. When the chart on the screen is "just right", there are three ways it can be output. The first is to save the screen on disk in "picture" form, so it may be recalled later, in a slide show type of use. The second is to "dump" the screen onto an attached graphic printer. Either a small size or a full-page size chart can be printed.

The third and most important output is driving an attached digital plotter, producing a chart of almost any size, resolution and number of colors. If the plotter has the capability to change pens (colors) automatically, CHARTPLOT will prepare the entire chart in one operation. If pens must be changed manually, CHARTPLOT will draw all lines of one color in one pass, stop and prompt the operator to change the pen (color), and then CHARTPLOT will do all charting of the second color, and so on.

All of the data and chart specifications may be saved to disk to be used in preparing other charts. Data may be entered directly from the keyboard or from files on diskette. The data file format for CHARTPLOT data may be written by other BASIC programs. In addition, CHARTPLOT can read Data Interchange Format (DIF) files. DIF is a standard file organization which allows data exchange between programs. DIF files are created by some spreadsheet programs (such as CALC/RESULT ADVANCED). A file conversion program is included to convert files from Busicalc 1 and Multiplan (SYLK) to CHARTPLOT-64 format.

CHARTPLOT prepares horizontal and vertical graphs and bar charts, X-Y and pie charts. Scaling, chart positioning, lettering sizes and options are managed automatically, usually requiring only slight adjustment before final output.

CHARTPLOT can handle up to 220 data items on a chart. These points may be arranged in any number of data sets. Once entered, the data may be modified through menu options. A powerful statistics function is included which can calculate averages, standard deviations, straight regression lines, and exponential smoothing on your data.

CHARTPLOT-64 is modular so it may be easily "tailored" to your printer, plotter and interface configuration. This is accomplished by a program which asks a series of questions. The answers are stored in a configuration file on diskette which is read each time you load CHARTPLOT. If your hardware changes, the configuration file may be updated.

HARDWARE REQUIRED

COMMODORE-64 COMPUTER

COMMODORE 1541 DISKETTE DRIVE

One of the following plotters:
AMDEK DXY-100
ROLAND DXY-800
ENTER SWEET 'P
HEWLETT-PACKARD 7074A
HOUSTON INSTRUMENTS DP-40
HOUSTON INSTRUMENTS PC PLOTTER model 595 or 695
STROBE 200 or 260
PENMAN model GR 1500
SILVER REED Color Pen Graph Model EB50
*COMMODORE 1520 Plotter/Printer

Plotters of different models from the same manufacturers may work if command sets and scaling are compatible (see APPENDIX H - Plotter Commands).

An appropriate interface for plotter is also required.

Optional printers (and interface if needed):
EPSON MX or FX
COMMODORE 1525
COMMODORE 1526
C Itoh PROWRITER 8510
SIEMENS PT/88 or PT/89
OKIDATA MICROLINE
OKIDATA OKIMATE 10
STAR GEMINI SERIES

See APPENDIX A - Configurations Tested for specifics of interfaces, wiring, switch settings, etc.

* The 1520 version of Chartplot will ONLY support the Commodore 1520 Plotter/Printer (No other printer support). All other plotters require the Chartplot-64 version and do, of course, support optional printers.

CHARTPLOT-1520

This version of CHARTPLOT-64 is adapted to the Commodore 1520 Plotter/Printer.

The chartmaking capability of this program far exceeds the standard capabilities of the 1520 because of two innovations:

Charts are drawn with the Y (up and down) axis of the chart across the paper and the X (left to right) axis of the chart is drawn down the paper. This limits the height to 3 3/4 inches but the width of the charts can be up to 7.8 inches.

Second is that all characters are written using plotting commands so that character sizes can exactly match the screen. (You are not limited to the 1520's four character sizes).

All of the features described in the CHARTPLOT-64 manual are included except for the following items:

The maximum chart size is limited to 3 3/4 inches high and 7.8 inches wide. The default size is 3 3/4 by 5 inches.

The screen printer dump option on menu 6, (r), is not included.

The CONFIGER program is not needed. The 1520 configuration is automatically used. The device number of the 1520 is 6 (the way it comes from the factory).

The colors of the four 1520 pens are black, red, blue and green. Instead of specifying them as pens 1-4, CHARTPLOT-1520 automatically changes pens to match the screen colors (1=black, 3=red, 6=green, 7=blue).

The data printout provides two sizes of print, 80 columns size which will print up to 4 data sets and 40 column size which can print only one, one-dimensional set.

When CHARTPLOT-1520 finishes plotting a chart, the plotter origin is reset past the chart just drawn, so no adjustment of the paper should be necessary when drawing several consecutive charts.

The demonstration charts have all been revised to print on the 1520 size paper and most use all four colors.

CHARTPLOT-64 SETUP

If you haven't read the section THE JOYS OF INTERFACING, do so first. Then, knowing your system requirements, you are ready to configure CHARTPLOT-64 to your needs.

If you want to try the program without going through the configuration steps below, a configuration record "C.DEMO" is included on the distribution diskette. It assumes an AMDEK plotter, serial IEEE bus for plotter and printer interface, and Epson printer. Skip to the LOADING CHARTPLOT-64 section below.

To create a configuration, first decide if you need more than one configuration (probably not unless you have more than one plotter or printer). If only one, then you should name it the default name (C.CONFIG) so you will only have to press <RETURN> to select it when loading CHARTPLOT.

To create the configuration, reset the '64 (power off, then on).

Insert the CHARTPLOT distribution diskette into the disk drive (#8).

Type LOAD"CONFIGER",8 and press <RETURN>

The messages "SEARCHING FOR CONFIGER" and "LOADING" should appear on the screen. When the '64 displays "READY." then type RUN and press <RETURN>.

The program will ask first for the name of your configuration. If you want it to be the default (C.CONFIG), simply press <RETURN>. Answer the questions. In most cases you will have to select one of a number of options. If you select an invalid response, the question will be asked again. If you accidently press a wrong key, continue to answer the rest of the questions. You will be asked "Do you want to change anything?" before the data is written to disk. If you answer "Y", then you can go through the questions again, correcting anything in error. When you answer "N" (no changes), you will be told to remove the diskette from the disk drive. Remove the tape covering the notch on the left side of the diskette (as it comes out of the drive) and replace the diskette into the drive before going on. This allows you to write the configuration record onto the CHARTPLOT-64 diskette. After finishing the program, you will be told to put the tab back on the diskette to protect CHARTPLOT-64 from accidental erasure.

LOADING CHARTPLOT-64

After the configuration for your setup has been created, loading CHARTPLOT is easy.

Reset the '64 (power off then on). Insert the distribution diskette into the disk drive (#8). Type LOAD"*",8 or LOAD"CHARTPLOT-64",8. The computer will respond with "SEARCHING FOR *" and "LOADING". When the computer responds with "READY.", type RUN.

The computer will ask for the configuration name (c.config). If you have used the default name in creating your configuration record, press <RETURN>. If you have selected a different name for the configuration, enter the name and press <RETURN>.

The computer will show the module names selected for your computer as they are loaded, (see APPENDIX D-Configuration File for explanation) and then the main program. After about 1 1/2 minutes the plot width prompt will appear. Either use the default value (9.5) or change it and press <RETURN>. The plot height prompt will appear. Either use the default value (7) or change it and press <RETURN>.

The main menu will appear after the size prompts. Proceed to the GETTING STARTED WITH CHARTPLOT-64 section of this manual to learn how to use CHARTPLOT-64.

DISTRIBUTION DISKETTE

In order to protect the copyright of this program, interlocks have been incorporated to prevent LISTing, PEEKing, SAVEing, and LOADing while CHARTPLOT-64 is in the computer.

The distribution diskette cannot be duplicated by standard computer equipment. If the distribution diskette becomes completely unreadable, return it to ABACUS Software for a replacement at a nominal cost of $10.00.

DEFINITIONS

This manual uses a number of terms which may or may not be familiar to you. In order to avoid any confusion, these terms are explained next:

DATA ITEMS AND DATA VALUES

A data item is a measurement snapshot with which we can associate a number called a data value. Another name for data item is a point. An example of a data item is the high temperature for a given date and its data value is 90 (degrees).

DATA SET

This is a name applied to a group of related data items. For example, the values of monthly sales for a year would be a data set. So would the daily high temperatures day by day for a month or year.

A second data set could be the daily low temperatures for a month or year. We call these types of data sets one-dimensional.

Some data sets require two values for each point (an X and a Y coordinate). An example would be the data set which has a lifespan value (years) for varying number of cigarettes smoked per day. We will call these types of data sets two-dimensional.

DATA GROUPING

For one-dimensional data sets, you must have a way to group the data points. This is the data grouping name. It may be days, months, years or any identification of the individual points.

For two-dimensional data sets, no special data grouping is needed because each point has two values.

INDEPENDENT AXIS

For the one-dimensional case, this is the axis which shows the data grouping information.

For the two-dimensional case, this is the X-axis, which increases from left to right.

DEPENDENT AXIS

In the one-dimensional case, this is the axis which displays the data values.

In the two-dimensional case, this is the Y-axis, which increases from bottom to top.

LEGENDS

These are the "labels" which explain each axis on the chart.

CHARTPLOT-64 is set up for 4 data sets at a time and each may have up to 55 points. These numbers may be changed, provided there is enough memory available.

THE JOYS OF INTERFACING

Interfacing means the way that a device (such as a printer or plotter) is electrically connected to the computer. The very simplest way to interface is to select a plotter which is made to directly attach to the Commodore '64. Then all you have to do is to attach the cable to each device and use them. Life is not that simple, because there is only one plotter presently available with that kind of interface--the Commodore 1520.

All the rest of the plotters in the world have some other kind of interface!

CENTRONICS INTERFACE

The easiest to use is the Centronics interface. To use a plotter with such an interface, you will have to buy an interface unit which plugs into the round serial I/O connector in the back of the '64 or 1541 disk drive and converts the signals to the Centronics 36 pin standard. Cardco, Microworld, MSI and other manufacturers make such interfaces. Complications arise with the selection (either through switches on the unit or by a secondary address in the file OPEN command) of code translation, automatic linefeeds, etc. Fortunately, all plotters we have tried operate as plain ASCII (7-bit) devices, and linefeeds don't affect any plots. Therefore if you set the interface for standard ASCII output it should work ok. When you configure CHARTPLOT-64 to your hardware, select the SERIAL BUS (IEEE) I/O option. Unless there is a special code needed for the interface, select secondary address 0 for the plotter and answer "N" to the plotter translation question.

RS-232 SERIAL INTERFACES

The most popular type of interfacing is RS-232. This is a "standard" built around a 25-pin connector widely used in telecommunications. The Commodore '64 has programs in read-only memory (ROM) which output and read data in the RS-232 format. The biggest problem is that while RS-232 CONNECTORS are standard, almost nothing else is!

The first problem is the voltage levels. The "standard" defines +12 volts as a "1" and -12 volts as a "0". The '64 defines +5 volts as "1" and 0 volts as "0". Unless you can find a plotter which works on the '64 voltage levels (also known as TTL voltages), you will have to buy a RS-232 interface to convert voltage levels between the '64 and the RS-232 plotter. Commodore makes one (VIC 1011A) and the DATA20 Corp. makes one also. These two interfaces perform the necessary voltage conversions, but others MAY NOT! If you plan to use RS-232, check this point carefully!

The next problem area is signal and control lines. There are two signal lines defined in RS-232 devices, one for data from the host computer ('64) to the plotter and the second from the plotter to the host. Normally the first (host to plotter) is on pin 3 and the other (the signal line from the plotter to computer) on pin 2 (this return data line from plotter to host is needed only for one of the two control methods-see below). However one plotter we used (Roland) has them the other way around!

Another line needed is signal ground-normally found on pin 7.

As mentioned earlier, RS-232 was developed in a communications context, where it was expected to have data transmission both ways. In this plotter application, all of the commands for the plotter are generated by the computer. The only response needed from the plotter is a signal to the computer to "hold-off" sending data because the plotter cannot handle any more commands. Some plotters have buffer memories (up to 550 bytes) where commands are stored as received and held until the plotter can execute them. Nonetheless, the buffer can fill, requiring a hold-off signal to avoid loss of data.

CHARTPLOT-64 provides support for two different methods of signalling:

DTR (Data Terminal Ready) line monitoring.

The RS-232 convention provides for a wire (pin 20 usually) which has a +12 volts on it if the plotter can accept more data. When it cannot, the voltage goes to 0 (or -12 volts). The ROM programs for RS-232 in the '64 automatically stop the transmission of data when this line goes low and resume (with some help) when the line goes high again. RS-232 interfaces provide for this control signal, but be careful-the voltages may be reversed (I had to bypass the DATA20 for this line because it switched polarity). If you want to use this method of control (it's more reliable than the next), select the DTR option in the configurator.

XON/XOFF signalling

If included in the plotter design, this method of control uses the data signal line from the plotter to the computer instead of the DTR control line. When the plotter buffer fills, the plotter sends a particular character (X-OFF or DC3 which is 19 in decimal/$13 in hexadecimal). The CHARTPLOT output module listens to the signals from the plotter and when X-OFF or DC3 is received, turns off data transmission. Of course, there is another character (X-ON or DC1 - 17 decimal/$11 in hexadecimal) which tells the computer to restart transmission.

To use this method, select the XON/XOFF option in the configurator. This method seems to be slightly less reliable than the DTR method, especially at high baud rates. I have also encountered a strange signal character (decimal 38/$26 hex) instead of DC3 from the Houston Instruments plotter only on the first holdoff--afterwards it sends DC3. (CHARTPLOT-64 has been modified to also respond to this character it as though it is a DC3)

BAUD RATE

CHARTPLOT-64 supports all '64 baud rates from 50 to 2400 baud. Select the number corresponding to the rate desired.

STOP BITS

Either 1 or 2 stop bits may be selected.

WORD LENGTH

Word lengths of 5,6,7 or 8 bits may be selected.

PARITY OPTIONS

None, odd, even, mark or space parity options may be selected.

HALF OR FULL DUPLEX

Use half duplex unless full duplex is specifically required.

At the end of the RS-232 part of the configurator program, the values of the command and control registers are displayed as they specify all RS-232 options. (See C-64 Programmer's Reference Guide for explanation if your're interested).

CABLES AND CONNECTORS

There's a good chance you will need extra cable or male/female connectors to complete the connection between the RS-232 interface and the plotter. Most Radio Shack stores carry the 25 pin connectors and 25 wire flat cable.

PLOTTER SWITCHES

There are normally some switches on the back of an RS-232 plotter, to set the baud rate, parity, etc. Consult the plotter manual and set these accordingly.

Because there seems to be so little in RS-232 which is really standard, WE CANNOT ACCEPT ANY RESPONSIBILITY FOR DAMAGE TO COMPUTERS, PLOTTERS OR INTERFACES. In order to help you and your dealer, we are including the details of

the wiring and program configurations used with the 8 plotters used to develop CHARTPLOT-64 (APPENDIX A-Configurations Tested). This should help to answer your questions. If not, call ABACUS at 616-241-5510.

GETTING STARTED WITH CHARTPLOT-64

CHARTPLOT is operated through menu selections. Each menu and input screen has a number in the upper left corner. This manual is indexed by those numbers to make it easy to find more information about a screen entry.

All of the menus have an option (0) to return you to the main menu if you decide that you don't want to select any options on that menu.

If you accidentally get into a menu option you don't want, press and hold the RUN/STOP KEY and press the RESTORE key. The screen will clear and say "READY." Then type GOTO 5 and press <RETURN> to go to the main menu. No data will be lost by this method. Do not type RUN or you will clear all data, specifications, etc. There are three kinds of responses you will have to make to CHARTPLOT prompts on the screen. The first type is simple yes or no answers. These are indicated by the ? followed by (y/n) and there is no blinking square cursor on the screen. Simply press the the Y or N key (none of the others will work). Your choice will be shown on the screen and CHARTPLOT will take the proper action.

When you are asked to key data into the computer, a prompt of ---> appears for numeric data in front of the default value. Simply press <RETURN> to accept that value or key in your new data and press <RETURN>.

For string type input (such as labels and titles), the prompt is -->> in front of the default value in quotes. As with numeric data, press <RETURN> to accept that value or key in your new data and press <RETURN>. If the data you key does not contain a comma (,) you may overwrite the right quote mark. If the data contains one or more commas (such as "SALES, 1983"), insert the data WITHIN the quotes. Maximum size of strings is 75 bytes.

OPERATION

The simplest way to use CHARTPLOT-64 is to key in your data, adjust the chart specifications using several of the menu options, and then display the chart on the screen. The F5 key returns you to the main menu while keeping the latest chart displayed available at the touch of the F7 key. If you wish to change any of the chart specifications, you can do so and then immediately redisplay the new chart. After you have designed the chart to your satisfaction, it may be printed, plotted or saved to disk.

You may save the chart specifications to disk for use at another time, or for use with other data files. The data may be saved to disk. Data is saved on disk separately from the chart specifications.

DISK NOTES- In order to allow using the same names for the data and specification files, CHARTPLOT AUTOMATICALLY adds a '.S' to the beginning of each specification file name when writing the spec files to disk.

To avoid problems which sometimes occur with the 1541 disk drive file replacement open option (0:...), CHARTPLOT scratches the old file and then writes the new file instead, when you select the REPLACE file Yes option.

PLOTTER FEATURES

Most plotters provide varying size of alphabetic characters. These are used in headings or labels. The sizing of most character output is controlled in CHARTPLOT by including the size with the color selection. CHARTPLOT-64 automatically selects the "standard" size for characters (the value is shown in the upper right corner of menus as "cs 8"). When the color is 1-16, the size sent to the plotter is proportional to the standard size. For bigger or smaller characters, key the size value times 100 and add the color value [size of 11 = 1100 + color red (3) = 1103]. There are more details about this in the menu options.

Some plotters have more than one pen and can change pens automatically. When you start a plot (option 6 of main menu) you may select automatic pen changing. The eight standard screen colors (1-8) and the pen numbers you selected for each at the time you made up the configuration are shown. You may change any of them at this time. Make sure that the proper color pens are in the proper positions before continuing to plot the chart.

PLOT SIZING

When CHARTPLOT-64 is started, the first prompt is plot width (inches). The default size is 10 (inches). Specify the size of the plot (within the paper borders). If you only want to create charts for printer output or disk saves, enter 0 as the plot width. This turns off the scaling functions and results in a cleaner screen chart.

Unless 0 has been entered in response to the first prompt, the second prompt is plot height (inches). The default is 7. Enter the size you want and press return. The two values for width and height setup all of the scaling and sizing necessary. The main menu will then appear. Another chart scaling option is available when you are ready to plot the chart. You may change the overall size of the chart by a percentage of the original size (when you entered the chart width and height). The default is 100% and if you select this (by pressing <RETURN>), the chart will be drawn the original size. If you enter another percent (80%) then the chart will be reduced to 80% of the original size. NOTE- This is intended for small size adjustments. If you enter

a very small percentage, or one way over 100%, the lettering of the chart may not be properly sized and aligned on the finished chart.

Normally a chart is drawn with the origin (lower left corner of the chart) at the plotter start point (HOME position). You can move (offset) the lower left corner through menu option "3.3.5-CHART OFFSET" (in inches).

The next section is called a CHARTPLOT-64 TUTORIAL which leads you through some of the basics of this powerful package.

A CHARTPLOT TUTORIAL

The first step is to load CHARTPLOT-64 into the computer. If you have not already done so, see the section LOADING CHARTPLOT-64. If the plot width prompt is showing, press <RETURN>. The plot height prompt will appear, press <RETURN> again.

If you make a mistake during this tutorial, you can probably correct the mistake by returning to the main menu and then reselecting the function. If you are at an input screen, you can always break out by holding the RUN/STOP key down and pressing RESTORE. This clears the screen and the computer prints READY. Type GOTO 5 and press <RETURN> and you will be returned to the main menu.

This tutorial concentrates on the functions and options of CHARTPLOT. The fastest way to see the results is on the computer screen, so you are frequently asked to select main menu option 2 (display chart on screen). If you wish, the chart may be plotted instead, by selecting menu option 6 (plot/print chart) and the default option to choose the plotter (you must have the plotter interfaced and configured or it probably won't work). You may also wish to try the print option (which will work only if the chart has been displayed on the screen first), or the chart screen save option (7).

For demonstration purposes, let's assume you have a lemonade stand which you operate for ten weeks during the summer. The summer is over and you want to make a chart showing how well (or poorly) you did. Each week you made a weekly budget based on the expected weather conditions. Your actual sales and weekly budgets for the summer are:

WEEK	SALES	BUDGET
1	$15.20	$16.00
2	17.35	12.00
3	20.70	17.00
4	33.15	8.00
5	21.91	8.00
6	17.16	8.00
7	13.45	10.00
8	8.92	12.00
9	20.11	10.00
10	13.17	8.00
	$181.12	$109.00

To make a chart with this data, start by selecting the INPUT & MODIFY DATA option. Enter 1 and press <RETURN> at the main menu. {0}.

Next we setup the global information about the data. Select option 5 GLOBAL DATA SPECS by keying 5 and <RETURN>. The first question on screen {1.5} is TWO DIM (Y/N). Since each set of numbers (sales or budget) has only one value each, answer "N" and press <RETURN>. Note that you must either key the quote(") over the quote in front of the letter n or use the cursor right key (lower right corner of the keyboard) to move over the quote. If Chartplot responds with extra letter ns and quotes, simply key the quote, the letter n and another quote and then; spaces to clear out the remaining characters on the line and then press <RETURN>. The next question is about the data grouping. Since we are using weeks, select option 2 and press <RETURN>. The next prompt is to enter the starting week number. Since we are starting with week 1 (default), press <RETURN>. You should now be back at the main menu.

Select INPUT & MODIFY DATA by entering 1 and pressing <RETURN>. Follow this with INPUT DATA FROM KEYBOARD by entering 1 and <RETURN>.The first prompt at screen {1.1} asks you to enter the data set into which you want to put the data. We'll put ACTUAL SALES into data set 1 and BUDGET into data set 2. Press <RETURN> to select data set 1. The computer responds with "clearing data setl-sure?" to remind you that if you had any good data in data setl, it will be lost if you continue and press "y". If you press any other key, you will be returned to the main menu. Since we do want to enter new data into data set 1, press "y". The next prompt is for data set name. Key "ACTUAL 1983" as the name and press <RETURN>. Next you are asked for the number of data items. Key 10 (number of weeks) and press <RETURN>. The next prompt asks if you want to enter the data in sequence or not. If you respond "y", you will be asked for 10 points in sequence. If you respond "n", you are able to select which item of data is to be entered and CHARTPLOT-64 data will accumulate inputs for each point. Since we have our sales data in sequence, press "y". The 10 data items are shown and your keyed values replace the zeros as you enter them. Now key the weekly sales values from the table on the prior page, with decimal points. For example, key "15.20<RETURN>" for the first item. When the tenth value has been entered, you will be returned to the main menu. If you make a mistake in keying a value, you can correct it before pressing <RETURN>. If you don't realize you made a mistake until later (or have to change data for some other reason), the ALTER option {1.2} allows you to change any data value.

Now in a similar manner, enter the BUDGET data. From main menu {0} select options 1 (INPUT & MODIFY DATA). Then from screen {1} enter another 1 (INPUT DATA FROM KEYBOARD). Type 2 to select the next data set number. Type "BUDGET 1983" for the data set name. The number of data items prompted defaults to 10 so just press <RETURN>. Enter the budget values (since there are no cents, you can type 16<RETURN>

for the first value,etc.).

The next step is to define the chart type. From the main menu {0}, select menu option 3 (DEFINE CHART). Next select option 1 (CHART TYPE). Key in "VG" for vertical graph. Type N to the ALTER DISPLAY SEQ prompt and you will be returned to the main menu.

To see the chart, select option 2 (DISPLAY CHART ON SCREEN) from the main menu {0}. To get back to the main menu, press the F5 key.

The chart you see contains many options which are selected automatically by CHARTPLOT-64. The next steps are to improve the chart by controlling these features.

Before going any further, you should save the data you keyed in. You should REMOVE THE DISTRIBUTION DISKETTE from the drive and replace it with one on which you want to save the data. If the diskette has not been initialized (NEWed), you can do so by selecting option 5 (FILE COMMANDS) from the main menu {0} and then option 5 (NEW DISKETTE). BE VERY CAREFUL, SINCE THE NEW COMMAND COMPLETELY ERASES ALL DATA AND PROGRAMS ON A DISKETTE!!

To save the data, press the F5 key to see the main menu and then select option 4 (SAVE CHART) from the main menu {0}. Select option 1 (SAVE DATA). Unless you are using a disk drive number other than 8, press <RETURN>. The data file name may be up to 16 characters long. "LEMON83" is a good name to use. Key in the name and press <RETURN>. The disk drive runs for a few seconds and you are returned to the main menu.

