

CHARTPAK-64

ABACACUS SOFTWARE FOR THE COMMODORE-64 AND-128

CHARTPAK-64

FOR THE COMMODORE-64 AND-128




Abacus  Software

CHARTPAK-64

**Powerful Charting Software
for your Commodore 64**

© 1983 RC WAINWRIGHT

Published By:

Abacus You Can Count On  **Software**

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PREFACE

Roy Wainwright began writing development software for the new Commodore 64 about a year ago. Two of his products - SCREEN GRAPHICS-64 and ULTRABASIC-64 are familiar tools for thousands of COMMODORE 64 owners. Roy saw the power and usefulness of these development tools and set out to harness this power in CHARTPAK-64. You see, CHARTPAK-64 is written using the commands found in SCREEN GRAPHICS-64 and ULTRABASIC-64. His development tools make the graphics part of chartmaking a relatively minor task.

Roy has strived to make CHARTPAK-64 a user-friendly package. You can sit down at your Commodore 64 with this user's manual and easily create presentation charts in minutes - all interactively. No programming knowledge is required to use CHARTPAK-64.

CHARTPAK-64 is one of the longest projects that Roy has undertaken. The result is that Roy has built almost unlimited flexibility into CHARTPAK-64.

We are very anxious to see how you make use of CHARTPAK-64. We welcome any feedback from you and hope you find CHARTPAK-64 to be a powerful addition to your software library.

Arnie Lee
Grand Rapids, Michigan
July 12, 1983

Based on feedback from user's like yourself, Roy has improved and expanded upon the original version of CHARTPAK-64. These features are changed:

- * improved ease of use and error handling
- * increased capacity for your large data requirements
- * new statistical functions to gain insight of your data characteristics
- * expanded manual with complete tutorials
- * new support for latest printers

We're sure that you'll find CHARTPAK-64 extremely complete and useful for your business and school charting needs. Roy has again tried to satisfy his user's requirements.

A.L.
January 15, 1985

TABLE OF CONTENTS

INTRODUCTION.....	1
LOADING CHARTPAK-64.....	2
DISTRIBUTION DISKETTE.....	2
DEFINITIONS.....	3
GETTING STARTED WITH CHARTPAK-64.....	4
A CHARTPAK-64 TUTORIAL.....	5
REFERENCE SECTION.....	13
[0] MAIN.....	14
[1] INPUT & MODIFY DATA.....	16
[2] DISPLAY CHART.....	27
[3] DEFINE CHART.....	28
[4] SAVE CHART.....	36
[5] FILE COMMANDS.....	37
[6] PRINT CHART.....	39
[7] SAVE/RESTORE GRAPH SCREEN.....	40
[8] EXIT TO BASIC.....	41
DEMONSTRATION CHARTS.....	42
DIF FILE EXAMPLE.....	45
FILE CONVERSION PROGRAM.....	47
DATA REDUCTION TUTORIAL	
INTRODUCTION.....	49
AVERAGES & STANDARD DEVIATION.....	54
LEAST-SQUARES LINES.....	56
TWO-DIMENSIONAL DATA.....	59
EXPONENTIAL SMOOTHING.....	60
APPENDIX A - PRINTER/INTERFACE INFO.....	68
APPENDIX B - ERROR MESSAGES.....	69
APPENDIX C - COLOR NUMBER TABLE.....	70
APPENDIX D - CHARTPAK-64 FILE FORMAT....	71
APPENDIX E - SAMPLE LEMONADE CHARTS.....	75
APPENDIX F - SAMPLE DIF CHARTS.....	78
APPENDIX G - SAMPLE CHEMISTRY CHARTS....	82
APPENDIX H - NOTE ON USING COLOR.....	83

INTRODUCTION

CHARTPAK-64 lets you create data chart easily! It also includes a simple data entry/update facility to allow you to create and adjust your statistical data for charting.

OPERATION

The simplest way to use CHARTPAK-64 is to key in your data, adjust the chart specifications using several of the menu options, and then draw the chart on the screen. The F5-key returns you to the MAIN MENU while keeping the chart 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 a chart to your satisfaction, you may get a permanent hard-copy on your printer.

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.

NOTE - In order to allow using the same names for data and chart specifications files, CHARTPAK-64 automatically adds .S to the beginning of each specification file name when writing the specification files to disk.

LOADING CHARTPAK-64

Insert the distribution diskette into the disk drive. Load CHARTPAK-64 with either:

LOAD"*",8 <RETURN>

or

LOAD"CHARTPAK-64",8 <RETURN>

When the **READY.** prompt appears, type: **RUN** and press the **<RETURN>** key. You will be asked to select the type of printer. Key a number from the menu list. The program will load the proper printer module and the main program. See appendix A for printer interface information.

The remainder of CHARTPAK-64 loads into the computer. It takes about 1-1/2 minutes to load. Some noises from the disk drive are normal. When the loading process finishes, the CHARTPAK-64 Main Menu appears.

DISTRIBUTION DISKETTE

The distribution diskette cannot be duplicated by standard computer equipment. In order to provide a backup in case of difficulty, a second complete set of software is included on the diskette.