From here on in this tutorial, option selection from the main menu will be shown using / /. For example, to get to the chart type selection screen you have to select option 3, then 1. This is shortened to 3/1/. The "/" means RETURN.

The chart vertical axis is automatically set to the range of the data - it ranges from the lowest to the highest values in the data. To make the chart look more normal, we need to fix up the dependent axis (data values). Go to 3/2/2/ to input dependent axis information. Key in "$$$ SALES $$$" for the legend. Since we want a normal scale, press <RETURN> (0 default) at the normal/log scale prompt. The default minimum value is 0, and we probably want to leave it at that value, so press <RETURN>. To make the chart more normal, enter the value 40 for the maximum value instead of the 33.15 which was computed automatically. You will have to space over the digits left on the screen by 33.15. The base value is left at 0, bottom for bar charting options. The number of divisions (horizontal lines) can be left at 4, since this will give us four lines, each at 10, 20, 30 and 40 values. Press return to accept the default color.

Display the chart 2/ to see the new dependent axis. Remember to press the F5 key to return to the main menu. If you want to change it further, simply go back to screen 3/2/2/.

The independent axis in this example is the data grouping information (weeks). To improve this, go 3/2/1/. Key "--1983--" for the legend. The scale is normal, so press <RETURN>. The min, max and number of divisions don't matter on bar charts, so just press <RETURN>. The GRP NAMES are normally shown horizontally, but because they are 4 characters long (WK10) and are not separate, we want to show them vertically. Key a 1 and <RETURN>. Press <RETURN> at the color prompt to accept the default color.

Display the chart using 2/ again to see how the new independent axis looks. Note how the weeks overlap the bottom legend. This can be fixed by altering the chart shape. Press F5 to return to the main menu and then go to 3/2/3/. Notice the flashing mark in the lower left corner. Use the cursor up key (with SHIFT) and the mark will move up. Put it up about halfway between the 0 and 10. The mark may also be moved sideways to allow more room along the left side when needed. Press <RETURN>. Now the mark will flash in the upper right corner. Since there is no reason to change that position now, simply press <RETURN>.

Now display the chart 2/ to see if the bottom legend is satisfactory.

Next, let's fix the title. Press F5 again and then go to 3/4/1/ and key "** LEMONADE STAND SALES **" and press <RETURN>. The flashing mark in the top line allows you to reposition the title (move it right a little) and press <RETURN>. Press <RETURN> to use the default color.

Now let's move the data set legend to the right. Go to 3/4/2/ and move the flashing mark to the right half of the chart (above WK6) and then press <RETURN>.

Now let's change the line markings. Go to 3/3/1/. For the ACTUAL (data set 1) let's use a letter A for the plotting symbol. Press shift and "A" and press <RETURN>. Then choose a solid line for actual data (press S and <RETURN>). Press <RETURN> to default the color to black. Now for the second data set (budget), use B for the plotting symbol and a dashed line.

Use option 2 to display your work again.

If you're satisfied, save the chart specification. First press F5 and go to 4/2/. After the disk drive device prompt, you should see the name under which you saved the data. You may use the same name for the specs since CHARTPLOT adds a '.S' in front of the name of specification

files. Press <RETURN>. The disk will run for about 15 secs., and then return you to the main menu.

Suppose we want to add last year data to this chart. On the distribution diskette is LEMON82, a file with budget and actual from last year. To add this to your chart, go to 1/8/ to use the directory. Key the device number first and press <RETURN>. Select data files (press 1 & <RETURN>). Select the LEMON82 file (key in the number found along the left edge of the screen along side the filename LEMON82 and press <RETURN>. The READ DATA FILE screen asks for a device.Key the number (8) and <RETURN>. CHARTPLOT next displays the name of the file you selected. If ok, press <RETURN>. The next prompt is DIF file (y/n). Since this is not, press N. Now you will be presented with each data set saved in the file. The first is "ACTUAL 1982". Since we want that data, press Y to read it in. Select a data set into which CHARTPLOT-64 will read the data by pressing 3 & <RETURN>. The next screen shows the next data set in the file (BUDGET). Since last year's budget is not needed, bypass it by pressing N. The next prompt is to choose whether or not to accept data group names (WK1,WK2,etc). Since the names are already in the computer, press N to bypass.

Go to screen 2/ to see how that third data set is added to your chart!

Go to screen 3/3/1/ to change the plotting character for last year's data (data set 3). Press <RETURN> three times to leave the options for data set 1 as they were. Press <RETURN> three more times to leave data set 2 options alone. Then for data set three, key "L" for the plotting character and press <RETURN>, key "N" for no line and press <RETURN> and then press <RETURN> to leave the color the default (1=black).

Go to screen 2/ to plot the revised chart.

You can easily change this to a bar chart. Press F5 then go to 3/1/ and select VB as the chart type. Press N to bypass altering the display sequence. Try displaying the new bar chart using 2/. You will get the message BARS TOO WIDE. Press <RETURN> then go to screen 3/3/3/ to adjust the bar width. Press <RETURN> at the first prompt (Mixed bar grouping). Change the bar width to 45 and leave the space between the bars at 7. For each bar you may select the filling options and drawing color. Select fill option 3 (horizontal lines) and default the bar fill spacing and drawing color for line 1 (ACTUAL). Use fill option 5 (diagonal lines) for budget and fill option 2 (vertical lines) for data set 3 (last yr).

Go to screen 2/ to see the bar chart.

Note how the MIXED type of bar chart intersperses the three data sets. Go to screen 3/3/3/ and select the G (GROUPED) bar grouping, default all the rest and then go to screen 2/ to display the chart in grouped format.

To see the use of the sequence alteration, go to screen 3/3/3/ and go back to the Mixed bar grouping and default the rest. Then go to screen 3/1/ to select chart type. Press <RETURN> at the chart type prompt to keep VB. Then press Y at the ALTER DISP SEQ? prompt. The four data set names in the computer are shown (data set 4 still has default name). Press 1 and <RETURN> to select data set 1 and then press 3 and <RETURN> to select data set 3. This will show ACTUAL 83 and ACTUAL 82 only. Press 0 and <RETURN> to end the sequence. Your choice is now shown. If ok, press Y to go back to the main menu. Go to screen 2/ to see the chart. (you can widen the bars to 65 to make it easier to read by going to screen 3/3/3/). Note also that you should change the data grouping axis legend to something like "SUMMER WEEKS" or "WEEK COMPARISON" by going to screen 3/2/1/.

To see how the base value works, let's assume we want to see how much above or below an average of 12 per week our sales are. Go to screen 3/2/2/ and key 12 in the base value and press <RETURN>. Take the defaults on the other values. Then go to screen 2/. Since most people like a line for the base value, add one using the chart lines option. Go to screen 3/5/. There can be up to six lines. Select line 1 and press <RETURN>. The value at the left should be 12. Normally you will want the same value on the other end (horizontal line). Enter the value 12 and press <RETURN> at the second prompt. Then select a solid line (press S and <RETURN>). Key 1 and press <RETURN> for black color. Now display the chart again with screen 2/.

To change this to a horizontal chart, go to screen 3/3/3/ to change the bar width to 30 (there are less plotting points in the vertical direction). Go to screen 3/1/ to select chart type of HB. Display it. Note that the following changes are needed:

Go to screen 3/2/1/. Change the GRP NAMES code back to horizontal (0) along the left edge.

Go to screen 3/2/3/. Move the bottom of the rectangle down (under the 0), and then move over to the right (to about 5) and press <RETURN>. Move the top corner down (under ACTUAL 1982) and press <RETURN>.

Now go to 2/ to display the chart again.

You can create a pie chart of the current year sales by going to screen 3/1/. Select a Pie chart by pressing P (and a blank to clear the B) and <RETURN>. When you display the chart 2/, you are asked which data set you want to display.

Key 1 and press <RETURN>. Whenever you draw a pie chart you will be asked if you want to change anything about the segments (colors, separation, fill). Since you must specify this now, press 4. Then you are asked for the size, color, fill and separation option for each segment. To make it easy to start, key 1 (black-automatic size) for the size-color, 0 for the fill angle (0=no fill) and 0 for the separation for the first segment, 1/1/0/ (black-vertical fill-no separation) for the second, 1/2/0/ for the third, etc. When the last segment color has be entered, the pie chart will be drawn.

To get more feel for the options, redraw the chart using 1/0/9/ (black-no fill-maximum separation) for the first segment and use the prior values for the rest. Notice how the first section is separated from the others.

See the sample charts in APPENDIX J - SAMPLE CHARTS

{0} MAIN MENU

This menu is the main control point for CHARTPLOT. All functions return to this menu. If the program stops for some reason, you may restart it with a GOTO 5. It will return you to this menu without losing any data or specifications already keyed in.

DIMENSIONS - When you RUN CHARTPLOT you are first asked for the dimensions of the desired chart: [plot width (inches) and plot height (inches)]. These values set up a number of scaling factors and default values in the system. Plotters have thousands of points in the x and y directions. All of the plotting calculations are done in plotter units. When displaying a chart on the screen, the plotter coordinate is scaled down to a screen coordinate. Because the screen has only a discrete number of points (320 horizontally and 200 vertically), there is some distortion of lettering and bar/pie filling on the screen although the plot will be ok. To prevent this screen distortion in order to give a good screen for printer dumping or slide show purposes, enter a 0 as the plot width. The chart height prompt will not appear and the scaling will not take place. (note that the data will have to be read in and a separate chart made for plotter purposes).

Charts may be offset on the plotter from the normal home (lower left) position. The offset is controlled by an option in the chart definition menu (3.3.5).

A note about colors -

The '64 can display 16 different colors. In high resolution graphic mode, different colors within 8x8 pixel cells will "bleed" - all dots in the cell will show with last color displayed. CHARTPLOT defaults to black plotting on a white screen, giving the cleanest display on the screen. Of course the printer dumps are the same colors (black & white).

One of the advantages of plotters is their capability to draw charts in many colors. CHARTPLOT will allow you to specify up to 8 colors on a chart. When drawing the chart, it will change the pen automatically or draw everything in one color, then ask you to change the pen, draw everything in the second color, and so on. For plotters which change pens automatically, there is a table in CHARTPLOT of the Commodore screen colors (1-8) and the pen number which should be selected for each. Normally you will use colors 1 (black) and 3-8 for drawing. If your plotter happens to have red in pen 7 (3 on the screen), the table should have color 3 to select pen 7. The CONFIGER program lets you set up this table when you define your system. Each time you plot and select automatic pen changing, the table will be shown so you can change the table and also check that the proper color pens are in the proper holders. If you need to

use eight colors on the chart, use color 2 (white) and select color 16 (light grey) for the screen color in menu option 3.3.2.

MAIN MENU OPTIONS:

0.1 INPUT & MODIFY DATA

This option takes you to all of the menus concerned with entry and correction of data for the chart. This is normally the starting point for any chart.

0.2 DISPLAY CHART ON SCREEN

This option produces the chart on the screen, based on the data and specifications stored in the computer. When the chart is completed, press the F5 key to switch back to the CHARTPLOT main menu. To switch back to the chart, press the F7 key.

If you have not specified a chart type, you will be transferred to the chart type selection screen {3.1}.

If the chart to be drawn is a pie chart, you must select which data set is to be used. You are also asked to specify the size, color, separation and fill values of each segment.

If a BASIC error occurs during the drawing of the chart, the drawing process will stop. Press the F5 key to view the error message. See Appendix b-ERROR MESSAGES for the possible messages and their causes. Type GOTO 5 to resume operation without losing data or specifications.

0.3 DEFINE CHART

This option takes you to all of the chart specification and option menus. These menus allow you to select and adjust the chart display parameters.

0.4 SAVE CHART

This option takes you to the menu where you can save the data, the chart specifications or both. They are saved separately so that the same specifications may be used with a variety of data sets to produce a group of comparative charts. Similarly, one set of data may be displayed several different ways using other specifications.

0.5 FILE COMMANDS

This menu option takes you to the menu where you can rename, copy and delete files or initialize (NEW) diskettes.

0.6 PLOT/PRINT CHART

This option outputs the chart on the plotter or printer.

The plotter option generates the chart and you may specify the size percent and pen selections. If you choose the plotter option for a pie chart, you will be asked to specify the data set and the size, color, separation and filling values for each segment. See details on menu option 2/.

The printer option copies the chart screen to the printer. Therefore, before using the print option, you must first display the chart on the screen 2/.

0.7 SAVE/RESTORE CHART SCREEN

This option lets you save and later restore a complete chart directly from the screen. It is useful in cases where a printer may not be available, or for presentations where it would be time-consuming to recall data sets, and create the charts.

0.8 EXIT TO BASIC

This option resets the computer to normal BASIC operation. Before the resetting process starts you are asked "ARE YOU SURE?". Press the "Y" key to do the reset. Pressing any other key will return you to the main menu.

nnnn BYTES FREE

Because the data sets and the display programs take up a lot of room, the number of remaining bytes of workspace are displayed on the main menu. If the number of bytes free is less than about 300, be cautious because additional specification parameters may take up the remaining room. If it happens, the BASIC message "OUT OF MEMORY ERROR" will be displayed. The program can be restarted without losing data by typing GOTO 5 and pressing the <RETURN> key. At this point you should temporarily save the data and specifications, shorten the legend and titles or cut the number of lines or data points and then reload the data and specifications.

{1} INPUT AND MODIFY DATA MENU

1.1 INPUT DATA FROM KEYBOARD

The first prompt is for the data set number into which you want to key your data. The list of data sets available in memory is displayed and their numbers. Enter the number of the data set desired and press <RETURN>. Your selection is checked against the maximum you have setup in screen {1.4}. If you are within the maximum, the message "clear data set - sure (y)" will be shown to remind you that the data set you selected will be cleared. Press Y to continue. Pressing any other key will return you to the main menu.

Next you are asked to supply a name for this data set. CHARTPLOT automatically supplies a default name (DATA SET N) if you just press <RETURN>. If you do not want the default, key in the name of your choice and press <RETURN>. You may also change the data set name later through the ALTER DATA & NAMES screen 1/2/.

Next you are asked to key in the number of points contained in the data set. CHARTPLOT supplies a default number (2) if you just press <RETURN>. If you do not want the default, key in the number of you choice and <RETURN>. The next prompt is "IN SEQUENCE (Y/N)". If you key Y then CHARTPLOT-64 will ask you for the point values in sequence. If you key N, then you can key the values in random sequence, and the data will be accumulated in each point.

After the data set has been selected, the screen shows the data set name, the data point numbers, the data group names and the data values of the last 13 data points (will start with all zeroes).

Next, you are prompted for the data values. For one-dimensional data you are prompted for only one value per data item. For two-dimensional data, you are prompted for both an X and Y value (unless you previously selected the automatic x or y option). As you key the data the last 13 values are shown on the screen.

When the last data value is entered, you will be returned to the main menu.

If you are not keying the data in sequence, you are asked for the point number you want to enter. The current data points around that point are shown on the screen and you key the value. That value will be ADDED to the point value and the total shown on the

screen. Then you will be asked for the next point. When you are finished, key 0 as the data point number to exit.

1.2 ALTER DATA AND NAMES

The first prompt is for the number of the data set to be changed. The list of all data set names and their numbers is displayed. Enter the number of the data set. If you want to change a data set name, key a -1. If you want to change the data group name, key a 0. Then press <RETURN>.

Next you are prompted to enter the starting data item to be changed (1=first item, 2=second, etc). Key in the item number and <RETURN>.

The next display shows the item number, the data group name and the value (x and y values for two-dimensional data sets) for up to 13 data items, beginning at the specified data item. To change a value, key in the number of the data item you want to change and press <RETURN>. Then you are prompted for the new data value. For two-dimensional data, both the X and Y data will be shown for changing. If you want to add an item before the entry number (and push the rest of the list up) type an up-arrow (↑) and then the data value to insert. If you wish to delete an item (and slide the rest down) type a left-arrow (←).

After each data item is entered, the revised list is shown. You may quit by typing a 0 and <RETURN>.

If you want to see a point out of the range currently being shown, key the point number you wish and press <RETURN>. The points around and including your selection will be shown. Key the new value and press <RETURN>.

You will be returned to the main menu.

1.3 CLEAR/COPY/MOVE DATA SET

This option presents the CLEAR/COPY/MOVE data set menu. The options are:

1.3.1 CLEAR DATA SET

CLEARing a data set sets all data values within that data set to zero. You are prompted to enter the number of the data set to be cleared. Key in the data set number and press <RETURN>. The message "CLEAR DATA SET - SURE? (Y)" will be shown to remind you that the data set you selected will be cleared.

Press Y to continue. Pressing any other key will return you to the main menu.

1.3.2 COPY DATA SET

COPYing a data set moves all data items from the FROM data set to the TO data set and leaves the FROM data set intact.

First you are prompted to enter the number of the FROM data set. Key the data set number and press <RETURN>.

Next you are prompted to enter the number of the TO data set. Key in the data set number and press <RETURN>.

1.3.3 MOVE DATA SET

MOVEing a data set moves all data items from the FROM data set to the TO data set and clears the FROM data set to zero.

First you are prompted to enter the number of the FROM data set. Key the data set number and press <RETURN>.

Next you are prompted to enter the number of the TO data set. Key in the data set number and press <RETURN>.

The message "CLEAR DATA SET - SURE? (Y)" will be shown to remind you that data set you moved the data FROM will be cleared. Press Y to continue. Pressing any other key will return you to the main menu without clearing the FROM data set (the data will also be in the new data set).

1.4 CHANGE DIMENSIONS

This screen lets you set the chart size, number of data sets and the maximum size of the data sets. Initially, CHARTPLOT-64 defaults to 4 data sets, each containing 55 points. The NUMBER OF DATA SETS multiplied by the NUMBER OF POINTS IN EACH DATA SET must be kept at or below 220 because of memory limitations.

WARNING-Because this option must establish arrays in BASIC, (ALL OF MEMORY IS CLEARED). Therefore all data values, chart specifications and names in memory are lost when this option is selected.

The first prompt is for the chart width. Key in the width (inches) and press <RETURN>. If you want to

get the best printer and screen output and don't want to plot a chart, key a zero(0) for the width.

If the width is not zero, you are prompted for the chart height. Key in the number of inches desired.

The next prompt is for the number of data sets.

The last prompt is for the maximum number of points in any data set. A possible error at this point is "OUT OF MEMORY ERROR" if your combination of values is too large.

All data sets are initialized at 0. Data set names are set up "DATA SET n" and plotting characters are set up as the data set number (1..2..3). The default data grouping names are set up as the letters (A..B..C). All bar types are set as type 2 (vertical bars). All drawing colors are set to 1 (black).

You are returned to the main menu.

1.5 GLOBAL DATA SPECS

This option sets up data grouping information.

The first prompt asks if you are using TWO-DIM (Y/N) (two-dimension data sets). Press <RETURN> to accept the default (N). Otherwise, key Y and press <RETURN> for two-dimensional data.

If you are using two-dimensional data, the following prompts appear:

X OR Y AUTOMATIC? Answer with an X and <RETURN> for x values automatically increasing, a Y and <RETURN> for Y values automatically increasing or press <RETURN> for neither.

When you select X or Y the following prompts appear:

STARTING VALUE? Enter the starting value for the automatic numbering and press <RETURN>.

INCREMENT? Enter the amount (may be negative) to be added to the value of each data item and <RETURN>.

At this point for the two-dimensional case you will be returned to the main menu.

For the all other cases you are asked:

HOW IS THE DATA GROUPED?

The first six options are:
1 DAY {SMTWTFS..}
2 WEEK {WK1..WK2..}
3 MONTH {JFMAMJJASOND}
4 MONTH {JAN..FEB..}
5 QUARTER {QTR1..QTR2..}
6 YEAR {1982..1983..}

Key in the number of your choice and press <RETURN>.

For each of these options you are asked for a starting period (which month, which day, week, etc). CHARTPLOT will automatically fill all of the data group names with the selected names.

The seventh option allows you to specify each name:

7 BY OTHER {ACTUAL BUDGET ..}
First you are prompted to enter the number of names within the group. Enter the number and press <RETURN>.

Next you are prompted for each name. To conserve memory and for printing space, each name is limited to 9 characters (including spaces). Enter each name and press <RETURN>. An error message appears if the name is too long. In this case, CHARTPLOT asks you to repeat the entry.

You are returned to the main menu.

1.6 DATA SET CALC/PRINT

All of these functions (except printout) provide "DATA REDUCTION" - For a discussion of these concepts and examples of the use of these options, see the section "DATA REDUCTION TUTORIAL" on page 61.

Some of these options use the current screen display parameters (in 3.2.1 and 3.2.2) to determine the starting and ending data points for lines. For best results WORK OUT THE SCREEN DISPLAY OPTIONS FIRST (menu 3).

This menu option (1.6) takes reads in another section of the CHARTPLOT program to do the calculations. If the CHARTPLOT-64 distribution diskette is not in disk drive 8, you will be reminded to insert it. After a few seconds, the data set calculation and printing menu will show. It has

the following options:

1 DATA SET CALCS

This function lets you add, subtract, multiply or divide data sets and/or constant values. The choices are:

1.1 DS R = DS A + DS B : Add data sets/values

1.2 DS R = DS A - DS B : Subtract data sets/values

1.3 DS R = DS A * DS B : Multiply data sets/values

1.4 DS R = DS A / DS B : Divide data sets/ values

After selecting one of these options, you are asked if the calcs are to be done on the X-values, Y-values or Both. Unless the data sets are two-dimensional, you should take the default value (X only). If the data sets ARE two dimensional, you can select which of the sets of values are to be manipulated. Key the letter X, Y or B to indicate your choice and press <RETURN>.

The next prompt asks you to select.the data set where the result is to be placed. The list of data sets and their names is displayed. You may select the same data set as one of the factors (for example-you can multiply data set two by 2 and put the result back into data set 2 by selecting data set 2 as the result and one of the factors). Key the number of the resultant data set and press <RETURN>.

The next prompt asks you to select the data set for factor A. Note, that for subtraction and division, the distinction between factor A and factor B is important. The list of data sets and their names are displayed. If you want to use a constant for factor A, then key a value of 0 (none of the data sets) and press <RETURN>.

Make a similar selection for the data set to be used for factor B in the calculation.

If you selected a constant factor in the calculations (by keying a 0 as the data set number), you will be asked for the X factor and/or the Y factor depending on the answer you gave to the X,Y or Both prompt above. Key in the value and press <RETURN>.

You are returned the the 1.6 calc/print menu when the calculations are completed. If you do not need any further calculations, select option 6 (return to

main menu). From the main menu (0), you can select the ALTER DATA AND NAMES option (1.2) to see the new values and/or change the name of a new data set.

2 DATA SET AVERAGE/STD DEV

This option analyzes a data set and sets up to three lines on a chart for the average value, the average plus and the average minus a number of standard deviations. This works primarily with one-dimensional data.

The first prompt asks you to select the data set whose values are to be averaged. The list of data sets and their names is displayed. Key the number of the data set and press <RETURN>.

CHARTPLOT-64 will add up the values in the data set and show you the total of the x values, the average and the standard deviation. If you need to save these values, write them down (they are used to setup the lines but are not otherwise saved in the system).

The next prompt asks you which line (1-6) you want to show the average (if you don't want to show the average, key 0). Next you will be asked whether the line is to be solid(S) or dashed(D). Key in the letter and press <RETURN>. Next select the line color (1 is black).

The next prompts handle the standard deviation. First you are asked for the number of standard deviations you want the lines displaced. (key a 0 to ignore standard deviations). Then you are asked for the line number which will be set to the average + n standard deviations. Then specify its type and color. Last, you are asked for the same information about the average - n standard deviations line.

The lines may be adjusted or suppressed through the Chart Lines menu option (3.5). See the DATA REDUCTION TUTORIAL for a discussion and examples of these concepts.

3 LEAST SQUARES

This option computes a least-squares "best fit" line through the values in a data set. The equation of the line is used to setup the chart lines with values so the line and the line plus and minus the residual variance may be plotted.
If the chart type is a Comparison chart, the regression line is computed using the two data sets

selected for comparison.

The first prompt asks you to select the data set whose values are to be used. The list of data sets and their names is displayed. Key the number of the data set and press <RETURN>.

The data is evaluated and a number of resulting values are shown on the screen. These are explained in the DATA REDUCTION TUTORIAL. If you need any of these, write them down.

The next prompt asks you which line (1-6) you want to show the regression line (if you don't want to show the line, key 0). Next you will be asked whether the line is to be solid(S) or dashed(D). Key the letter and press <RETURN>. Next select the line color (1 is black).

The next prompts handle the residual variance (which is like the standard deviation for an average). First you are asked for the number of residual variances you want the lines displaced, (Key a 0 to ignore). Then you are asked for the line number which will be set to the average + n residual variance. Then specify its type and color. Last, you are asked for the same information about the average - n residual variances line. The ends of the lines are automatically adjusted to fit on the screen. In exceptional cases, you may have to change the plotting range (options 3.2.1 and 3.2.2) to make the lines show properly.

The lines may be adjusted or suppressed through the Chart Lines menu option (3.5). See the DATA REDUCTION TUTORIAL for a discussion and examples of these concepts.

When a least-squares line is computed on one-dimensional data, the x value used is the data point number (1,2,3,etc.).

4 EXPONENTIAL SMOOTHING

This option reduces the variation in the data and attempts to determine the trend by exponential smoothing. The simple smoothed value for each point is placed in another data set. Optionally, the trend may be calculated and smoothed and placed into another data set. Further the smoothed trend can be used to improve the smoothed data estimate by applying a trend adjustment, correcting for the natural trend lag.

The first prompt asks you to select the data set

whose values are to be used. The list of data sets and their names is displayed. Key the number of the data set and press <RETURN>.

The next prompt asks you to select the data set into which the exponentially smoothed values are to be placed. The list of data sets and their names is displayed. Key the number of the data set and press <RETURN>.

The next prompt asks you to select the data set into which the smoothed trend values are to be placed. If you do not want to calculate and smooth the trend, key the value 0. The list of data sets and their names is displayed. Key the number of the data set or 0 and press <RETURN>.

The next prompt asks you to select the data set into which the trend-adjusted smoothed values are to be placed. If you do not want to trend-adjust the smoothed values, key the value 0. The list of data sets and their names is displayed. Key the number of the data set or 0 and press <RETURN>.

The next prompt asks to supply the initial values to be used in the smoothing. First is the initial value of the smoothed data. Key the value and press <RETURN>.

If you selected trend smoothing, you are now asked for the initial value of the trend. Key the value and press <RETURN>.

Next you are asked for the smoothing constants (default is .1). This determines how much weight is given to the most current data (.1=10%) The value may be any number greater than 0 and less than 1. The larger this value is, more emphasis will be given to recent data and less to old data. Key in a value and press <RETURN>.

If you selected trend smoothing, you must specify the smoothing factor for the trend. Key in a value and press <RETURN>.

If trend-adjusted smoothed values were chosen, you must enter the value of the trend correction factor. The "standard" value is supplied as the default. A larger number will increase the amount of trend correction applied, and a smaller number will decrease this. Key in a value and press <RETURN>.

The calculations are performed and you are returned to the main menu. The new data sets are given names which include the factors you selected and the

original data set name. If the smoothing factor is .15 and the data set name is "SALES", the smoothed data set would be named "S.15[SALES]". The trend is named in a similar way with T and the trend smoothing factor and the original data set name. The trend-adjusted data set is named with a TA and the trend correction factor in the name.

5 PRINT DATA

This option lets you print the values in up to four data sets on an attached printer.

The first prompt is for the secondary address for the printer.

This address is used with the Commodore printers (1525, MPS801, 1526) and Okimate 10 to select normal uppercase characters (secondary address 0) or upper/lowercase (secondary address 7). For other printers, an interface is used and if programmable, the secondary address is used to setup the interface. Usually a secondary address of 0 is normal uppercase, but if it doesn't work, consult the interface manual. The default of 0 is automatically supplied. Key another value or press <RETURN>.

Next you must select the data sets to be printed. The list of numbers and names of all data sets in the computer is shown. You are asked to select the data sets you want (up to 2 if two dimensional data, 4 if not) in the sequence they are to be shown from left to right. When you have selected all that you want (or will fit), key a 0 to terminate this input. The list of data sets you have selected are redisplayed and you must key Y to accept and use the list, or key N to re-create the list. The data sets will be printed on device 4.

6 RETURN TO MAIN MENU

This option is selected to leave the calc/print module and return to the CHARTPLOT-64 main menu. Reading the main program will take about 1-1/2 minutes.

1.8 DISPLAY DIRECTORY

This option allows you to scan the diskette directory and select the file you want to read. CHARTPLOT-64 supplies a default value of 8 for the disk drive device number if you press <RETURN>. If you don't want the default, key in the device number

and press <RETURN>.

Next you are asked for the type of files to be searched:

0 **ALL FILES**

1 **DATA FILES** (all sequential files on diskette except those with ".S" at the beginning)

2 **SPECIFICATION FILES** (only sequential files beginning with ".S")

3 **OTHER FILES** (only non-sequential files, which includes saved chart screens and programs)

The default value of 1 (data files) is automatically supplied. Press <RETURN> to accept. CHARTPLOT-64 will show you the diskette name, all files which match your selection and the number of blocks free on the diskette. Each file shown is given a number and then the size of the file is shown and its name. You can stop the display by pressing the space bar. The display will continue when the space bar is pressed again. To select a file to read, key the entry number corresponding to the name and press <RETURN>. That filename will automatically be suppied at the next filename prompt. If you want to see the entire list again, key a 0 (zero) and press <RETURN>.

If for some reason you don't see the name you want, select one anyway, and you will go to the READ DATA FILE screen (1.9). You can enter the correct name manually at the filename prompt.

1.9 READ DATA FILE

This option allows you to read a data file into the program. The first prompt is for the diskette drive device number. Enter the device number and press <RETURN>.

Next you are prompted for the filename of the data file to be read. If you previously used the DIRECTORY DISPLAY function, the name you selected will automatically be shown here. Otherwise enter the filename and press <RETURN>.

You are asked if the data is a DIF file? (Y/N). (DIF data files are created by some programs. For an explanation see APPENDIX E - DIF FILES. If the file to be read is a DIF file, press Y. If not, press N.

For NON-DIF files the following prompts appear:

DATA SET NAME followed by the name of the first data set from the disk file. You are asked Y TO ACCEPT, N TO BYPASS and must press either a Y or N for each data set. This allows you to selectively read saved data sets into different data set numbers.

When you key Y, the next prompt shows you the data sets in memory and asks you for the data set number where the new data is to go.

When all of the data sets have been reviewed, you are prompted to ACCEPT DATA GROUP NAMES - Y TO ACCEPT N TO BYPASS. If you key Y, the data group names previously saved in the file are read in. If you key N, the default data group names (A.B.C.D..) are used (which may be changed later).

READING SPREADSHEET FILES

(To read files from Busicalc 1 and SYLK files from Multiplan, see APPENDIX G - File Conversion Program.)

To use a DIF file to transfer data from a program such as CALC-RESULT (Advanced) into CHARTPLOT, you must first save the data. Select the DIF file save option in the spreadsheet program. You then may have to select whether to save the data by rows or columns. Select the Row option unless you have a special need to save the data by column.

To read the data into CHARTPLOT, select option 1/8/ to read the directory and select the DIF file name. Then read the file. Answer "Y" to the question "DIF file?". You will be asked if data was saved by rows. If you used the row option, answer "Y", else answer "N". Then you will be asked if data sets are rows or not. More times than not you will want data sets to be rows of the original spread sheet (the row being a particular expense and the columns are months, quarters or years data). In this organization, the name of the data set will be the label in the first column and you will want the data group names to be the column headings. CHARTPLOT will assume the data set name is the first column and will ask if you want the data group names to come from the first row. The alternative is to get data group names from labels (CALC-RESULT doesn't write labels in DIF files but other programs may) or to key or select data group names directly into CHARTPLOT (go to menu options 1/5/, 1/2/ or from a previous chart).

If the spreadsheet is saved by columns, the data set

names can come from labels or the first row, and data group names can come from labels, first column or neither (you must supply them).

Then you will be prompted for each data set the program sees in the DIF file (including blank rows). If you want to use the data set, press Y, else key N. If you accept the data, you will have to select the data set number in CHARTPLOT where the data is to be placed.

Once the data is read into CHARTPLOT, you may use the ALTER DATA option (1/2) to change the data set names, the data group names and to check (or alter) any of the data items.

{2} DISPLAY CHART ON SCREEN

When this option is chosen, CHARTPLOT-64 will draw the chart according to the chart specifications previously selected. After the chart is drawn, you may use the F5 key to return to the Main Menu. The F7 key allows you to review the chart screen at any time.

If you selected a pie chart, you will be asked to select the data set to be displayed. The list of the data set names is shown. Key a number and press <RETURN>.

For each point in the data set (pie segment) you can control four different factors:

Size - CHARTPLOT will automatically setup a size for the printing of the data group name and values for each segment. If you don't specify a size (00), the automatic size will be used (the main menu shows the size in the upper right corner). If you want larger or smaller lettering, specify the size you want (1-16) times 100 (100-1600) and add it to the color value (next).

Color - The normal plotting color is black, so enter 1 the units digit. See screen for other colors.

Fill:

0=no fill
1=fill with vertical lines
2=fill with lines to left by 22.5 deg.
3=fill with lines to left by 45 deg.
4=fill with lines to left by 67.5 deg.
5=fill with horizontal lines.
6=fill with lines 22.5 deg below horizontal.
7=fill with lines 45 deg below horizontal.
8=fill with lines 67.5 deg below horizontal.

Separation - Normally all segments of the pie are drawn together, but you can have any (or all) separated by entering a number (1-9).

If you have previously specified the segment options or read them from disk, you will be asked if you want to change them or not. If you press n, the chart will be drawn. If you reply y, then you will be shown the current values for each segment to allow you to make changes.

[3] DEFINE CHART MENU

3.1 CHART TYPE

There are 7 types of charts:
P PIE CHART
HB HORIZONTAL BARS
HG HORIZONTAL GRAPH
VB VERTICAL BARS
VG VERTICAL GRAPH
X X-Y PLOT
C COMPARISON CHART

The pie chart displays only one one-dimensional data set at a time.

The X-Y PLOT displays only two-dimensional data.

All other types work with one-dimensional data sets.

This menu also appears automatically when you go to display a chart 2/ and no type of chart has been selected.

After selecting a chart type, you are asked ALTER DISPLAY SEQ? (Y/N). Normally data set 1 is shown first, data set 2 second, etc. and all data sets in memory are shown on a chart. This option lets you choose the data sets to be shown, and the sequence in which they are to be shown.

If you type N, then you are returned to the main menu.

If you type Y, then CHARTPLOT-64 shows you the current selected data sets and their names, and then the list of all data sets and names. You are then asked to enter the numbers of the data sets you want to appear on the chart and the sequence in which you want to see them. Type the data set number and <RETURN> for each data set you want to display. When you have entered all of the data set numbers you want to display, type a 0 and <RETURN>. Then the new selected list is shown, and the prompt OK (Y/N). If the list is correct, key Y and <RETURN> and you are returned to the main menu. If not, key N and you can redo the selection process.

For a chart type C (comparison), data set selection is required, as you must select two data sets to be compared. The first data set is shown in the horizontal direction and the second in the vertical direction.

3.2 CHART SHAPE

This option does not appear on the DEFINE CHART menu for a PIE chart type.

The chart shape menu has three options:

3.2.1 INPUT GROUPING/INDEPENDENT VARIABLE AXIS INFO

LEGEND-This is the name to be displayed along this axis. Key in the name of the legend desired and press <RETURN>.

NORMAL (0) OR LOG (1) SCALE-This option allows either normal or a logarithmic scale on this axis. Note that all values must be greater than 0 for log scale-to work. Key in a 0 or 1 and press <RETURN>.

MIN VALUE-This is the smallest value along the axis. This value defaults to the smallest data value after keying 1/1/ or file reading 1/9/. Key in the desired value and press <RETURN>.

MAX VALUE-This is the highest number along the axis. This value defaults to the largest data value after data input 1/2/ or file reading 1/9/. Key in the desired value and press <RETURN>.

NUMBER OF DIVISIONS (- =TICS ONLY)-This is the number of lines and values (in addition to the minimum line) along the axis. Normally you adjust the min, max and number of divisions to get even values along the axis. Key in the desired value and press <RETURN>

If you want to suppress the lines across the chart and only display tic marks along the axis, enter the number of divisions as a negative number (-4 means 4 divisions with tic marks only).

GRP NAMES -> (0) OR V (1)-This option lets you control whether the data group names are shown horizontally (0) or vertically (1) along the axis. Key in 0 for horizontal names or 1 for vertical names and press <RETURN>.

SIZE(*100) + COLOR - This option lets you control the size of the lettering and the color of the axis, legend, group names and scale lines. Key a color number 1-16 (see APPENDIX C) to use default size. To control size, enter the size number desired (1-16, normal is 8) as the hundreds and thousands digits and press <RETURN>. The default is automatic sizing and black color (1). Key in the desired value and press <RETURN>. You are returned to the main menu.

3.2.2 INPUT VALUE/DEPENDENT AXIS INFO

LEGEND - This is the name to be shown along this axis. Key in the desired value and press <RETURN>.

NORMAL (0) OR LOG (1) SCALE - This option allows either normal or a logarithmic scale on this axis. Note that all values must be greater than 0 for log scale to work. Key in 0 or 1 and press <RETURN>.

MIN VALUE - This is the smallest value along the axis. This value defaults to the smallest data value after keying 1/1/ or file reading 1/9/. Key in the desired value and press <RETURN>.

MAX VALUE - This is the highest number along the axis. This value defaults to the largest data value after data input 1/2/ or file reading 1/9/. Key in the desired value and press <RETURN>.

BASE VALUE - This is the number to be used as the bottom or starting point of bars on the bar charts. Normally this is equal to the minimum. However in the case of a variance bar chart where the values can be both positive and negative, set the max to the biggest positive number, the min to the largest negative number and then set the base value to 0. This draws bars going both up and down. Key in the desired value and press <RETURN>.

NUMBER OF DIVISIONS (-= TICS ONLY) - This is the number of lines and values (in addition to the minimum line) along the axis. Normally you adjust the min, max and number of divisions to get even values along the axis. Key in the desired value and press <RETURN>.

If you want to suppress the lines across the chart and only display tic marks along the axis, enter the number of divisions as a negative number (-4 means 4 divisions with tic marks only).

SIZE(*100) + COLOR - This option lets you optionally control the size of the lettering and the color of the axis, legend, group names and scale lines. Key a color number 1-16 (see APPENDIX C) to use default size. To control size, enter the size number desired (1-16, normal is 8) as the hundreds and thousands digits and press <RETURN>. The default is automatic sizing and black color (1). Key in the desired value and press <RETURN>.

You are returned to the main menu.

3.2.3 SELECT CHART RECTANGLE

This option lets you adjust the shape of the chart by moving the two diagonal corners with the cursor keys. When this option is selected, the graphics screen (displaying the last chart drawn) is shown with a flashing mark in the lower left corner. Use the cursor control keys to move the corner where you want it to appear and then press <RETURN>. Then the flashing mark will show in the upper right corner. Move it the using the cursor control keys and press <RETURN>. You are then returned to the main menu. The next time the chart is drawn on the screen 2/ or plotter 6/ it will be the new size. Note that the axis legend names don't move, but the values or group names do move with the axis.

3.3 CHART OPTIONS & COLORS MENU

Only some of these options show, depending on the type of chart selected.

3.3.1 LINE CHARTING OPTIONS

The prompts repeats for all data sets (lines) and for each allows you to control:

PLOTTING SYMBOL-The default plotting symbol for each point is the data set number. This may be changed to any letter (or even two letters) or graphic symbol available in the upper/lower character set. Key in the desired symbol and press <RETURN>.

LINE TYPE-There are three choices:

S - Solid line (default)
D - Dashed line
N - No line

Key in the desired choice and press <RETURN>.

SYMBOL SIZE(*100) + LINE COLOR - This option lets you optionally control the size of the symbol and the color of the symbol and line. Key a color number 1-16 (see Appendix C) to use default size. To control size, enter the size number desired (1-16, normal is 8) as the hundreds and thousands digits and press <RETURN>. The default is automatic sizing and black color (1). Key the desired value and press <RETURN>.

When all lines have been reviewed, you will be returned to the main menu.

3.3.2 SCREEN COLORS

This option lets you select:

SCREEN COLOR - This is the background color of your chart (see Appendix C). Key the desired value and press <RETURN>. The default is 2 (white).

BORDER COLOR - This is the border color surrounding the chart (see Appendix C). Key the desired value and press <RETURN>. The default is 14 (light green).

DASHED LINE INTERVAL - This value changes the length of each section of dashed lines on charts. The default is 50. Key in the desired value and press <RETURN>.

You are returned to the main menu.

3.3.3 BAR CHART OPTIONS

BAR GROUPING - There are three ways to show the data sets in bar chart form.

The first is **MIXED**, where all of the data from all data sets for the first data grouping is shown, then all data for the second data grouping, etc.

The second is **GROUPED** where all of data set 1 data is shown first, then data set 2, etc.

The third is **STACKED**, where data set 1 data is shown first, then data set 2 data is stacked on top of data set 1, etc.

Enter M, G or S and press <RETURN>.

CHARTPLOT-64 computes the minimum and maximum values after the data is entered, assuming M or G bar charting will be used. Therefore when you select stacking, the max value of the dependent axis will have to increased to handle the largest sum of the data values.

BAR WIDTH - is the width of each bar on the screen. Key in the desired bar width and press <RETURN>.

SPACE BETWEEN BARS - is the number of points between each bar. Key in the desired value and press <RETURN>.

BAR FILL OPTIONS - There are 23 ways to fill a bar. Select one of the following for each data set:

1 NONE - The bar is not filled in.
2 VERTICAL LINES - The bar is filled with vertical lines.
3 HORIZONTAL LINES - The bar is filled with horizontal lines.
4 CROSSHATCH - The bar is filled with both vertical and horizontal lines.
5 LEFT DIAG BARS - The bar is filled in with diagonal bars going down from left to right.
6 RIGHT DIAG BARS - The bar is filled in with diagonal bars going up from left to right.
7 DIAG CROSS HATCH - The bar is filled with both diagonal bars creating a diagonal crosshatch.

Bars may be filled in colors. Enter the color number as the hundreds and thousands digits, with the fill option as the units digit. For example- 2=fill with vertical lines, 302 = fill with red vertical lines, etc.

There are two cautions. Because of the way the C-64 high resolution mode works, there may be screen color "bleeding" into adjacent bars or points unless there is a lot of room around each bar. The second is that colors will give no difference on a printer output, so all bars will look alike on printer outputs.

FILL SPACING - The default value is set automatically, and gives a very close set of lines. Larger values will increase the space between each fill line, giving fewer lines in each bar.

SIZE(*100) + COLOR - This option lets you optionally control the size of the lettering and the color used to draw the bar outline and the data set name size and color. Key a color number 1-16 (see Appendix C) to use default size. To control size, enter the size number desired (1-16, normal is 8) as the hundreds and thousands digits and press <RETURN>. The default is automatic sizing and black color (1).

You are returned to the main menu.

3.3.4 PIE CHART OPTIONS

FILL SPACING - The spacing between the pie chart filling lines may be adjusted through this screen. The default is set automatically. Key in the desired value and press <RETURN>.

SHOW % Y(1) N(0) - This option allows you to control the printing of the calculated percentage with each segment. If the option is 1, the percentage will show (default). To suppress, key a 0.

You are returned to the main menu.

3.3.5 CHART OFFSET

ORIGIN X OFFSET(INCHES) Key the number of inches the lower left corner of the chart should be displaced (offset) to the right (default is 0).

ORIGIN Y OFFSET(INCHES) Key the number of inches the lower left corner of the chart should be displaced (offset) upward (default is 0).

You are returned to the main menu.

3.4 CHART DESCRIPTIONS

These options allow you to control the chart title and extra lines.

3.4.1 CHART TITLE

The first prompt asks you for the title of the chart. Key the title (which may be up to 75 characters long) and press <RETURN>.

Next the graphic screen (displaying the last chart drawn) is shown with a flashing mark in the last title position (normally the upper left corner). Use the cursor control keys to move the flashing mark to the desired position and then press <RETURN>.

SIZE(*100) + COLOR - This option lets you optionally control the size of the lettering and the color of the title. Key a color number 1-16 (see APPENDIX C) to use default size. To control size, enter the size number desired (1-16, normal is 8) as the hundreds and thousands digits. The default is automatic sizing and black color (1). Key in the desired value and press <RETURN>.

You are returned to the main menu.

3.4.2 DATA SET LEGEND POSITIONS

This option displays the last graphic screen and shows a flashing mark at the last position of the data set legend display. (normally upper left corner). Use the cursor control keys to move the mark to the desired position and then press <RETURN>.

3.5 CHART LINES

You may add up to six "help" lines to the chart. They may represent any data values, such as the minimum, maximum and average of a salary scale for a job.

In the one-dimensional case, the lines are drawn across the chart. Normally both ends are the same value, although you can make them different.

In the two-dimensional case, you must give the x and y values of the end points of each line.

LINE NUMBER
Enter the number of the line you wish to describe (1-6).

VALUES -

<-^ END. This is the x value of the left end of the line in the vertical graph or bar case, or the upper end in the horizontal bar or graph case. Key in the desired value and press <RETURN>. If you specified a two-dimensional chart, you will then have to enter the Y value for the first end of this line.

V> END. This is the value of the right or lower end of the line. Key in the desired value and press <RETURN>. You will have to enter a y value for a two-dimensional line.

(S)OLID (D)ASHED Key an S for a solid line or a D for a dashed line and press <RETURN>.

If you want to turn a line off, key a null string ("" -two quotes with no space between them) at the line type prompt.

COLOR Key the color number of the line (see color table).

3.8 DISPLAY DIRECTORY

The prompts and their meanings are the same as the DISPLAY DIRECTORY screen 1/8/.

The file type prompt of 2 (spec files) is automatically supplied on this menu option.

After selecting a filename, you are automatically switched to the READ CHART SPECS FILE option 3/9/.

3.9 READ CHART SPECS FILE

This option allows you to read a chart specification file. The first prompt is for the disk drive device number. Enter the device number and press <RETURN>. Next you are prompted for the filename of the specification file. If you previously used the DISPLAY DIRECTORY function, the name you selected is automatically shown here. You may press <RETURN> to accept that filename. Otherwise, enter a new filename and press <RETURN>. After the specification file is read, you are returned to the main menu.

[4] SAVE CHART MENU

4.1 SAVE DATA

All of the data sets in the computer are saved to disk. If you want to select only certain data sets to load, this is done when reading them back into the computer 1/9/.

The first prompt is for the disk drive device number. Key in the device number and press <RETURN>.

The second prompt is for the filename. The filename must not have ".S" as the first characters or the name will conflict with the related specification file. Key in the filename and press <RETURN>.

CHARTPLOT-64 saves the file to disk. If a file with the same name already exists on disk, you will see the prompt REPLACE?(Y). If you press Y, the data from memory overwrites the old file on disk. If you press any other key (including <RETURN>) THE DATA IS NOT SAVED and you are returned to the start of this menu.

4.2 SAVE SPECIFICATION

All of the chart specifications in the computer are saved to disk.

The first prompt is for the disk drive device number. Enter the device number and press <RETURN>.

The second prompt is for the filename. Key in the filename (it may be the same as the data filename) and press <RETURN>.

CHARTPLOT-64 saves all of the specs to disk. If a spec file with the same name already exists on disk, you will see the prompt REPLACE?(Y). If you press Y, the data from memory overwrites the old file on disk. If you press any other key (including <RETURN>) THE DATA IS NOT SAVED and you are returned to the start of this menu.

4.8 DISPLAY DIRECTORY

The prompts and their meaning are the same as the DISPLAY DIRECTORY screen 1/8/.

The file type prompt of 0 (all files) is automatically supplied on this menu option.

(5) FILE COMMAND MENU

5.1 DELETE DATA FILE

This option removes a data file from disk.

The first prompt is for the disk drive device number. Enter the device number and press <RETURN>.

The second prompt is for the filename to be deleted. Enter the filename and press <RETURN>.

5.2 DELETE SPECIFICATION FILE

This option removes a specification file from disk.

The first prompt is for the disk drive device number. Enter the device number and press <RETURN>.

The second prompt is for the filename to be deleted. Enter the filename and press <RETURN>.

5.3 RENAME FILE

This option allows you to rename a file on disk (perhaps to avoid a conflict with another filename).

The first prompt is for the disk drive device number. Enter the device number and press <RETURN>.

The second prompt asks you to specify the new name, followed by an "=" and then then the old name (filename to be changed) and press <RETURN>.

5.4 COPY FILE (SINGLE DRIVE)

This option allows you to copy a file on disk (perhaps to make a duplicate).

The first prompt is for the disk drive device number. Enter the device number and press <RETURN>.

The second prompt asks you to specify the new name, followed by an "=" and then then the old name (filename to be copied) and press <RETURN>.

5.5 NEW DISKETTE

This option intializes a diskette. Be aware that **ALL DATA ON THE DISKETTE IS DESTROYED** by this option.

The first prompt is for the disk drive device number. Enter the device number and press <RETURN>.

The second prompt asks you for a diskette name. You

may enter up to 16 characters and press <RETURN>.

The third prompt asks you for a diskette identifier. Enter two characters and press <RETURN>.

5.8 DISPLAY DIRECTORY

The prompts and their meaning are the same as the DISPLAY DIRECTORY screen 1/8/.

The file type prompt of 0 (all files) is automatically supplied on this menu option.

(6) PLOT/PRINT CHART

This option produces a "hard copy" of your chart either on a plotter or printer.

The first prompt is p(L)otter or p(R)inter? Press <RETURN> for plotter output (L)-the default or press R and <RETURN> for printer output.

For plotter output the next prompt is size %. This is normally 100% meaning your plot will be 100% of the size you specified in the plot width and height prompts. You can key in a lower percent to scale the plot down, or a number greater than 100 to increase the size of the plot. This percent only changes the size of the chart, not it's origin (see CHART OFFSET menu 3.3.5). The next prompt is auto pen chg?(y/n). If your plotter supports and you want to use automatic pen changing, press Y, otherwise press N. If you press Y the current table of screen colors and pen numbers is shown (the one you established in CONFIGER). You can change the table by pressing Y at the prompt "change (y/n)". Then each screen color will be shown in sequence and you must key the new pen number.

Make sure the pens are in their proper holders before continuing to plot.

For the SILVER REED option 8 (normal chart orientation) you must set the plotter at the lower left corner of the position of the finished chart (normally about 5 inches down the page at left margin).

For the SILVER REED option 9, position the pen at the upper left corner of the page, since the chart will be drawn sideways down the paper.

If the plot is a pie chart, you will be asked to specify the data sets to be shown as in main menu option 2. If the segment colors and fill options have already been specified, you will be asked "change segment colors/options (y/n)" If you press n, the chart will be plotted. If you press y, you will be shown the present values so you can make changes. Then the chart will be plotted. You will see the plotter commands as they are sent to the output module, although upper and lower case characters are reversed.

If you specified printer output, you will be asked for the device number and whether you want a small (0) or large (1) printout. Small printer output takes about 1.5 minutes on an EPSON FX-80 and 4.5 minutes on a COMMODORE 1525.

[7] CHART SCREEN SAVE/RESTORE

7.1 SAVE CHART

This option lets you save a chart screen to diskette. You are asked for the device number. Key in the disk device number and press <RETURN>. The next prompt shows the filename of the last file read or written or last option selected by the directory function. Accept or change the filename and press <RETURN>.

If a file with the same name already exists on disk, you will see the prompt REPLACE?(Y). If you press Y, the data from memory overwrites the old file on disk. If you press any other key (including <RETURN>) THE CHART IS NOT SAVED and you are returned to the start of this menu.

7.2 RESTORE CHART

This option lets you restore a screen previously saved. Prompts are the same as 7.1.

7.8 DISPLAY DIRECTORY

This is the same as other directory displays.

The file type prompt of 3 (other files) is automatically supplied on this menu option.

(8) EXIT TO BASIC

This option resets the computer for normal BASIC operation. Before the resetting process starts, you are asked "SURE? (Y/N)". Press the "Y" key to do the reset. Pressing any other key returns you to the main menu.

DEMONSTRATION CHARTS

Now you have mastered the basics of chartmaking with your '64! To show some of the other features of this program, there are a series of data files and chart specifications included on the distribution diskette. All of these were created for pretty clear screen displays, and therefore they don't use colors and size variations the same as you would with plotters. After getting your plotter working with the demos as included, experiment with changing colors.

All of the demonstration charts except the ocean chart were created for 10 x 7 inch plotting size. For the SILVER REED use a 70% size for the normal orientation and 90% for large orientation. The ocean chart size is 3 x 5 inches.

To see these demonstration charts, simply follow these instructions (see APPENDIX J for sample plots):

If CHARTPLOT-64 is not in the computer, load it in.

Go 1/8/ and select data files (1). Select the number of data file name "data.1" and press <RETURN>. Then press <RETURN> two more times and the diskette drive should start reading. You will be asked if this is a DIF file. It is not, so press N. Next you will be prompted for data set selection. Press Y/<RETURN>/Y/<RETURN>/Y/<RETURN> and Y to read in all of the data sets and data group names.

You should be returned to the main menu. Go 3/8/ to read in the spec file directory. After the device default, select spec files (2) and <RETURN>. Select file ".sdata.1a" and read it into CHARTPLOT.

When the main menu reappears, go 2/. This is a 12 month bar chart of three sales regions. Note the three different types of bar filling and that these are mixed bars (M).

You may notice that some of the letters appear "squashed" and bar filling may appear uneven. As explained earlier, this is due to the screen compression calculations needed to fit the plotter screen onto the monitor. It will not affect the plotted chart. It can be eliminated when you want screen/printer charts only (a later example will show this).

The next several examples all use the same data sets with different specifications, showing how you can display a group of data sets many different ways.

Go 3/9/ (from now on we will key the filenames directly and always default the device number) and change the last a in ".sdata.1a" to a b (to read in ".sdata.1b"). Then display it. Note that this is similar, only uses the grouping (G) bar option. If a rainbow coloring appears in the left group, it is not intentional but due to the TV system with high

density vertical lines.

Now go 3/9/ and select spec file ".sdata.lc" and display it. This is an example of stacked bars. Note that the bars are wide and easier to read, and the top shows the total sales of the three regions combined.

Go 3/9/ and read in ".sdata.ld". Again this is the same data, only shown in a vertical graph format.

Go 3/9/ and read in ".sdata.le". This is a horizontal graph of the data. Note how the top is lowered, and the bottom of the scale is 20, not 0.

One of the features of CHARTPLOT-64 is the ability to plot using logarithmic scales. Log scales are used to find constant RATES of change, because they show up as straight lines on a log chart. Go 3/9/ and read in ".sdata.lel" and display it. Note how the dependent (value) scale is compressed at the right side?

Go 3/9/ and read in ".sdata.lf" and display it. This is an example of stacked horizontal bars. Note that the right side is moved in slightly to show all of the top value (250).

If you have a printer attached to your computer, try printing some of these, as the resolution is higher than most TV sets.

To create a non-compressed screen for good-resolution printing or screen displays, go to the dimensions menu option 1/4/. The first prompt is the "clearing all data - sure?" reminder- press y. The next prompt is the chart width. Enter 0. You will then be asked about the number of data sets and the maximum number of items in each. Take the defaults (4 & 55). Now read in "data.1" again and spec file ".sdata.lap". This is the first chart (".sdata.la") prepared with no compression. The only problem is that if you plot it, it will be very, very small because the scaling is set for the screen.

To clear all of the data sets, go through the 1/4/ option again. Use default sizes- 9.5 and 7 inches, 4 data sets and 55 points.

Go to screen 1/9/ and after the device default, type "data.2" as the file name. Press N at the DIF file question and accept all data sets and group names. Then go 3/9/ and read in ".sdata.2a" and display. Since this is a pie chart, you are first asked to select a data set to display. Select 1 and then you will be asked for colors, press <RETURN> to accept the saved values.

Again reset the data sets (go 1/4/) and take all defaults.

Read in data file "data.3" (not a DIF file) and spec file "data.3a". This is a vertical graph comparison of actual data versus a budget for a fiscal year.

Reset the data sets (1/4/) and read in data file "data.4" (not a DIF file) and spec "data.4a". This is an example of using color, although you will notice it is impossible to keep it from bleeding into the horizontal lines (due to the '64 hires design). This is a Mixed bar chart.

Go to screen 3/9/ and read in spec file "data.4b" and display. This is the same data and chart, except for the Grouped sequence instead of Mixed sequence.

Reset CHARTPLOT (1/4/) and read in data file "data.5" (not DIF) and spec "data.5a". This is a wage scale comparison, and includes three lines, a solid one for the mid-range ($23500), and dashed lines at the edges of the range.

Go 3/9/ and read in "data.5a1" and see the same data on a log scale.

The next example requires changing the data set size to 1 by 108. Simply go 1/4/ and enter 1 for the number of data sets, and 108 for the max number of points. Go to screen 1/9/ and read in "data.6" and spec file "data.6". Note that the bottom of the rectangle has been moved up so the data group names may be printed vertically.

The next sample chart is an x-y chart of the Atlantic ocean floor. Go to screen 1/4/ to clear the data sets (take the defaults). Read in data file "ocean chart" (not a DIF file). The spec file has the same name. Note that the y values are negative to make the curve go downward.

The next examples are X-Y charts taken from a high school chemistry lab. The experiment is to measure the solubility (amount of a substance which can be dissolved) of three compounds at various temperatures of the solution. The three compounds are Ammonium Chloride, Sodium Nitrate and Potassium Nitrate. There are four data points for each compound. The temperature of the solution is the X-value and the number of grams which can be dissolved in 10 milliliters is the Y-value.

Go to screen 1/4/ and take all defaults. Then go to screen 1/9/ and read the data file "sol-curve". Respond N to the DIF file prompt then Y and <RETURN> to the data set name and number prompts for the three compounds and Y to the data grouping names.

Next go to screen 3/9/ and read the chart specifications. The filename is also "sol-curve". Display the chart on the screen 2/. Note that a "help line" (entered on screen 3/5/) was used to extend the line for Potassium Nitrate (P on

chart) down into the lower corner.

Look at the charts and notice how all of the curves seem to have a slight bend in them, bending upward towards the right. This is usually the case when a relationship has a constant RATE of increase. To see if this is true, we changed the dependent (Y) axis to a log scale. To see the resulting chart, go to screen 3/9/ and read chart spec "sol-curvel". Then display the chart using screen 2/. Note also how the data set legends have been moved to a free space on the chart.

DIF FILE EXAMPLE

A DIF file example is included on the diskette. It was written by CALC-RESULT (ADVANCED) from a very ordinary budget worksheet (see Appendix I - Sample Worksheet). The data we want to chart is Total Sales, All Direct Costs, Overhead costs and Net Profit. The file was saved by Rows.

Start by resetting the data sets using screen 1/4/, using the defaults for chart size, the number of data sets and (55) for the number of points. Go 1/8// to read the directory on device 8. Select data files (option 1) and <RETURN>. You will see all data files on the diskette. Select "dif-budget" by keying its number and <RETURN>. You will be on screen 1.9. Press <RETURN> twice to read the DIF file on drive 8. The prompt "DIF file?(y/n)" will appear. Press Y. The next prompt is "saved by rows?(y/n)". Since it was, press Y. The next prompt is "are data sets rows?(y/n)". Since we want categories (rows) of income and expense to be charted, answer Y.

The next prompt is "data group names from 1st cell?(y/n)". Since we want the data group names to be Qtr 1, Qtr 2, etc, (1st cells (row) across top), answer Y. Then you will be asked "data set names from labels?(y/n)". Since CALC-RESULT doesn't put labels into DIF files, press N.

Finally, you are told the name of each data set CHARTPLOT encounters (the first is blank). The prompt is y:accept, n:bypass. Press N for the first. The next is "Sales APPLES". Press N again. Keep pressing N until "TOTAL Sales" appears. Then press Y, since that's one of the ones we want. Then you will have to select the data set in CHARTPLOT where it is to go. (use the default-1). Press <RETURN>. In the same way, select the other three data sets (All Direct Costs, Overheads and Net Profit) and put them into data sets 2,3 and 4. Then you must finish out the rows of data by pressing N to the rest of the data set prompts. The message "now reading rest of data" appears for about 15 seconds while the data is read in. You are then returned to the main menu. Since CHARTPLOT reads each row (dataset) completely, including the totals, you will have to delete the totals (go 1/2/ and select item 5 then key <-).

By now you should be able to manage chart specifications to create the results like DIF Example A and B in Appendix J (if not, there are specification files "dif-budget.a" and "dif-budget.b" on the diskette which you can read thru 3/9/.

The same DIF file may be used to prepare a sales mix comparison (stacked bar chart) shown in Example C. Simply start over with 1/4/ and read in the three sales lines (APPLES, ORANGES and BANANAS) as the data sets, then do a stacked bar presentation. ("dif-budget.c" is a spec file for

this if you're lazy).

Example D uses the same DIF file, but the data sets are not rows, they're columns (the quarters). Start by reading the DIF file again 1/9/, only specify the file was saved by rows but the data sets are NOT rows. The next prompt is "DATA GROUP NAMES FROM LABELS?(Y/N)". Since Calc-Result does not use labels, respond N. The next prompt asks if the data group names come from the first cell? Answer Y. Accept the four quarters of data into data sets 1-4 and bypass the year data set. Use 1/2/ and select option 0 (data group names) to shorten the names to a maximum of 11 characters so they will fit the vertical format. The spec file "dif-budget.d" will show the example.

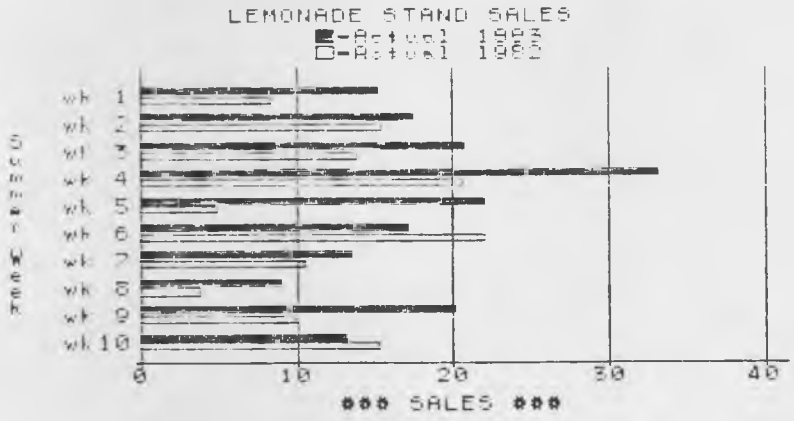
DATA REDUCTION TUTORIAL

This tutorial will let you use CHARTPLOT-64 to show the results of simple data reduction methods and help you learn how CHARTPLOT-64 works. If you haven't gone through the CHARTPLOT-64 TUTORIAL, you should do that first to gain familiarity with the menus and operation.

If you haven't already done so, load CHARTPLOT-64 into the computer.

DATA REDUCTION can be simply described as the steps taken to try and find the TRUTH in sets of numbers so the TRUTH can be used to predict the future. Measurements often contain small errors due to inaccuracy of measurement, or the data contains "noise" effects (such as the day to day variation in sales at a grocery store, even though the monthly sales levels may be pretty constant). The TRUTH is important because it can show us what's REALLY HAPPENING, so we can plan for the future.

The easiest data reduction methods involve data set arithmetic. In the CHARTPLOT-64 Tutorial you made a chart showing how the two years of lemonade stand sales compare. <<<<(Example 1)>>>>.



EXAMPLE 1

Even that chart didn't really help get at the TRUTH about how much we are ahead or behind last year's sales. What we need is a chart showing the percent this year is ahead or behind last year each week. Go 1/8/ and read the LEMONEX data sets into the computer (both Actual 83 and Actual 82). Also go 3/9/ and read the spec file in, then display the chart. To compute the percent change of 82 vs 83 we want to divide 83 data by 82 data to get the ratio, subtract the constant value one (1) from the ratio and the multiply by 100. We will put the results into data set 3. Do the following:

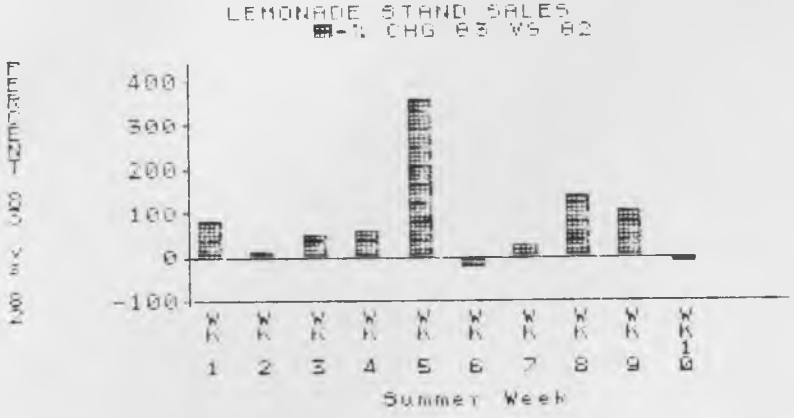
1/6/ (go to the calc/print menu)

1/4/ (Divide) : DS 3 (ratio) = DS 1 (Actual 83) divided by DS 2 (Actual 82).

1/2/ (Subtract) : DS 3 (ratio-1) = DS 3 (ratio) minus DS 0 (constant value 1)

1/3/ (Multiply) : DS 3 (percent vs 82) = DS 3 (ratio-1) times DS 0 (constant value 100)

6 (return to main menu)



EXAMPLE 2

Use 3/1/ to change chart type to VB and display sequence (show data set 3 only) and go 1/2/ to change the data set 3 name to "% chg 83 vs 82". Go 3/2/2/ and change the axis name to "PERCENT 83 vs 82", the min and max values to -100 and 400 to handle the range of values, the base value to 0 and the number of divisions to 5 and plot the chart <<<<(see Example 2)>>>>>. You may also want to change bar width, add lines etc.

If you have a printer attached, Go option 1/6/ to go to the calc print module, then take option 5 to print the data sets (all three). <<<<See Example 3>>>>. Note that the printout tries to align the data on four decimal places, but when the number of decimal places exceeds four, the decimal point has to "float" in the column. Select option 6 to return to the main menu.

pt #	data group name	Actual 1983 > x-value <	Actual 1982 > x-value <	% chg 83 vs 8: > x-value <
1	WK 1	15.2	8.4	80.952381
2	WK 2	17.35	15.45	12.2977347
3	WK 3	20.7	13.68	49.1354467
4	WK 4	33.15	20.6	80.9223301
5	WK 5	21.91	4.8	356.458333
6	WK 6	17.16	22	-22
7	WK 7	13.45	10.5	28.0952381
8	WK 8	8.92	3.71	140.431267
9	WK 9	20.11	9.85	104.162437
10	WK10	13.17	15.2	-13.3552632

EXAMPLE 3

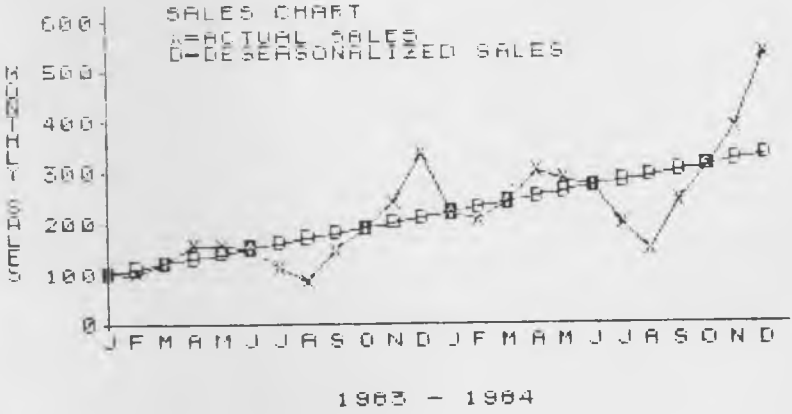
The data set calculations are set up so if one data set has fewer points than the other, the short data set is re-used. This allows you to setup a series of 12 monthly factors in one data set (say 2) and then divide several years of

monthly sales (data set 1) by those 12 factors. Look at the sales data in <<<<<(Example 4)>>>>> and the chart <<<<<(Example 5)>>>>>. There is obviously an uptrend, but how much? If we have accumulated the seasonal factors from several years or outside source (trade association seasonal factors for example), we could load these 12 values into a data set and then divide the actual sales by the seasonal factors to create a "deseasonalized" data set. When this is plotted - TRUTH! <<<<<(see example 6)>>>>>. PS-THE REAL WORLD IS SELDOM THIS GOOD!

pt #	data group name	ACTUAL SALES > x-value <	SEASONAL FAC > x-value <
1	J	100	1
2	F	99	.9
3	M	120	1
4	A	156	1.2
5	M	154	1.1
6	J	150	1
7	J	112	.7
8	A	85	.5
9	S	144	.8
10	O	190	1
11	N	240	1.2
12	D	336	1.6
13	J	220	0
14	F	207	0
15	M	240	0
16	A	300	0
17	M	286	0
18	J	270	0
19	J	196	0
20	A	145	0
21	S	240	0
22	O	310	0
23	N	384	0
24	D	528	0

EXAMPLE 4

EXAMPLE 5

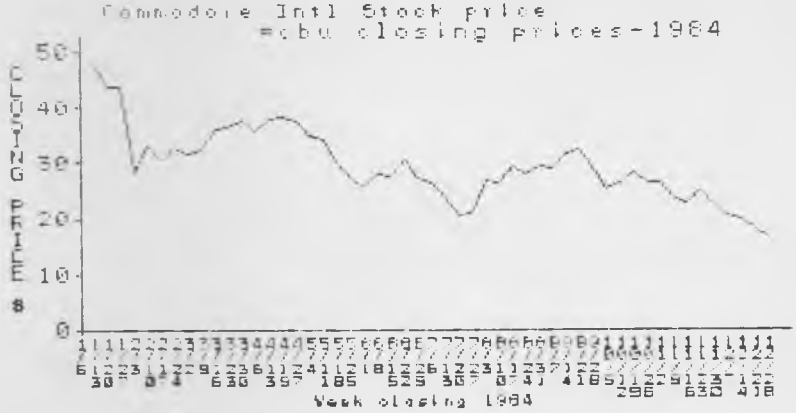


EXAMPLE 6

AVERAGES AND STANDARD DEVIATIONS

When we don't have a good set of indices to use to eliminate seasonal variations, we tend to use an average to cut out the variation and get at the underlying TRUTH. We may not realize it, but whenever we select an average we are assuming that the TRUTH does not have any trend in it--it's FLAT. BE VERY CAREFUL, since this can be a VERY BAD ASSUMPTION in many cases.

To demonstrate the average use, there is a data set on disk which has Commodore stock prices at the end of each week for all of 1984. The filename is CBU WEEKLY. Restart CHARTPLOT with 4 data sets of 55 each (default) by going to menu option 1/4/. Then read the data set into memory (and the data group names). There is a spec file with the same name to make the charting easy. These prices can be charted <<<<(example 7)>>>> if you turn the data group names vertical on the bottom and select no character for the line symbol 3/3/1/.



EXAMPLE 7

To compute and display the average, go to 1/6/ to select the calc/print module. Then go 2/ and select the price data set (1) to be averaged. Note that the total, average and standard deviation is shown.

Look at these values for a minute:

TOTAL X = 1552 This is the total of all 52 closing prices for the year.

AVG X = 29.8461539 This is the average, calculated by dividing 1552 by 52.

STD DEV X = 6.78984033 This is the standard deviation, which is a statistical measure of the spread of the data points above and below the average. In most cases, the average plus and minus one standard deviation (29.85 + 6.79 = 36.64 and 29.85 - 6.79 = 23.06) contain 68% of all the data points. The average plus two standard deviations usually contains 95% of the data points. A frequent use of standard deviation of sales is to determine how much inventory to carry. If you know you sell an average of 20 units every week and it takes one week to receive stock, and your standard deviation of sales is 5 units, then you know that 2/3 of the time (68%) your sales will not be more than 25 nor less than 15. If you stock 25, you should have enough to prevent stockouts 2/3 of the time (actually it will be 84% because you won't stockout if your sales are lower than 15 either).

So in this example (Commodore stock prices) we know that 2/3 of the time it should fall between 23.06 and 36.64. Actually it is 69.2%

Since the computer is most useful because it lets you SEE this, do the following:

To continue with the AVERAGE function, the next prompt asks you which line should contain the average. Press <RETURN> to accept the default (1). Then press <RETURN> to accept the default for the line type (S) and the color (1=black).

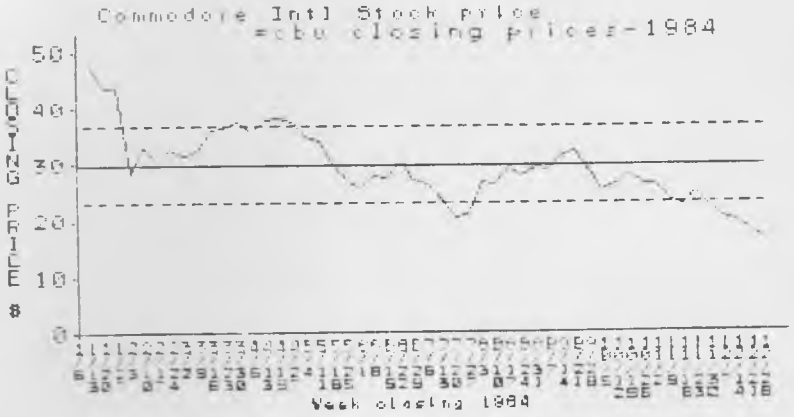
The next prompt is for the number of standard deviations you want to see above and below the average. Press <RETURN> to accept the default (1).

The next prompt asks you for the line number where the average + 1 standard deviation is to go. Press <RETURN> to accept the default (2). Next set this line to a dashed line (key a cursor right and the letter D at the TYPE prompt). Select color 2 and press <RETURN>.

Do the same for the other line (average - 1 standard deviation).

Now go back to the main menu [6] and then plot the chart.

(main menu option 2). See <<<<example 8>>>>.



EXAMPLE 8

To further understand the lines, go 3/5/ and select line 1 (the average). See that the average value is shown at both ends of the line. In the same way examine line 2 and 3 and see the values of the average plus and minus one std deviation.

Press F7 key to show the chart again. Notice how this IS NOT a good forecast for the future since it assumes no trend? In fact, the next week end price was 17.75!

LEAST-SQUARES LINE

A technique which is better than the average is a least-squares line computation. This technique finds the line which fits in between a set of data points so that the total of the squares of the distance between each point and the line is minimized. There are other methods but this is most popular. The big advantage is that this line will slope and should pick up any trend in the data which the simple average will not do. Just as with the average, all you have to do is to go 1/6/, then take option [3], select the data set of the data and specify the types of the three lines. Do it now, but stop before selecting the line options.

The screen shows all of the intermediate values computed in the process of determining the regression line. They stand for:

TX,TY - the total of X and Y values

XX, YY, XY - the totals of X squared, Y squared and X*Y

XB, YB - the average of X and Y

CV - covariance between X and YCR - coefficient of correlation between X and Y (0 means no correlation, -1 or +1 is perfect correlation)

SY - Residual variance of the line with the y-values in the data

YI - Y-intercept of the least-squares line

SL - slope of the least-squares line

As mentioned above, for one-dimensional data like this, the data point number (1-52) is used as the x-coordinate of the data.

TX = 1378 (the total of the x values, 1 through 52)

TY = 1552 (the sum of the y values, like we had in the average)

XX = 48230 (the sum of each of the numbers 1-52 squared)

YY = 48718.5313 (the sum of the squares of the y values - the prices)

XY = 36915.25 (the sum of the product of x and y for each data point)

XB = 26.5 (the average of the x values (1-52))

YB = 29.28461539 (the average of the y values, -agrees with the average example

CR = -.795005951 (the correlation coefficient -pretty good - it's negative because the data doesn't go up as you increase x (go right), it goes down)

SY = 4.11872824 (the residual variance - the deviations in y are not explained by the regression line. Note that this is considerably smaller than the std. deviation in the average case (6.79). This means that the regression line is a better predictor of the data. As with the standard deviation, it means that 68% of the time the data will be within 4.12 of the regression line.

YI = 39.3772625 (the Y-intercept of the regression line [where the line crosses the vertical axis when the x point is 0]).

SL = -.359664475 (the slope of the regression line). These two values allow the system and you to compute the y value of the regression line at any x point as follows:

Y = X * SL + YI

Y = X * -.36 + 39.38

if X = 1 then Y = -.36 + 39.38 which is 39.02

if X = 52 then Y = 52 * (-.36) + 39.38 which is 20.66

Now continue with lines. The regression calculations select lines 4, 5 and 6 as defaults. Put the regression line into line 4, and make it solid black, and put the residual variance in lines 5 & 6 and make them dashed lines. Go back to the main menu [6] and then select option 2 to show the chart. Notice how the regression line more clearly picked up the trend (TRUTH). This could be used to forecast where the stock price would be in the near future, based purely on the past. (You must judge whether the past is a good predictor of the future). You extend the line for future periods:

If X = 53 then Y = -.36 * 53 + 39.38 which is 20.3 (vs actual price of 17.75 for the next week).

You can see the line values by displaying the values of line 4 (go 3/5/). The value at the left side (point 1) is 39.017598 and the value at the right side (point 52) is 20.6747097.

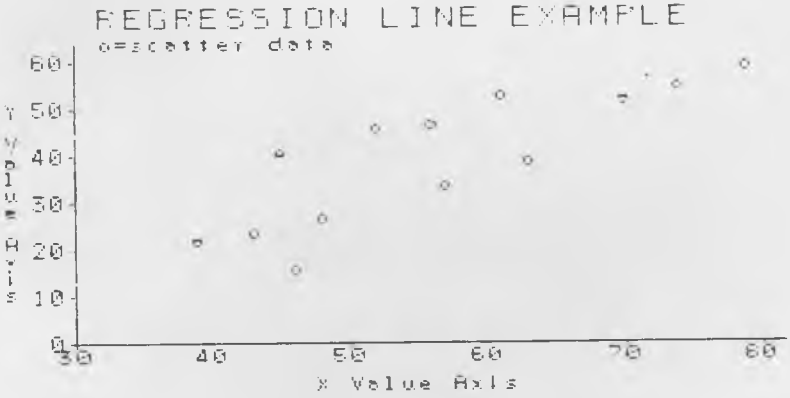
BE CAREFUL, these lines are computed from a data set and will not change automatically if data is added or changed in the data set. To recompute, simply go 1/6/3/ and select the data set. You will have to specify the number of std dev or residual variances (it is not saved), but can then take defaults through the lines.

TWO DIMENSIONAL DATA

The least-squares line is the only method really suitable for the x-y plotting mode. As an example, go 1/4/ and reset data sets. Read in the file "X-Y REGR" (one data set and group names). Go 3/9/ and read in the specifications with the same name. This is an x-y chart. Go 2/ to draw the chart. See <<<<(example 9)>>>>. This is a scatter diagram of 13 x,y pairs of points. What is the line which best fits the data?

Go 1/6/ and then take option 3 and select data set 1 as input. Make the regression line solid and the +/- 1 residual

variance lines dashed and then go back 6/. Now plot the chart. It should look like <<<<(example 10)>>>>. (Note that 8 of the 13 points (61%) are within the residual variance lines).



EXAMPLE 9

The biggest limitation with least-square lines is that the line is straight. There are techniques which try to fit curved lines through data but are beyond the scope of this program and tutorial. An alternative method which is easy to use and gives very good results with one-dimensional data is exponential smoothing.

EXPONENTIAL SMOOTHING

This is a data reduction technique which eliminates the random variation in a set of numbers to get at the TRUTH hidden under those numbers. To understand how it works, let's first understand weighting factors.

In the simple averaging process of all of the data, each number gets the same weight. If you had two years of monthly sales data, each month contributes 1/24 to the average. If you add another month, the new month (as well as each of the other 24 months) contributes 1/25 of the average, and so on. While this may be easy to calculate, it is poor as a base for forecasting the future since it doesn't put any more value on recent information than sales data that is two years old! It actually gives less and less weight to current information (1/25 instead of 1/24, etc).

One way people improve on this is to use a moving average. Here you decide that 12 months is as far back as you care about. So compute the average of the last twelve months. Note each of these now counts for 1/12 of the average - DOUBLE the weight it had before. Also - note that all information more than 12 months old is completely ignored. Now when a new month's sales data is available, you discard the oldest and only use the prior 11 months plus the latest. Note that each of the last 11 months has the same weight as before (1/12) and the new month is weighted 1/12.

This is clearly better than the simple average. (Incidentally, by using a 12 month span, the month-to-month effects of annual seasonal variations are cancelled out.)

The problem remains that the most recent month is given no more weight than data 12 months ago. A way to solve this is to reduce the number of months in your moving average, but if you reduce it to say 4, then the average will probably jump around too much to be reliable.

Some years ago in the early dawn of the computer age, exponential smoothing was developed. It's easy to compute and has the great advantage that the weighting for each month gets less and less as the months get older. For example, if the current month has a weight of 1, then the prior month has a weight of .85. The one prior to that is nicely to reality where the most recent data is the most important. The speed at which the data is ignored is controlled by a smoothing factor (.15 in the example above

corresponds roughly to a 12 month moving average). A value of .9 would consider the current month data only and ignore the past almost completely.

The formula is: Current smoothed value = (smoothing constant * current month value) + ((1-smoothing constant) * last month smoothed value).

Using 100 as the old smoothed value, 121 for the new value and .15 for smoothing constant, the formula works out to:

new smoothed value = (.15 * 121) + (.85 * 100)

which equals 103.15, up from 100 the prior month

If sales were 115 the following month, the value would be:

new smoothed value = (.15 * 115) + (.85 * 103.15)

which equals 104.93

So, while sales went from a 100 average to 121 then 115, our smoothed sales level went from 100 to 103.1 to 104.9

If you want a more responsive smoothing, use .25 as the smoothing factor. Then the results become 105.25 and 107.65.

The choice of a smoothing factor value is not "cut and dried", it's up to you to JUDGE which seems to work best. Often the only way is to try several and see which "seems most comfortable".

The trend can be computed as the change between last month's smoothed value and this month's smoothed value. The variations in the trend can be reduced by exponential smoothing also. The smoothing factor for the trend is separate from the one for the data so they may be different (although you USUALLY have them the same).

Since the objective is to get at the TRUTH, we want to eliminate any errors due to the exponential smoothing and trend calculation methods. The only problem is that if a sudden real jump in the data occurs, the system will lag behind. The solution is to multiply the trend by a factor and add it to the simple smoothed value to correct for the trend lag. This is called trend-adjusted smoothing.

See <<<<(example 11)>>>>. Note how the line for the trend-adjusted smoothing rises faster (and actually overshoots slightly) than the step function. The factor used to multiply times the trend is usually:

[(1- trend smoothing factor)/trend smoothing factor]

If the smoothing factor is .2 (in the example to follow) then the multiplier is (1-.2)/.2 or .8/.2 or 4.

To see this in action, reload the Commodore stock price data. Restart CHARTPLOT with 4 data sets of 55 each (default) by going to menu option 1/4/. Then read the data file CBU WEEKLY into memory (and the data group names). There is a spec file with the same name to make the charting easy. Read it into memory through menu option 3/9/. Draw the chart (option 2) to confirm that it is loaded correctly.

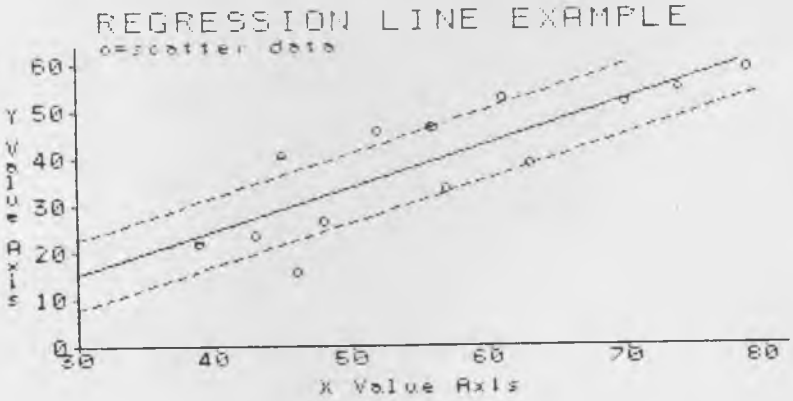
Go 1/6/ and then select option 4 to smooth this data. Select data 1 (price data) as the FROM data set and then put the smoothed results into data set 2, the trend into data set 3 and the trend-adjusted values into data set 4.

Use 40 as the starting value for the data smoothing and 0 for the initial trend (these only need to be fairly good, since the real data overwhelms these values quickly).

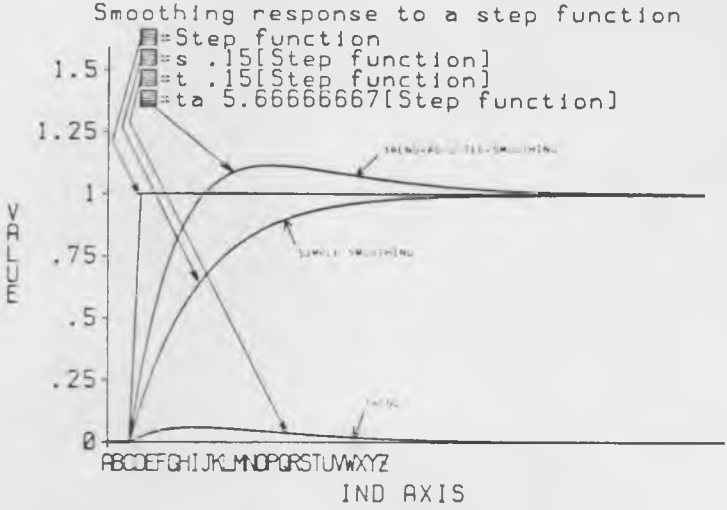
Use .2 as the smoothing factor for the data, .2 as the smoothing factor for the trend and the default value (4) for the trend adjustment. Select option 6 to return to the main menu.

Go 3/1/ and select data sets 1,2,3 for plotting (you will have to adjust the dependent axis to min of -10 and the number of divisions to -6 since the trend goes negative). Also change the plotting characters to nulls <<<<<(**see example 12**)>>>>>. Note that the trend only moves slightly. If you wanted to highlight it you could multiply it by 10.

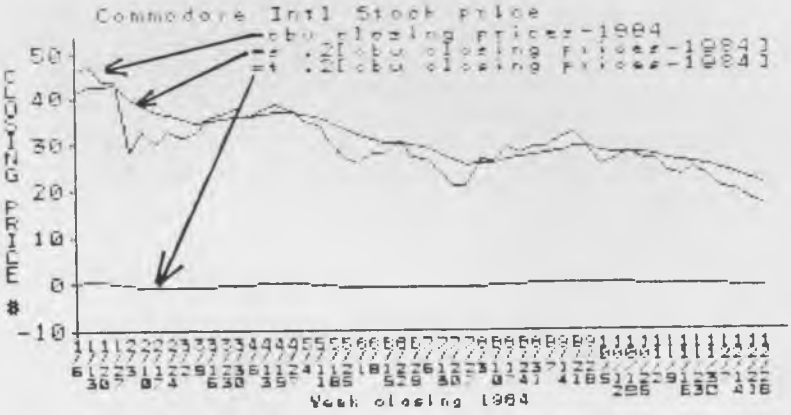
Note the names and the fact that the curve now follows the data and gives us a hint at the TRUTH, the way the price will move in the short term future.



EXAMPLE 10



EXAMPLE 11

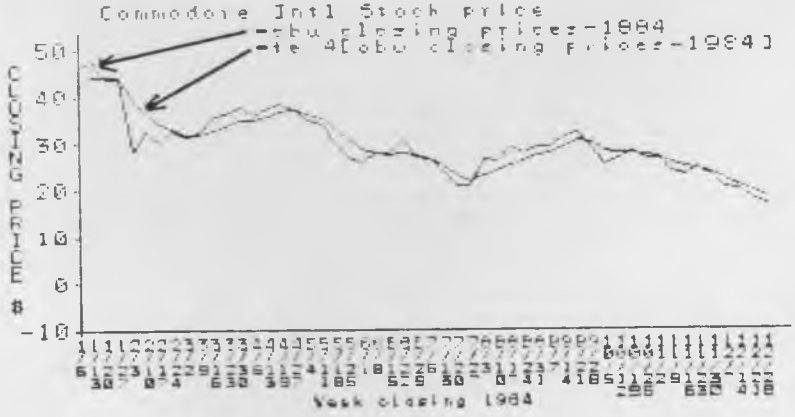


EXAMPLE 12

Go to 3/1/ and change the display sequence to 1 (raw prices) and data set 4 (trend-adjusted) <<<<(see example 13)>>>>>. Compare the simple smoothing from example 12 with the new trend-adjusted smoothing.

These techniques provide good values as predictors of the future if the "environment" does not change. For example, the Commodore price next week will most probably be the price predicted by extending the current trend line and the current smoothed price as long as nothing else in the computer or stock market changes materially. To see this, print out the data sets (all 4). The price in the next week would be estimated by extending the smoothed value of data set 4 (18.16) by one trend (-.7589). The sum is 17.40 against the actual 17.75!!!

Don't get too excited yet, these methods only know what's in the numbers and NOTHING about the outside world. If for example, ATARI announces a new computer, Commodore's stock price may change in a way that neither exponential smoothing nor least squares or averaging can predict. The trick in forecasting well is to use the techniques included here to determine the current fundamental levels and trends and then factor those values by good information and even "hunches" by other external factors which may occur.



EXAMPLE 13

APPENDIX A

CONFIGURATIONS TESTED

CHARTPLOT was developed and tested using a number of plotters and printers. The details of the configurations and wiring are given as examples, but do not imply any recommendation or endorsement.

PLOTTERS

```
Plotter:           Amdek DXY-100
Interface type:    Serial
Interface device:  Cardco '64 to Centronics model 'A'
Plotter Sec Addr:  0
Plotter Xlate:     N

Plotter:           Roland DXY-800 (8 pen, auto pen chg)
Interface type:    Serial
  Bit select:      7
  Speed select:    H
Interface:         Cardco '64 to Centronics model 'A'
Plotter Sec Addr:  0
Plotter Xlate:     N

Plotter:           Enter Sweet 'P
Interface type:    Serial
Interface device:  Cardco '64 to Centronics model 'A'
Plotter Sec Addr:  0
Plotter Xlate:     N

Plotter:           Hewlett-Packard 7470 A (2 pens)
Interface type:    RS-232
  Bit switches:    on-S1, US, B3, B1
  Speed:           300 baud
  Parity:          Even
  Duplex:          Half
  Stop bits:       1
  Word size:       7 bits

Interface device   DATA20
  Hold off:        XON/XOFF
  Connections:     Plotter pin    DATA20 pin
                      7              7
                      2              2
                      3              3
```

```
Interface device  DATA20
  Hold off:       DTR
  Connections:    Plotter pin    DATA20 pin
                     7             7
                     3             3
                    20            11 (must bypass inverter
                                      or go right to
                                      '64 User Port pin K)

Interface device  Commodore VIC 1011A
  Hold off:       XON/XOFF
  Connections:    Plotter pin    VIC 1011A pin
                     7             7
                     2             3
                     3             2

Interface device  Commodore VIC 1011A
  Hold off:       DTR
  Connections:    Plotter pin    VIC 1011A pin
                     7             7
                     3             2
                    20             5 and 6

Plotter:          Houston Instruments DMP-40 (B & L)
Plotter:          Houston Instruments PC-695
Interface type:   RS-232
  Bit switches:   none
  Speed:          2400 baud
  Parity:         None
  Duplex:         Half
  Stop bits:      2
  Word size:      8 bits

Interface device  DATA20
  Hold off:       XON/XOFF
  Connections:    Plotter pin    DATA20 pin
                     7             7
                     2             2
                     3             3

Interface device  DATA20
  Hold off:       DTR
  Connections:    Plotter pin    DATA20 pin
                     7             7
                     3             3
                    20            11 (must bypass inverter
                                      or go right to
                                      '64 User Port pin K)

Interface device  Commodore VIC 1011A
  Hold off:       XON/XOFF
  Connections:    Plotter pin    VIC 1011A pin
                     7             7
                     2             3
                     3             2
```

```
Interface device  Commodore VIC 1011A
  Hold off:       DTR
  Connections:    Plotter pin     VIC 1011A pin
                     7               7
                     3               2
                    20               5 and 6

Plotter:          Strobe 200
Plotter:          Strobe 260
Interface type:   RS-232
  Switches:       no parity
  Speed:          1200 baud
  Parity:         None
  Duplex:         Half
  Stop bits:      1
  Word size:      8 bits

Interface device  DATA20
  Hold off:       XON/XOFF
  Connections:    Plotter pin     DATA20 pin
                     7               7
                     2               2
                     3               3

Interface device  DATA20
  Hold off:       DTR
  Connections:    Plotter pin     DATA20 pin
                     7               7
                     3               3
                    20              11 (must bypass inverter
                                        or go right to
                                        '64 User Port pin K)

Interface device  Commodore VIC 1011A
  Hold off:       XON/XOFF
  Connections:    Plotter pin     VIC 1011A pin
                     7               7
                     2               3
                     3               2

Interface device  Commodore VIC 1011A
  Hold off:       DTR
  Connections:    Plotter pin     VIC 1011A pin
                     7               7
                     3               2
                    20               5 and 6
```

Plotter: PENMAN GR 1500
Interface type: RS-232
  Switches: no parity
  Speed: 1200 baud
  Parity: None
  Duplex: Half
  Stop bits: 1
  Word size: 8 bits

Interface device DATA20
  Hold off: XON/XOFF
  Connections:

Plotter pin	DATA20 pin
7	7
2	2
3	3

Interface device DATA20
  Hold off: DTR
  Connections:

Plotter pin	DATA20 pin
7	7
3	3
20	11 (must bypass inverter or go right to '64 User Port pin K)

Interface device Commodore VIC 1011A
  Hold off: XON/XOFF
  Connections:

Plotter pin	VIC 1011A pin
7	7
2	3
3	2

Interface device Commodore VIC 1011A
  Hold off: DTR
  Connections:

Plotter pin	VIC 1011A pin
7	7
3	2
20	5 and 6

Plotter: SILVER REED Color Pen Graph EB50
Interface type: Serial
Interface device: Cardco '64 to Centronics 'A
Plotter Sec Addr: 0
Plotter Xlate: N

PRINTERS

Printer: Commodore 1525
Interface: none needed

Printer: Commodore 1526
Interface: none needed

Printer: Okimate 10 [black & white]
Interface: none needed

Printer: Epson FX-80

Printer: Epson MX-80

Printer: Epson Mx-100

Printer: C Itoh Prowriter 8510

Printer: Siemens PT/88

Printer: Star Gemini 10

Printer: Star Gemini 15

Printer: Okidata Microline 92

All work with:
Interface device: Cardco '64 to Centronics model 'A'
Printer Sec Addr: 5
Printer Xlate: N

Interface device: ECX Inc C-6401
switches: all 3 on
Sec Addr: 0
Printer Xlate: N

Interface device: Microworld Electronics MW-302
switches: on-3 & 4
Sec Addr: 0
Printer Xlate: Y

Interface device: Microworld Electronics MW-302
switches: on-3
Sec Addr: 0
Printer Xlate: N

Interface device: MSD INC. CPI
switches: on-1,3,5
Sec Addr: 0
Printer Xlate: N

APPENDIX B

CHARTPLOT ERROR MESSAGES

When the plotting or other modules of CHARTPLOT encounter commands with invalid parameters, error messages written on the screen. These are given below. They are usually accompanied by a BASIC message: ?syntax error in-(line number). The protection system of CHARTPLOT does not allow listing of the BASIC plotting program, but the explanation of the errors should give clues as to what needs to be changed.

BARS TOO WIDE occurs when the width of the bars and spaces between the bars exceeds the display area. When this occurs, press <RETURN> and then go to menu 3/3/3/ to change the width factors.

DISKETTE ERRORS occur during diskette operations. The error number, message, track and sector are shown. The only message not shown is number 63 FILE EXISTS. When this occurs, it handled by asking you if you want to replace the file or not.

> MAX-RESIZE occurs when trying to put a data point into the computer which exceeds the size of the arrays set up. If the data must be read in, go 1/4/ to adjust the size, but beware that ALL OF THE DATA IN MEMORY WILL BE ERASED during the resizing process.

TOO LONG-REINPUT is shown when the length of a data group name exceeds 9 characters. Abbreviate the name and re-enter.

NO 2-DIM PIE occurs when attempting to display a pie chart and the data is two-dimensional. Either select a different chart type (X) or use the global data specs option (1.5) to change the data to one-dimensional. **OUTSIDE RANGE** occurs when the base value selected on screen 3/2/2/ is outside of the min-max range at the time. Enter a number within the range.

OUT OF RANGE occurs when selecting a data set outside of the range of numbers currently in the computer.

INCREASE DATA SET SIZE TO nn occurs when reading data sets from diskette which have more points than setup in the computer. The data set size may be changed by option 1/4/, but all data in the computer will be erased.

BOTH CONSTANTS! occurs if you specify constants for both A and B data sets in the data set calculation function. Press <RETURN> and you can reselect the A and B data sets.

I/O ERRORS

The plotter and printer modules give bit details of the error byte:

```
RS232 modules- i 76543210
                1------- BREAK DETECTED
                ------1- FRAMING ERROR
                -------1 PARITY ERROR

SERIAL I/O     o 1------- DEVICE NOT PRESENT
                -1------ EOI LINE
                ------1- TIMEOUT READ
                -------1 TIMEOUT WRITE
```

OTHER BASIC ERRORS - Should you encounter any BASIC errors when using CHARTPLOT-64, you can recover without losing any data by typing GOTO 5 and pressing <RETURN>.

APPENDIX C

COLOR NUMBER TABLE

COLOR NUMBER	COLOR
1	BLACK
2	WHITE
3	RED
4	CYAN
5	PURPLE
6	GREEN
7	BLUE
8	YELLOW
9	ORANGE
10	BROWN
11	LIGHT RED
12	DARK GRAY
13	MEDIUM GRAY
14	LIGHT GREEN
15	LIGHT BLUE
16	LIGHT GRAY

APPENDIX D

CHARTPLOT-64 FILES

DATA FILES

Data files written and read by CHARTPLOT are standard Commodore sequential files. The data is in the following sequence: (N=numeric data, $=string data in quotes)

```
N  1    The number of data sets in the file.
N  2    The maximum number of points in any data set.

For each data set:

N  1    The number of points in the data set.
$  2    The data set name (in quotes).
N  3    The x/y pairs of data values (for one-dim data
        the y values are 0).

After the last data set:

$  1    The data group names (in quotes).
```

CHARTPLOT SPECIFICATION FILES

CHARTPLOT specification files are standard Commodore sequential files. The diskette file label has '.S' as the first two characters.

```
N   1   Background screen color code
N   2   Border color code
N   3   Independent axis number of divisions
N   4   Dependent axis number of divisions
N   5   X-position of lower left graph rectangle
N   6   Y-position of lower left graph rectangle
N   7   Independent axis color code
N   8   Dependent axis color code
N   9   Character set code (1-4)
N  10   Printer device number
N  11   Bar width
N  12   Bar spacing
N  13   Chart title X-coordinate
N  14   Chart title Y-coordinate
N  15   Chart title color code
N  16   Auto incr starting number
N  17   Auto incr increment
N  18   Group code selection
N  19   Starting number
N  20   Number of active data sets
N  21   Max number of points any data set
N  22   Min X-value (ind axis)
N  23   Min Y-value (dep axis min)
N  24   Max X-value (ind axis)
```

```
N  25   Max Y-value (dep axis)
N  26   Number of data sets to be selected for display
N  27   Pie chart line fill separation
        (minus if no % shown)
N  28   Data set legend X-coord
N  29   Data set legend Y-coord
N  30   Y-position of upper right graph rectangle
N  31   X-position of upper right graph rectangle
N  32   Group name switch 0=horiz, 1=vert
N  33   Bar chart base value
N  34   Log switch-independent axis (0=norm, 1=log)
N  35   Log switch-dependent axis (0=norm, 1=log)
N  36   Chart width in .1 mm units
N  37   Chart height in .1 mm units
N  38   Default character size-1
N  39   Offset x origin in .1mm units
N  40   Offset Y origin in .1mm units
$  41   Chart type
$  42   Dependent axis legend
$  43   Independent axis legend
$  44   Bar grouping (M,G or S)
$  45   Chart title
$  46   Two dimension (Y or N)
$  47   Automatic numbering (Y or N or null)

For each active data set:

$  48   Line type (S, D or N)
$  49   Not used
$  50   Plotting character
N  51   Line color code
N  52   Bar filling code
N  53   Bar filling spacing

For the maximum number of data points

$  54   Data group names

For the six additional chart lines

$  55   Line type (S, D or null)
N  56   Line color code
N  57   End point x-value
N  58   End point Y-value
N  59   Other end point x-value
N  60   Other end point y-value

For the maximum number of data sets

N  61   Data set numbers in display sequence
```

CHARTPLOT CONFIGURATION FILE

The CHARTPLOT configurator program (CONFIGER) creates a one-record file which is read by CHARTPLOT to select modules and parameter values. Although the filename may be anything (you must enter it at the time the program is loaded, filenames beginning with "C." are suggested to avoid filename conflicts with other files on disk.

```
N    1   Secondary address for printer file open
N    2   '64-ASCII printer translate byte (0 or 32)
N    3   Plotter device number (serial only)
N    4   Secondary address for serial plotter file open
N    5   RS-232 file open Control Register
N    6   RS-232 file open Command Register
N    7   '64-ASCII plotter translate byte (0 or 32)
N 8-15   Pen numbers corresponding to screen colors 1-8
$    16   Plotter command generator module
         (Z.PRTN n) n=plotter type #
$    17   Plotter screen character set (Z.CHRS n)
$    18   Plotter command codes module (Z.CMD n)
$    19   Plotter I/O module
$    20   Printer dump module
$    21   CHARTPLOT main module (Z.MAIN)
```

APPENDIX E

DIF FILE REFERENCE

The DIF file reading routines in CHARTPLOT-64 are in accordance with the DIFfile standard (see references below).

The file consists of a header section and the data section.

HEADER SECTION

The header section consists of a number of items describing the data organization. Each item in the header consists of four fields:

$	1	Topic (such as "TABLE" or "LABEL")
N	2	Vector number (when describing a column)
N	3	Value (such as the number of columns or rows in the data)
$	4	The column heading or string data associated with the item.

Note that these are written in BASIC in three print statements:
Print T$ (topic)
Print V1,V2 (the two fields vector # and value)
Print C$ (the string data)

Heading topics recognized by CHARTPLOT are:

TABLE (the title of the worksheet)

VECTORS (the number of columns)

TUPLES (the number of rows)

LABEL (the column headings)
Note-the DIF standard allows for multiple-line labels, but CHARTPLOT only reads one-line labels

DATA (signals end of heading section)

Any other topics in the heading section are ignored.

DATA SECTION

Each item in the data section consists of three fields describing one "cell" of the worksheet:

```
N   1   Type indicator (0=numeric data, 1=string data,
        -1=Beginning Of Tuple (BOT)
           or End Of Data (EOD) marker)
N   2   Numeric value of the data item (if type = 0)
$   3   String value (if data type =1)
```

Note that these are written in BASIC in two print statements:

```
Print V1,V2 (the two fields-type and value)
Print C$ (the string data)
```

In the data section, CHARTPLOT recognizes BOT, EOD and data value items only.

DIF FILE REFERENCES:
DIF: A FORMAT FOR DATA EXCHANGE BETWEEN APPLICATIONS PROGRAMS
BYTE Magazine November 1981 pp174+
Candace E. Kalish & Malinda F. Mayer
DIF Clearinghouse
POB 527
Cambridge, MA 02139

THE DIF FILE
for users of VisiCalc and other software
Donald H. Beil
Reston Publishing Company, Inc.
Reston, VA

APPENDIX F

HOW DOES CHARTPLOT WORK?

CHARTPLOT consists of a large number of 6502 assembly language programs which manage the graphics screen display, dumping the graphics screen to the printer thus saving and restoring the graphics screen to disk. These programs (routines) are executed through special keywords added to Commodore-64 BASIC. There is also a very large BASIC program (25K) which displays menus, saves and manages all data points and chart text and specifications. In normal mode, the BASIC program computes where to display a line or legend and then issues a special graphic command. The result of the command is usually a line or character on the screen. Another special command turns on plotter output and thereafter the graphic commands result in plotter commands being issued. Since the command structure of almost every plotter is different, the commands are issued by a module which is created for each plotter. The module also takes care of size conversions when necessary. This allows the BASIC program to be plotter device and interface independent.

APPENDIX G

FILE CONVERSION PROGRAM

To use information from Busicalc 1 or Multiplan spreadsheets in CHARTPLOT-64, the file conversion program included must be used first. The steps are as follows. Save the calculated data in Busicalc, using a filename starting with "!" (this saves the calculated values, not the formulae).

or

Save the data in Multiplan using the SYLK option.

Remove the diskette with the data from the drive.

Insert the Chartplot-64 diskette into the disk drive.

Type LOAD"FILE CONVERSION",8

Type RUN

You will be asked for the number of data sets and the maximum number of points (just like screen 1.4). Take the default values or change them and press <RETURN>.

Select the input device number by accepting the default (8) or changing it and press <RETURN>.

Key the data file name and press <RETURN>.

Press D for DIF file, S for SYLK file or B for Busicalc file. (DIF is included for CHARTPLOT-64 users)

You will be asked questions depending on the type of file:

DIF file reading is the same as described in menu 1.9. After the data has been processed you will get the prompt to select the output device number (default is same as input). Next you will be asked for the filename of the output file (default is same name). You should key a different name so that the original data will not be destroyed.

The DIF file data will be saved to disk in CHARTPLOT-64 format.

Then load CHARTPLOT-64 and read the data file just written.

SYLK files are read into a large array. The actual SYLK records are displayed on the screen as read. After all records have been read, the message "done reading" appears. The next prompt asks if data sets are rows. If so, press Y, otherwise press N. Next you specify the name column number and row numbers (these are used for data set and data group names). Next you must specify the first and last data

columns and first and last data rows (the rectangle containing the data values).

Next you are asked to select the data sets and the data set numbers into which they are placed. After the data has been processed you will get the prompt to select the output device number (default is same as input).

Next you will be asked for the filename of the output file (default is same name). You should key a different name so that the original data will not be destroyed.

The spreadsheet data will be saved to disk in CHARTPLOT-64 format.

Then load CHARTPLOT-64 and read the data file just written.

Busicalc file prompts start with "are data sets rows? (y/n). Press Y if you want the rows to be data sets, else press N.

Next you must select if the data group names are to come from the first col or row. Next you are asked how many of data columns are to be used. Last you are prompted for each data set (showing the column or row number from the original sheet).

After the data has been processed you will get the prompt to select the output device number (default is same as input). Next you will be asked for the filename of the output file (default is same name). You should key a different name so that the original data will not be destroyed.

The Busicalc 1 spreadsheet data will be saved to disk in CHARTPLOT-64 format.

Then load CHARTPLOT-64 and read the data file just written.

APPENDIX H

PLOTTER COMMANDS

If your plotter is not one of the six included in the configurator, there is a good chance that its command set is similar to one which is. The plotter commands issued by CHARTPLOT-64 are:

	AMDEK/ROLAND	SWEET 'P	H-P 7470A
Initialize:	H	HO;	Chr$(27).I250;;17: Chr$(27).N;19: IN;SC0,2500,0,1838;PU;
Pen change n:	Jn	HO; (no pen chg)	SPn;
Home:	H	HO;	PAPU0,0;
Move to x,y:	Mx,y	MAx,y;	PAPUx,y;
Draw to x,y:	Dx,y	DAx,y;	PDx,y;
Size (char) n:	Sn	CSn;	SIa,b; (a,b are dimensions)
Write string 0$:	P0$	TX0$;	LB0chr(3)

	H-I DP-40 H-I PC 595&695	STROBE 200 STROBE 260	PENMAN GR1500
Initialize: (see Note *1)	;:HA ECM IN;PU;	Chr$(27).1	I W1,HA
Pen change n:	Pn	HO; (home)	Pn,
Home:	HA	HO;	H,
Move to x,y:	Ux,y	PUPAx,y;	U Mx,y,
Draw to x,y:	Dx,y	PDPAx,y;	D Dx,y,
Size (char)n:	(size in label cmd)	SIn;	not used
Write string 0$: (ss=size-1 to 4+)	SlssOchr(95)	LB0$;	LO$

*1 Note about H-I DP-40 plot scaling- The ECM command in the initialization resets the scaling box. To use scaling, select the auto penchange = No on screen 6. When the first pen change prompt appears, set the scaling box. Be sure to put pen at lower left corner before proceeding.

	SILVER REED EB50 REGULAR	SILVER REED EB50 LARGE
Initialize:	I	M 0,-270 I
Penchange:	Cn	Cn
Home:	H	H
Move to x,y:	M x,y	M x,y
Draw to x,y:	D x,y	D x,y
Write String O$:	Internal Conversion	to move/draw

APPENDIX I

DIF FILE EXAMPLE

SPREADSHEET

APPENDIX J

COMPATIBILITY WITH CHARTPAK-64 & CHARTPLOT-64 first version

CHARTPAK-64 data files are exactly the same as CHARTPLOT-64 data files, so you can simply read them in under menu option 1.8 or 1.9. The CHARTPAK-64 specification files cannot really be used, it will be necessary to use the 3 menu options to recreate the specifications.

This version of CHARTPLOT-64 has identical data files to the first version. The spec files from version 1 can be read by this program. There are only two changes needed to get a proper chart displayed and plotted:

3/5/ to fix the lines. You will need to select line 4 and turn it off (change type to "") instead of "s".

If you chose to change the display sequence (3.1) on the chart you will have to reenter the changed sequence.

If you want to change the colors to make them similar to the current colors (black on white), you will have to change a number of the specs to get a good plot on the screen and plotter:

3/2/1/ Independent axis - change color to black (1) or other dark color.

3/2/2/ Dependent axis - ditto

If a line chart, go 3/3/1/ and change the line colors to black (1) or other dark color

3/3/2/ Change screen color to white (2) and border color to 14.

If a bar chart, got 3/3/3/ and change the bar colors and fill colors to black (1) or other dark color.

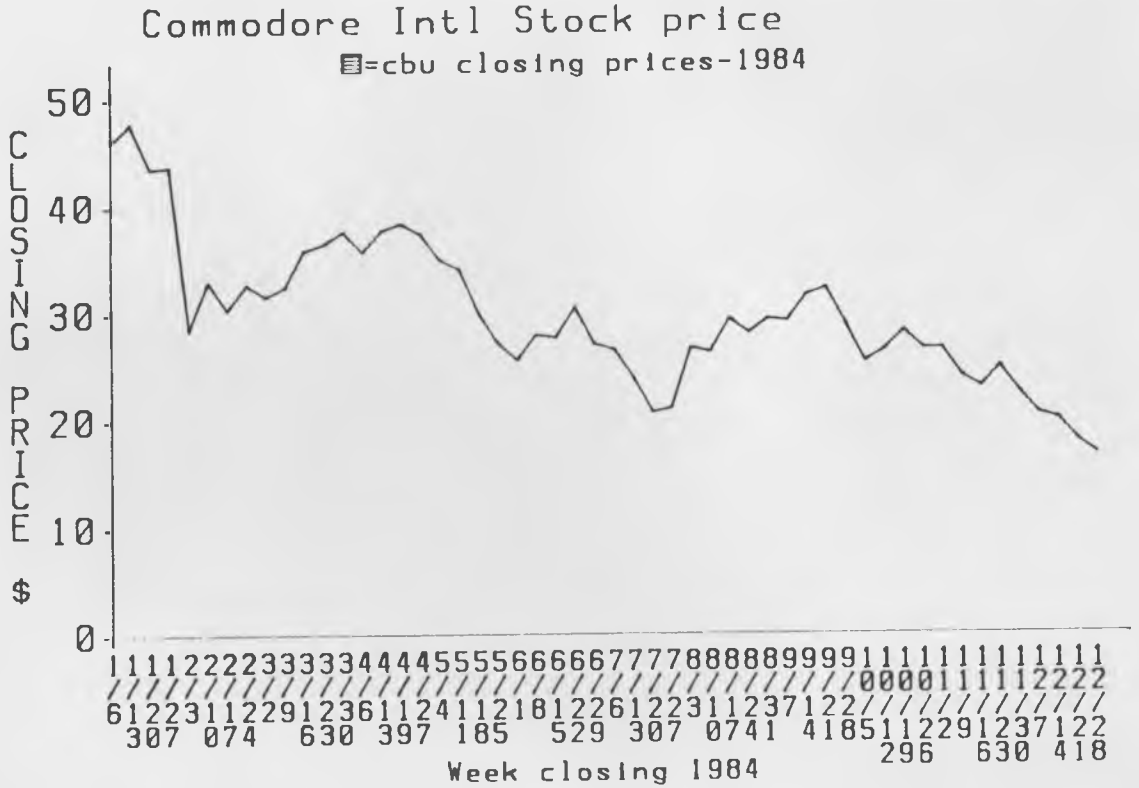
3/4/1/ and change the title color to black (1) or other dark color.

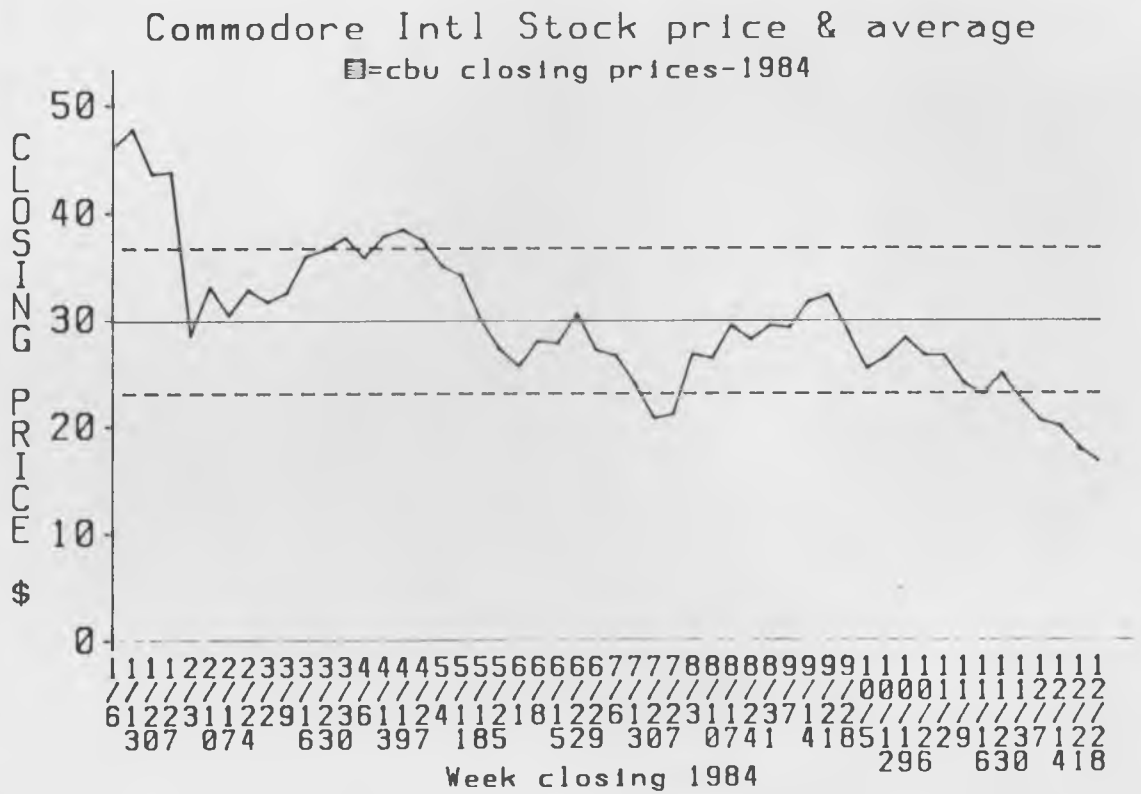
For any lines on your chart, you will have to go 3/5/ and change the color to black (1) or other dark color.

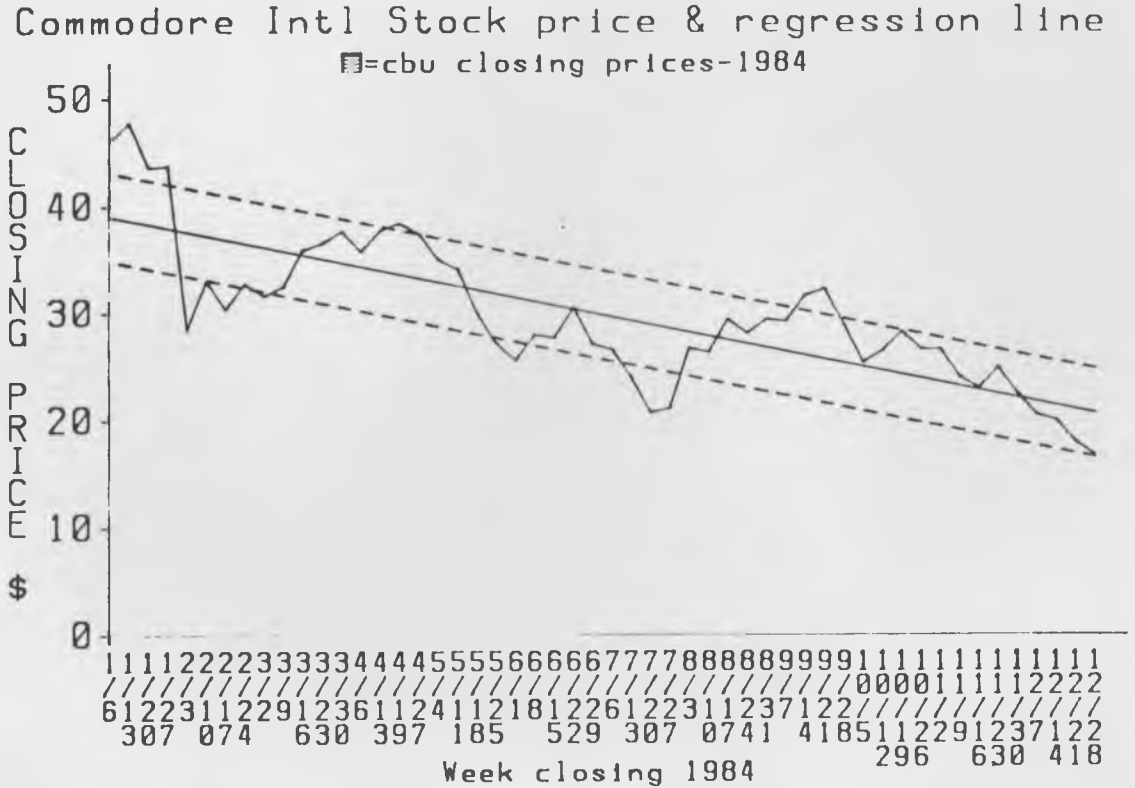
The configuration record is larger. If you want to read config records from prior versions, load "CONFIGER" and insert a new line "10250 RETURN". This will allow it to read in old format and write new format.

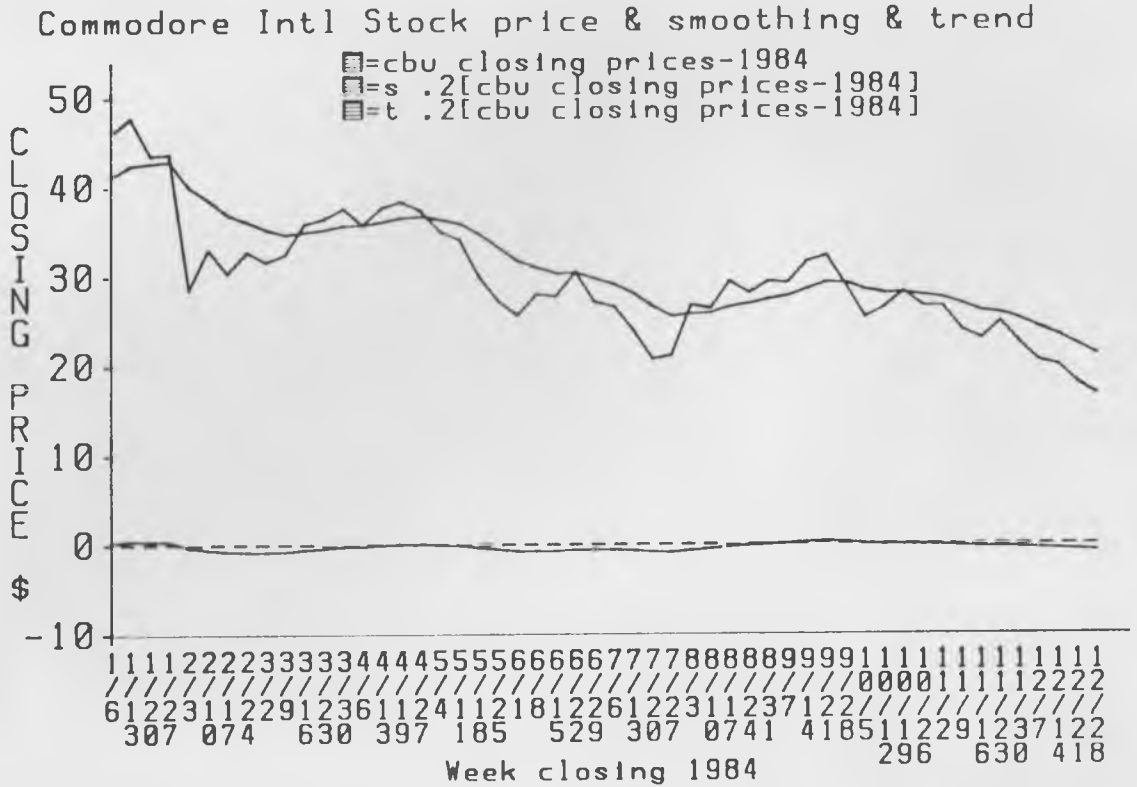
APPENDIX K

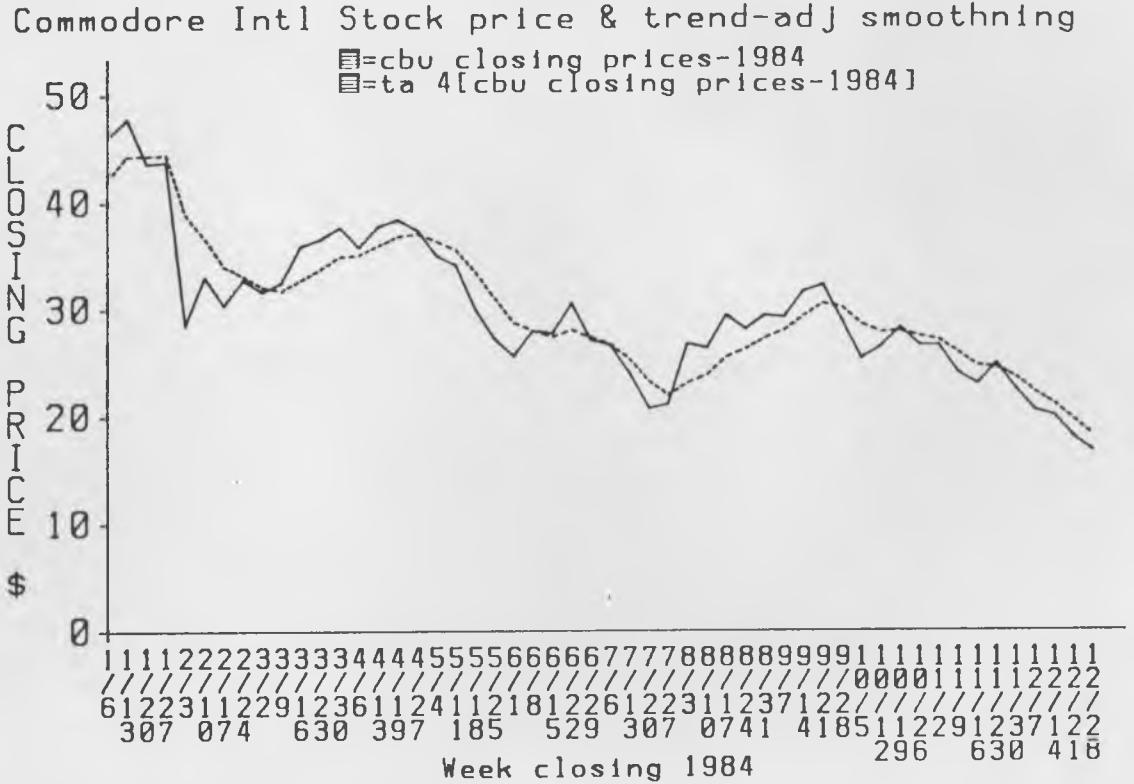
SAMPLE CHARTS

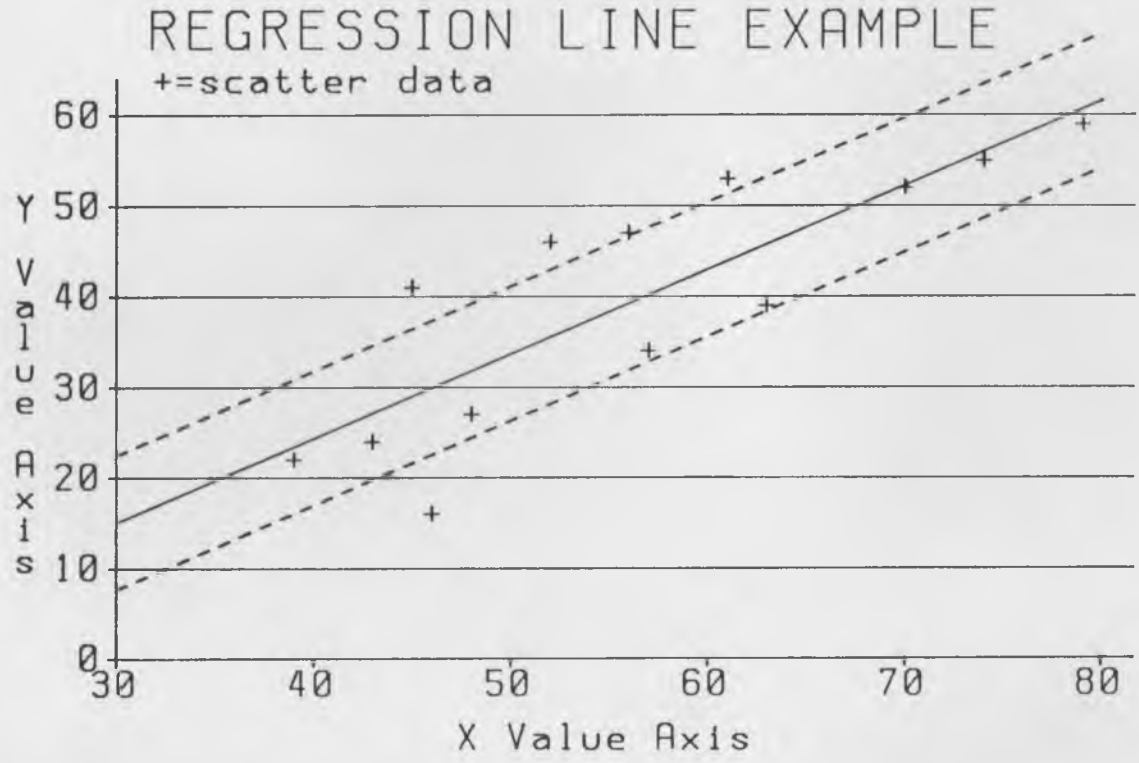

Commodore Intl Stock price
=cbu closing prices-1984
CLOSING PRICE $
50
40
30
20
10
0
Week closing 1984

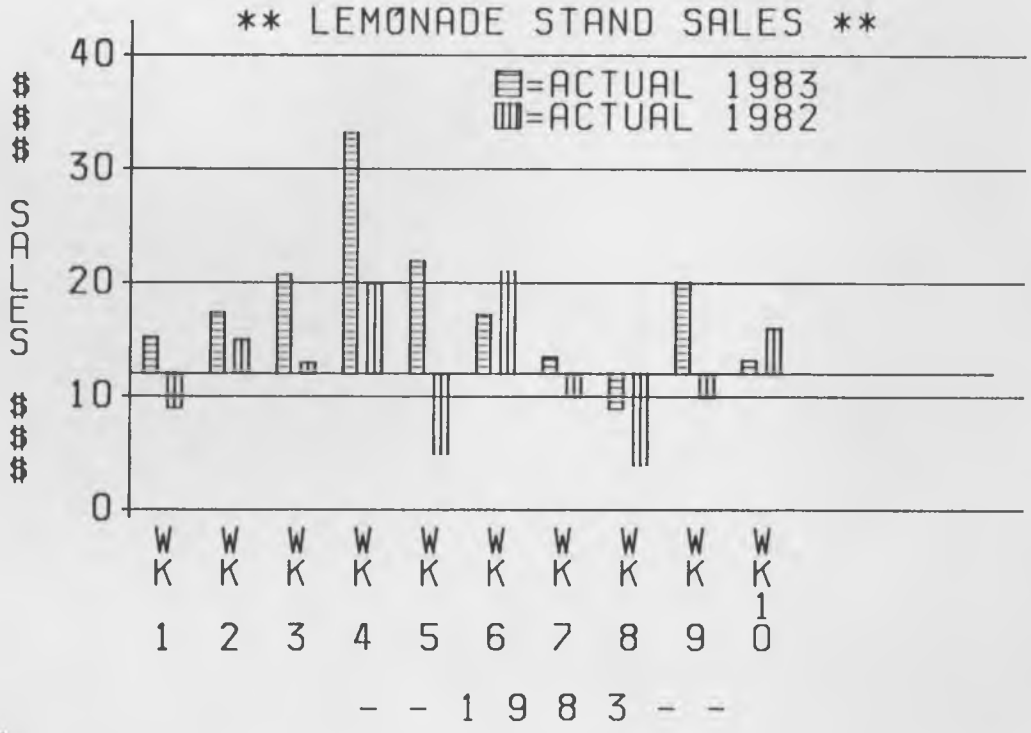

Commodore Intl Stock price & average
=cbu closing prices-1984
CLOSING PRICE $
50
40
30
20
10
0
Week closing 1984

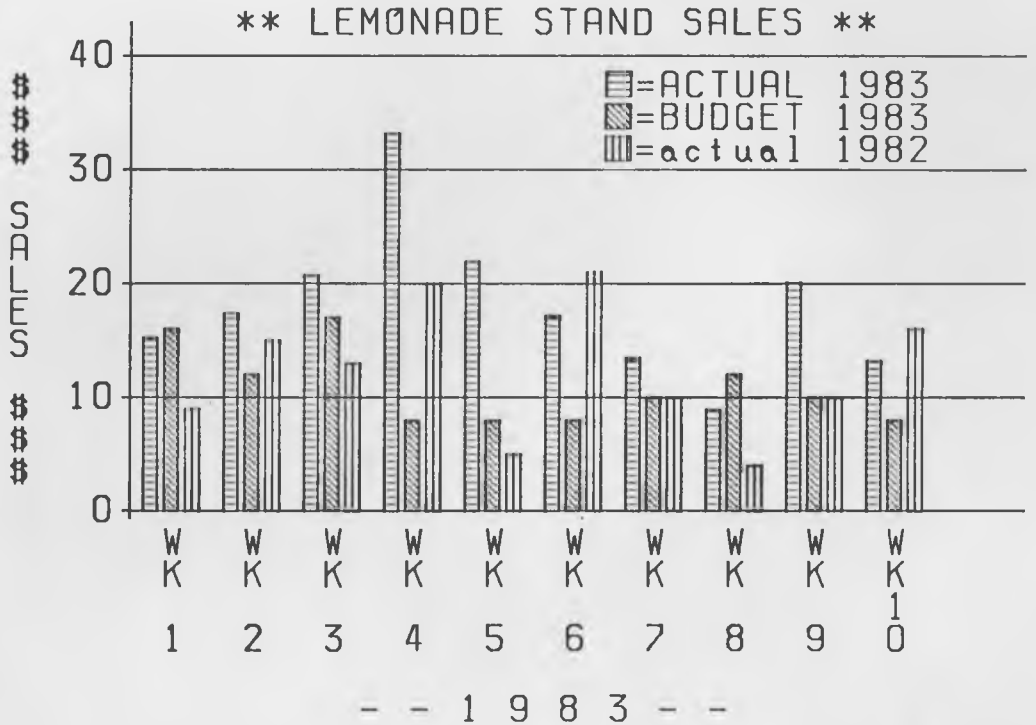

Commodore Intl Stock price & regression line
□=cbu closing prices-1984
CLOSING PRICE $
50
40
30
20
10
0
Week closing 1984

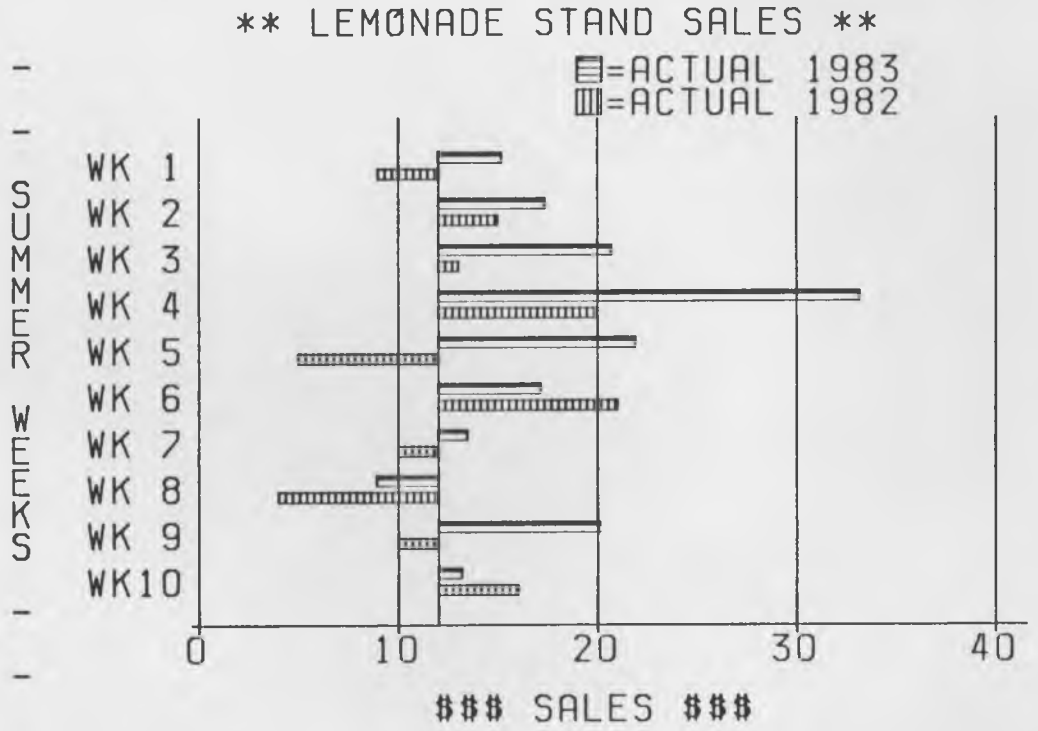

Commodore Intl Stock price & smoothing & trend
=cbu closing prices-1984
=s .2[cbu closing prices-1984]
=t .2[cbu closing prices-1984]
CLOSING PRICE $
50
40
30
20
10
0
-10
Week closing 1984


Commodore Intl Stock price & trend-adj smoothning
=cbu closing prices-1984
=ta 4[cbu closing prices-1984]
CLOSING PRICE $
50
40
30
20
10
0
Week closing 1984

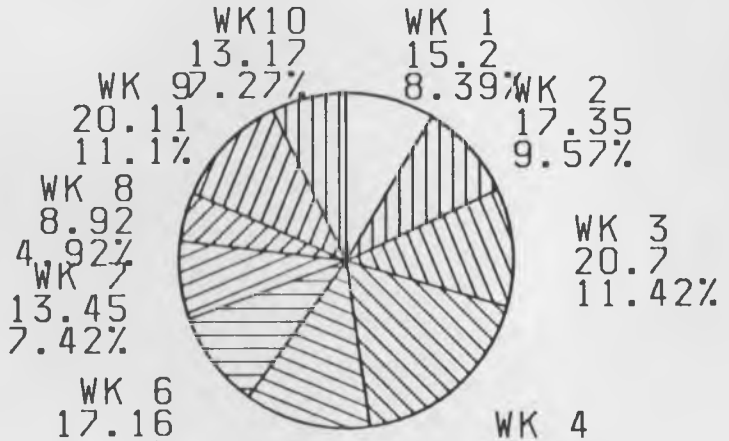

REGRESSION LINE EXAMPLE
+=scatter data
60
50
40
30
20
10
0
Y Value Axis
30
40
50
60
70
80
X Value Axis


** LEMONADE STAND SALES **
=ACTUAL 1983
=ACTUAL 1982
$$$$ SALES $$$$
40
30
20
10
0
WK 1
WK 2
WK 3
WK 4
WK 5
WK 6
WK 7
WK 8
WK 9
WK 10
- - 1983 - -

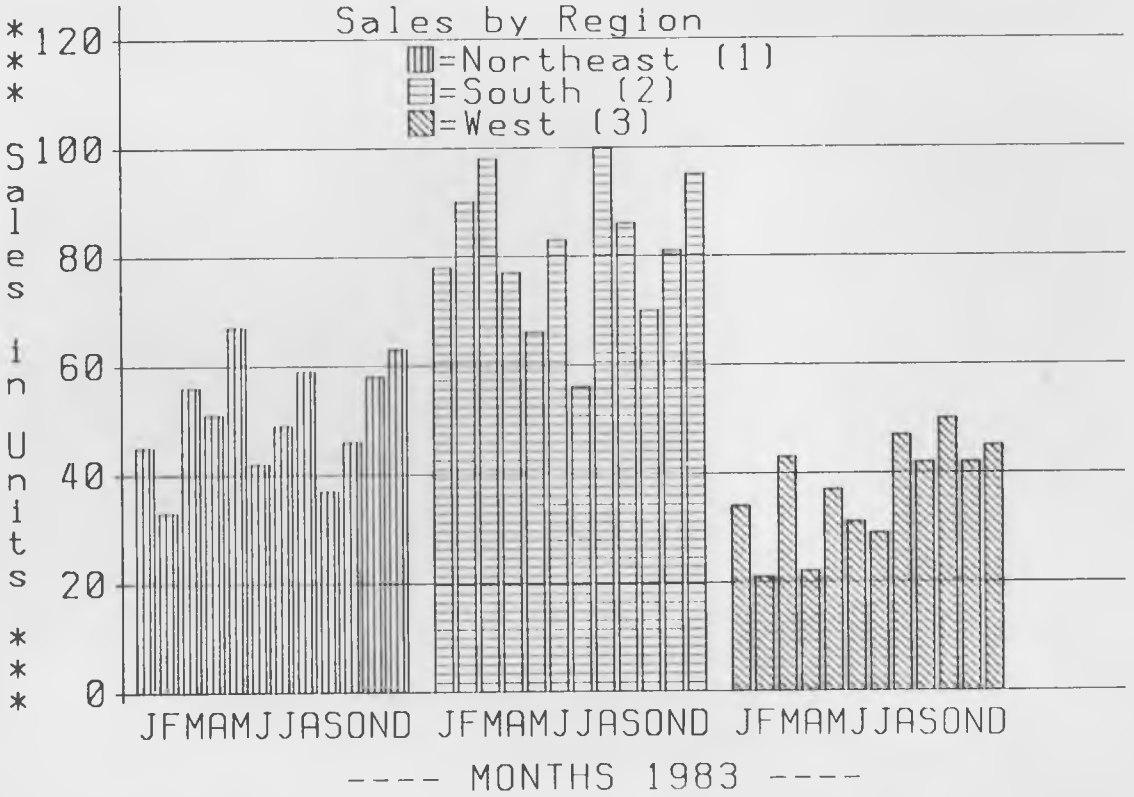

** LEMONADE STAND SALES **
=ACTUAL 1983
=BUDGET 1983
=actual 1982
$$$$ SALES $$$$
40
30
20
10
0
WK 1
WK 2
WK 3
WK 4
WK 5
WK 6
WK 7
WK 8
WK 9
WK 10
- - 1983 - -

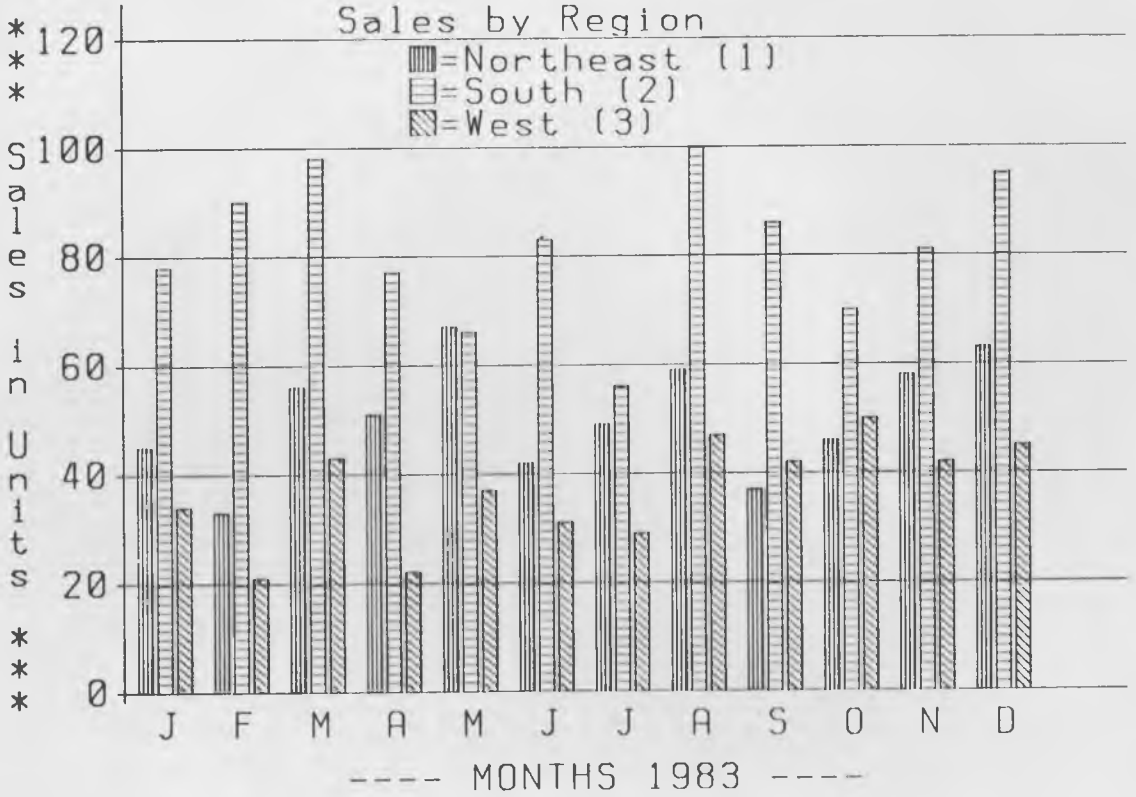

** LEMØNADE STAND SALES **
=ACTUAL 1983
=ACTUAL 1982
SUMMER WEEKS
WK 1
WK 2
WK 3
WK 4
WK 5
WK 6
WK 7
WK 8
WK 9
WK10
0
10
20
30
40
$$$ SALES $$$

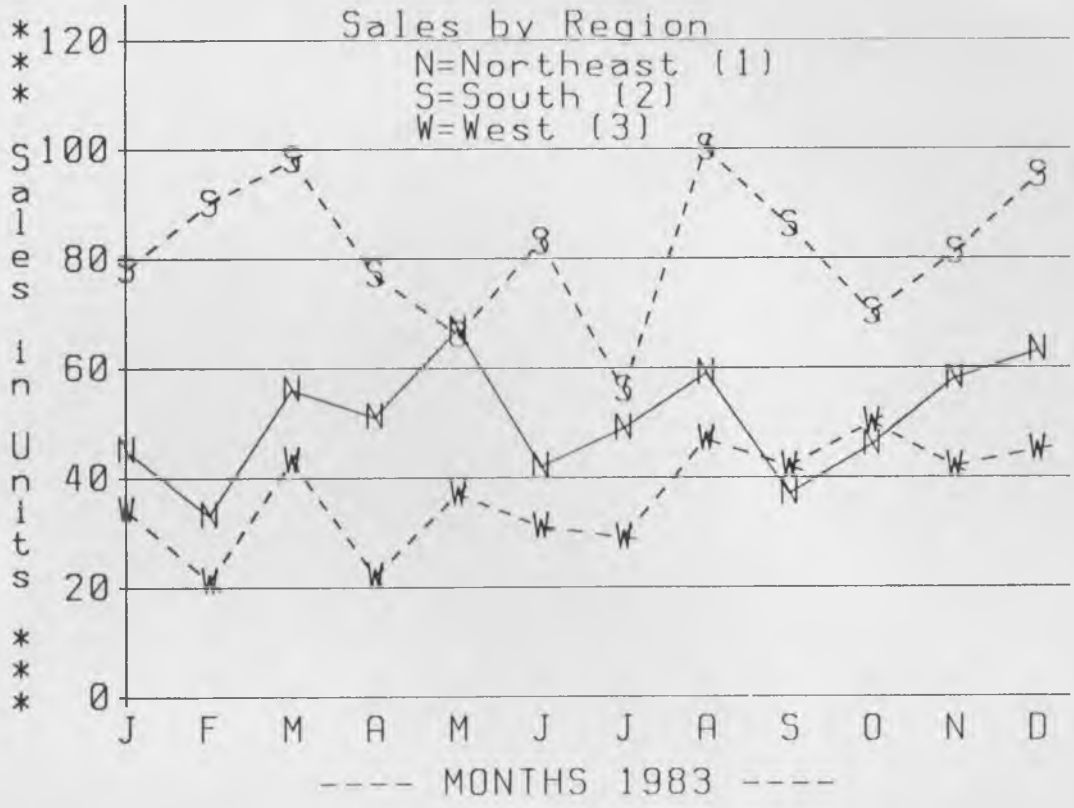
** LEMONADE STAND SALES **

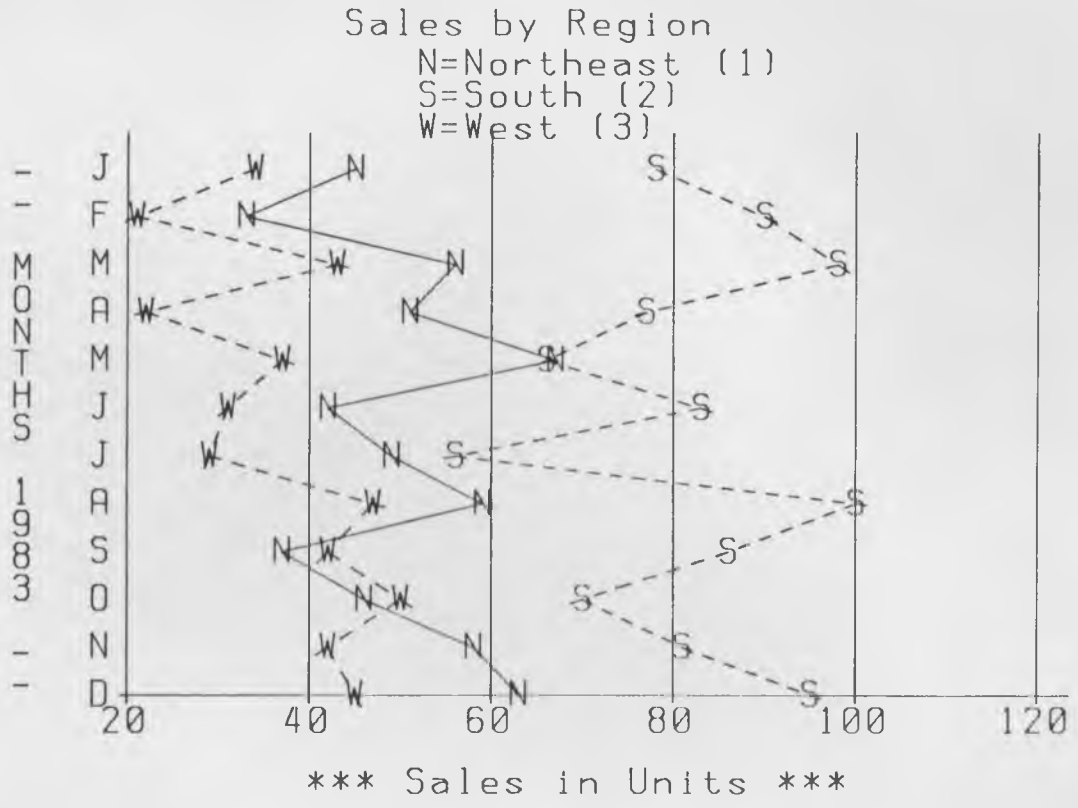


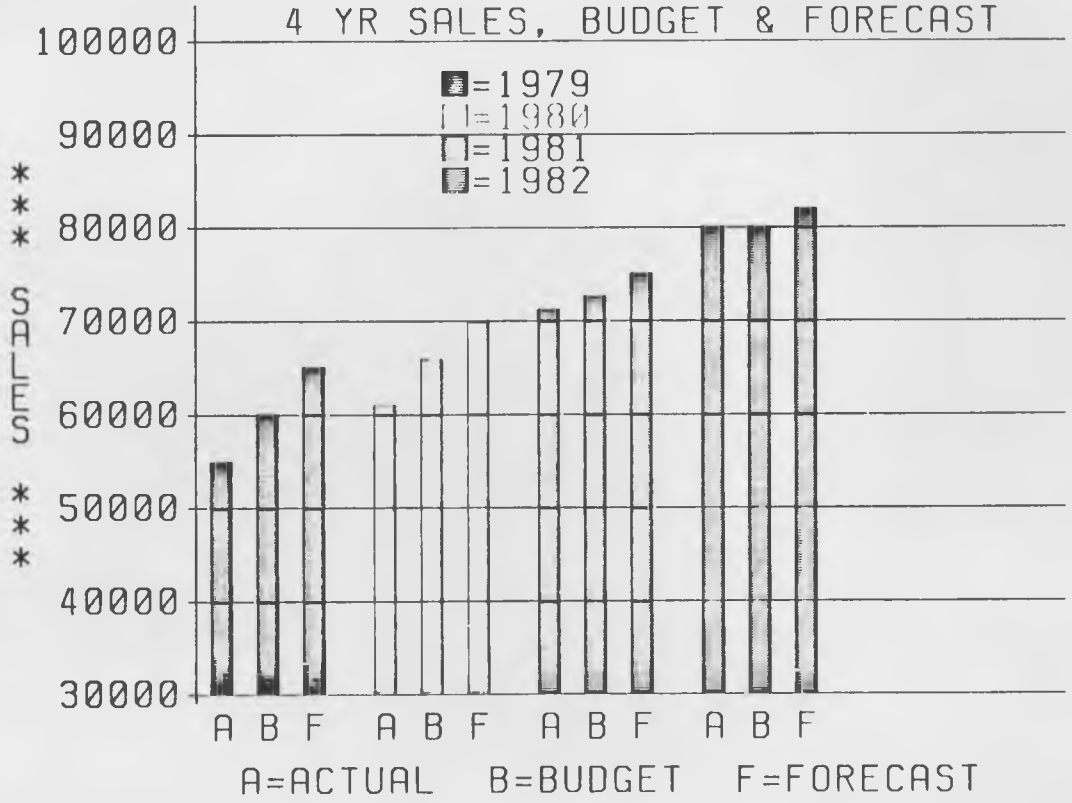
TOTAL
181

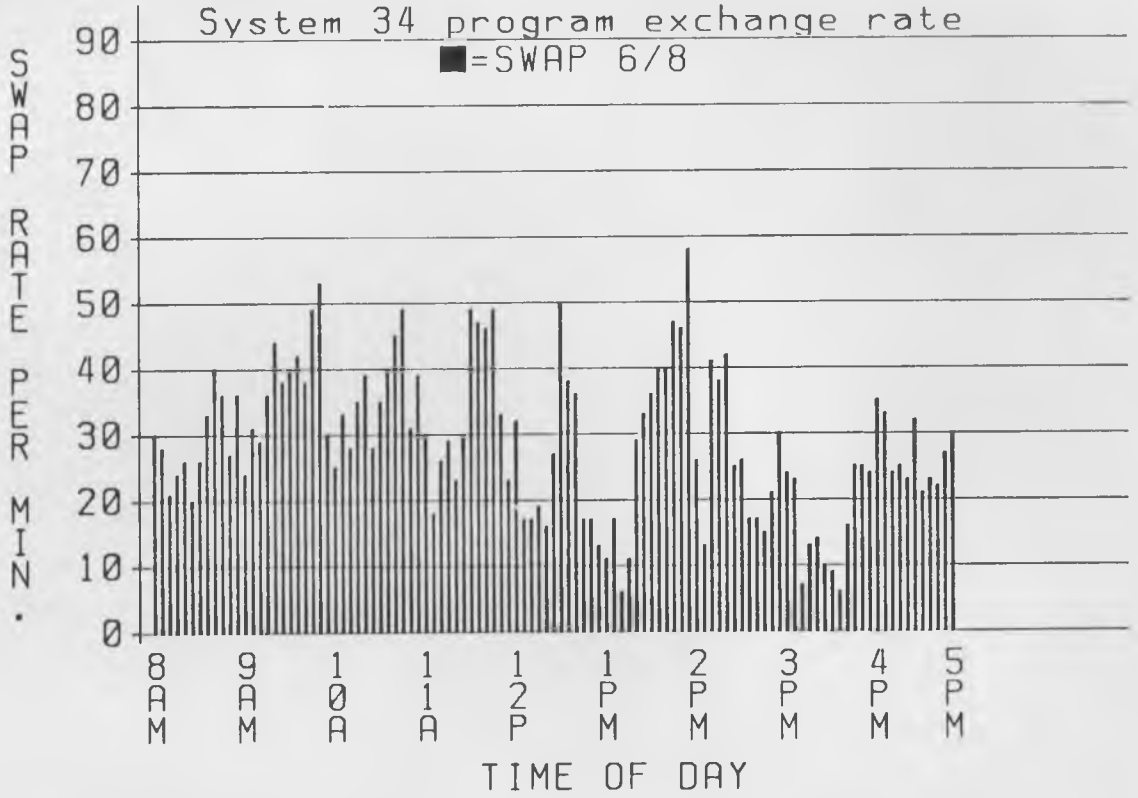

Sales by Region
=Northeast (1)
=South (2)
=West (3)
*** Sales in Units ***
120
100
80
60
40
20
0
JFMAMJJASOND JFMAMJJASOND JFMAMJJASOND
---- MONTHS 1983 ----

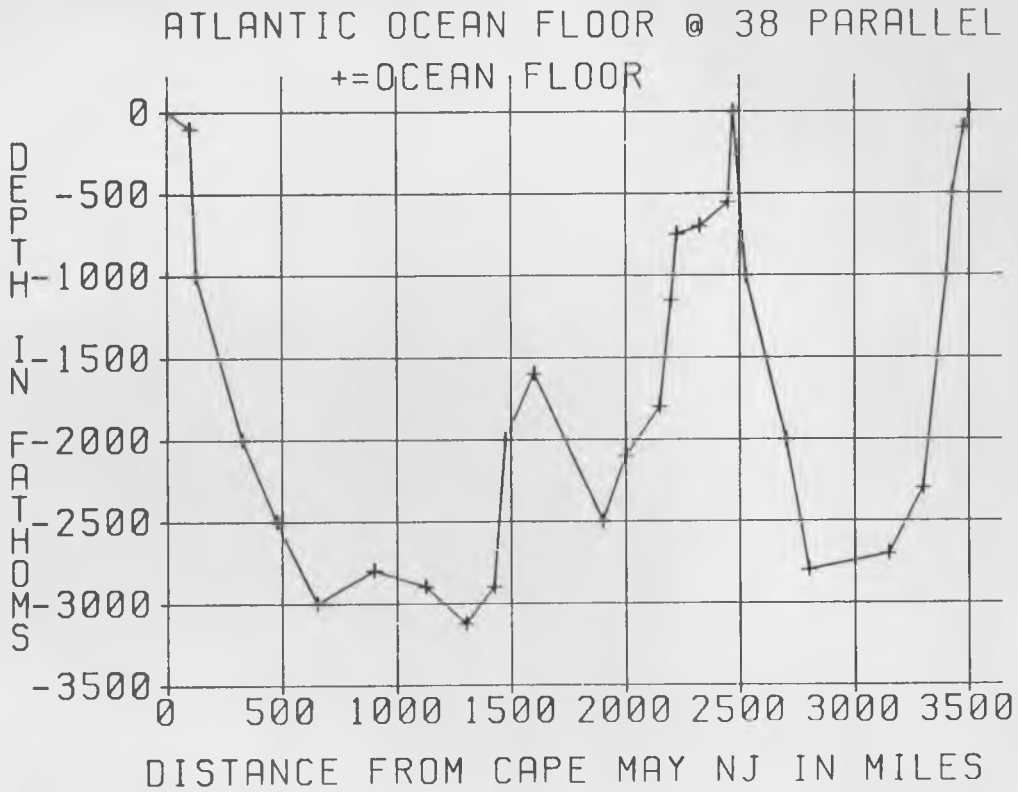

Sales by Region
=Northeast (1)
=South (2)
=West (3)
**** Sales in Units ****
120
100
80
60
40
20
0
J F M A M J J A S O N D
---- MONTHS 1983 ----

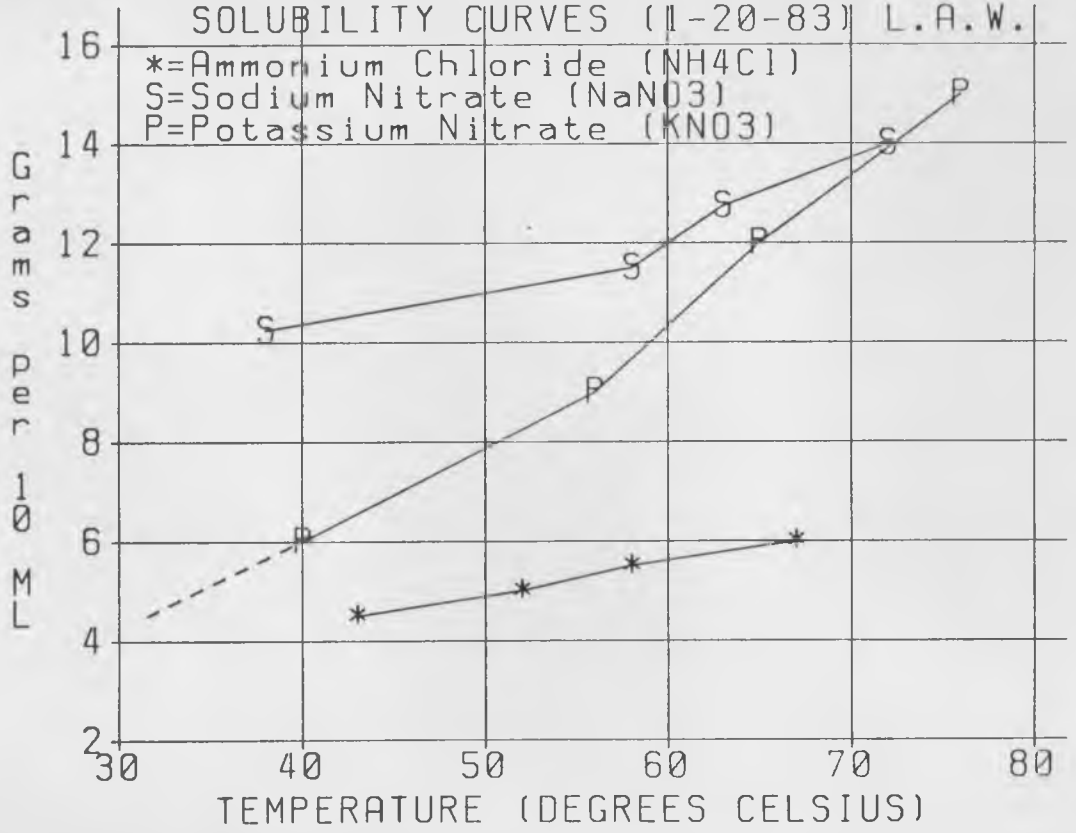

Sales by Region
N=Northeast (1)
S=South (2)
W=West (3)
*** Sales in Units ***
120
100
80
60
40
20
0
J F M A M J J A S O N D
---- MONTHS 1983 ----

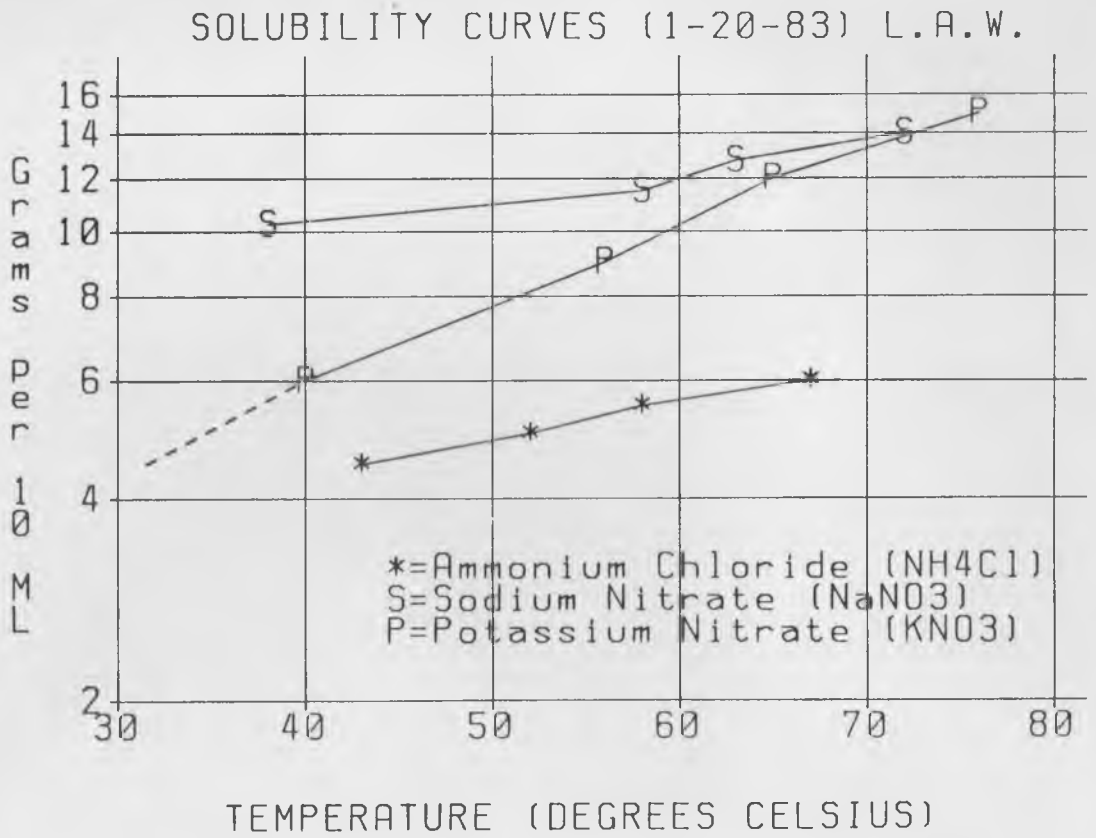

Sales by Region
N=Northeast (1)
S=South (2)
W=West (3)
- - MONTHS 1983 - -
J
F
M
A
M
J
J
A
S
O
N
D
20
40
60
80
100
120
*** Sales in Units ***

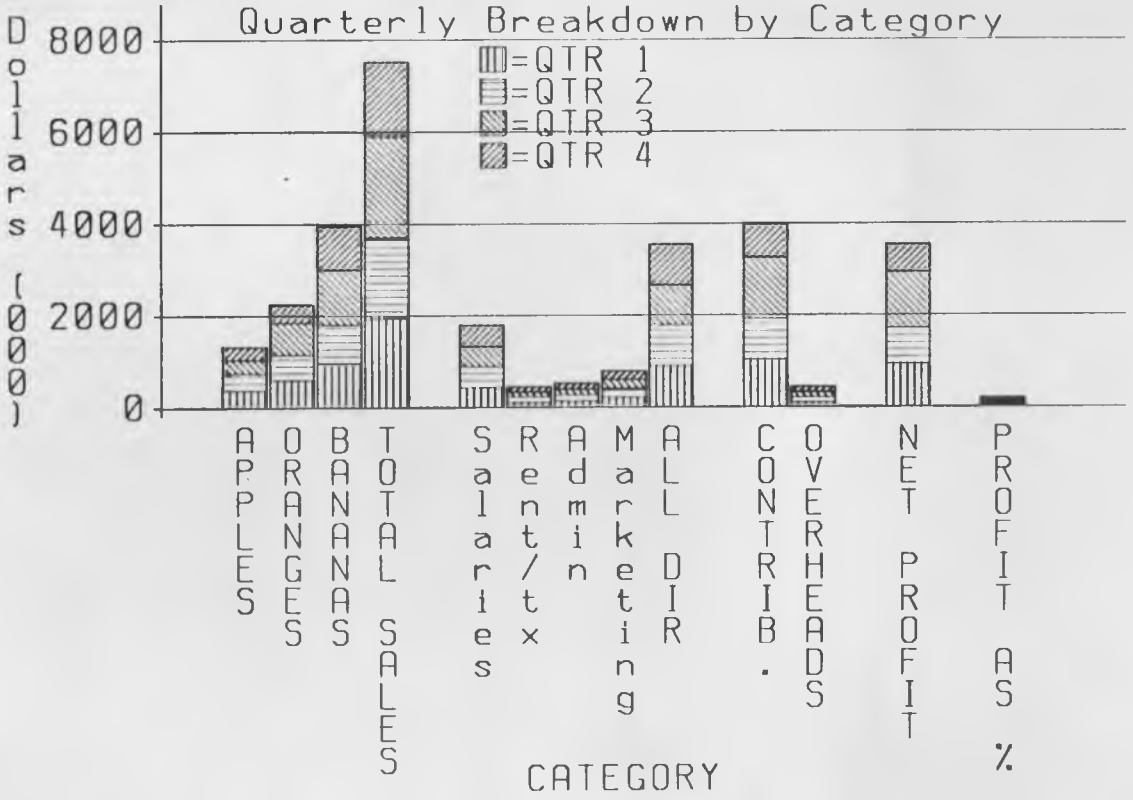

4 YR SALES, BUDGET & FORECAST
100000
90000
80000
70000
60000
50000
40000
30000
*** SALES ***
=1979
=1980
=1981
=1982
A B F A B F A B F A B F
A=ACTUAL B=BUDGET F=FORECAST


System 34 program exchange rate
■=SWAP 6/8
SWAP RATE PER MIN.
90
80
70
60
50
40
30
20
10
0
8 AM
9 AM
10A
11A
12P
1 PM
2 PM
3 PM
4 PM
5 PM
TIME OF DAY


ATLANTIC OCEAN FLOOR @ 38 PARALLEL
+=OCEAN FLOOR
DEPTH IN FATHOMS
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
0
500
1000
1500
2000
2500
3000
3500
DISTANCE FROM CAPE MAY NJ IN MILES


SOLUBILITY CURVES (1-20-83) L.A.W.
*=Ammonium Chloride (NH4Cl)
S=Sodium Nitrate (NaNO3)
P=Potassium Nitrate (KNO3)
Grams per 10 ML
16
14
12
10
8
6
4
2
30
40
50
60
70
80
TEMPERATURE (DEGREES CELSIUS)


SOLUBILITY CURVES (1-20-83) L.A.W.
Grams Per 10 ML
16
14
12
10
8
6
4
2
30
40
50
60
70
80
S
P
*=Ammonium Chloride (NH4Cl)
S=Sodium Nitrate (NaNO3)
P=Potassium Nitrate (KNO3)
TEMPERATURE (DEGREES CELSIUS)


Quarterly Breakdown by Category
=QTR 1
=QTR 2
=QTR 3
=QTR 4
Dollars (000)
8000
6000
4000
2000
0
APPLES
ORANGES
BANANAS
TOTAL SALES
Salaries
Rent/tx
Admin
Marketing
ALL DIR
CONTRIB.
OVERHEADS
NET PROFIT
PROFIT AS %
CATEGORY

GET THE MOST OUT OF YOUR COMMODORE-64 OR VIC-20 COMPUTER

CHARTPLOT-64

For the professional who wants to easily create the highest quality charts and graphs without programming onto plotters. Produces pie, bar, line or scatter charts and graphs from your own data interactively. You can change the resulting charts immediately. You can change scaling, labels, axis, colors, barfilling, etc. CHARTPLOT-64 handles up to four data sets totaling 200 points. DIF file interchange. Supports these plotters: AMDEK DXY-100, ROLAND DXY-800, ENTER SWEET P, Hewlett-Packard 7074A, Houston Instruments DP-40, Strobe 200. Also supports these printers: EPSON MX, FX, RX, Okidata Microline, Commodore 1525E/MPS801, Star Gemini, C ITOH Prowriter.

ASK ABOUT OTHER ABACUS SOFTWARE PRODUCTS

ULTRABASIC-64...Add 50 commands graphics music TURTLE and game features Tutorial demo plus **TAPE $39.95 DISK $42.95**

SYNTHY-64... Sets the standard for all of the rest Best 64 synthesizer anywhere Samples and manual **CASSETTE $29.95 DISK $32.95.** Also available 3 great companion music albums **Classical, Christmas,** and **Ragtime Sing-Along DISK $12.95 Each.**

CHARTPAK-64...Professional quality pie line and bar charts Menu driven interactive, hardcopy **DISK $42.95**

ASSEMBLER-MONITOR-64 High speed language development Eleven function monitor Screen editing of source file **DISK $32.95**

GRAPHICS DESIGNER-64... Menu-driven drawings, floor plans and illustrations etc Slide program capability **DISK $32.95**

TINY FORTH-64/20...Exciting language-low price Powerful extensible 200 + word vocabulary **TAPE $24.95 DISK $27.95**

CHARTPLOT-64...Same fine features as CHARTPAK-64 with high quality output to plotters **DISK $84.95**

POOL-64/20...Play Fullrack or nine ball using hires graphics Vic-20 required 8K expander **TAPE $14.95 DISK $17.95**

ANATOMY OF A COMMODORE-64 Complete guide Full comment ROMS list, detailed internals, descriptions **300 PAGE BOOK $19.95**

MERCURE-64...Simple powerful file management with fast design entry search report capabilities Tutorial **DISK $32.95**

SUPER DISK UTILITY-64... Speed copy 4 ways Total, Bam, Append or File, Dump or modify sectors More **DISK $22.95**

MASTER-64...Full ISAM file management, powerful screen management; excellent printer generator, programmer's aid; BASIC 4.0 commands; machine language monitor; Software developers NO RUNTIME ROYALTIES With 150 page manual in three-ring binder and development software **SOFTWARE ON DISK $84.95**

CHECKBOOK MANAGER-64 Simple check account maintainance Optional screen or printer report and backup **DISK $22.95**