If the distribution diskette becomes completely unreadable, return it to ABACUS Software for a replacement at a nominal charge.

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 the name for something (an entity) about 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 day and the data value is 90 (degrees).

DATA SET

This is a name that applies to a group of related data items. For example, the daily high temperatures, day by day for a month is a data set.

A second data set is 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 is a data set which has a lifespan value (years) for varying number of cigarettes per day. We call these types of data sets two-dimensional.

DATA GROUPINGS

For one-dimensional data sets, you must have a way to group the data points. This is the data grouping name. It may be day numbers, months, years or any other 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 goes 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 goes from bottom to top.

LEGENDS

These are the "labels" which describe the information about each axis on the chart.

GETTING STARTED WITH CHARTPAK-64

CHARTPAK-64 is easy to use because you interact with it through menu selections. Each menu and input screen has a number in the upper left corner. The REFERENCE SECTION of this manual is arranged by those numbers to make it easy to find more information about a screen entry.

All of the menus have option [0] that returns you to the MAIN MENU if you decide that you don't want to select any options on the one that is currently displayed.

If you accidentally get into a menu option that you don't want, press and hold the RUN/STOP key and press the RESTORE key. The screen will clear and say READY.. Next type GOTO5 and press the <RETURN> key to go to the MAIN MENU. No data will be lost by this method. Do not type RUN or you will clear all data, chart specifications, etc.

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> if you want to change that value.

For string type input (such as labels and titles), the prompt is -->> in front of the default value. As with numeric data, press <RETURN> to accept that value or key in your new data and press <RETURN>. Quotation marks (") are automatically placed before and after all default values to allow entry of any characters including commas in strings.

CHARTPAK-64 has two screens:

the chart (graphic) screen
and
the menu screen

Switching between them takes place automatically, but you can press the F5-key to see the menus and the F7-key to see the chart at any time.

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

A CHARTPAK-64 TUTORIAL

The first step is to load CHARTPAK-64 into the computer. If you have not already done so, see the section called LOADING CHARTPAK-64.

If you make a mistake during this tutorial, you can probably correct the mistake by returning to the MAIN MENU and re-selecting the function. If you are at an input screen, you can always break out by pressing and holding the STOP-key and pressing RESTORE. This clears the screen and computer prints READY.. Type GOTO5 and press <RETURN> and you are returned to the MAIN MENU.

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 budget based on the expected weather conditions. Your actual sales and budget for the summer were:

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	\$18.00
TOTAL	\$181.12	\$109.00

To make a chart using this data, start by selecting the INPUT & MODIFY DATA. Enter 1 and press <RETURN> at the MAIN MENU [0].

Next we set up the global information about the data.

Select option 5: GLOBAL DATA SPECS. The first question on screen [1.5] is: TWO DIM? (Y/N). Since each set of numbers (sales and budget) has only one value each, answer N and press <RETURN>. This tells CHARTPAK-64 that the data is not two-dimensional.

The next question is about the data grouping. Since we are using weeks, select option 2.

The next prompt is to enter the starting week number. Since we are starting with week 1 (default), press <RETURN>. You are now back at the MAIN MENU.

Select 1: INPUT & MODIFY DATA. Next select 1 again: INPUT DATA FROM KEYBOARD. The first prompt at screen [1.1] asks you to enter the data set number into which you will enter the data values. We'll put ACTUAL SALES into data set 1 and BUDGET into data set 2. Press <RETURN> to enter data for data set 1.

The message CLEARING DATA SET -SURE (Y) is displayed. This tells you that you are about to clear the data from the data set you selected. If you have selected the wrong data set, press any key except Y and you will be returned to the main menu. Since we DO want to enter new data into data set 1, press Y to clear the data and continue.

The next prompt is for the data set name. Key "ACTUAL 1983" as the name and press <RETURN>.

Next you are asked to enter the number of data items. Key 10 (number of weeks) and press <RETURN>.

The next prompt is: IN SEQUENCE? (Y/N). This lets you select whether you want to key the data in point sequence or select points and accumulate values. Since the sales values are listed in sequence, press Y.

Now key the sales values. For example key: 15.20 <RETURN> for the first item. As values are accepted by the computer, they are shown on the screen. When the tenth value is entered, you are 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 that you made a mistake until later (or the data has changed 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. The message CLEARING DATA SET-SURE(Y) appears again to remind you that you will be clearing data out of data set 2 this time. Press Y.

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 MAIN MENU [0], select menu option 3 (DEFINE CHART). Next select option (CHART TYPE). 1 Key in VG for vertical graph. Type N to the ALTER DISPLAY SEQ? prompt and you are returned to the MAIN MENU.

? Redo from start

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 CHARTPAK-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 new data. If the diskette has not been initialized (NEWed), you can do so by selection option 5 - DISK 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!!

Now to save the data, press F5 to return to the MAIN MENU and select option 4 (SAVE CHART). Select option 1 (SAVE DATA). Unless you are using a diskette drive number other than 8, just press <RETURN>. The data filename may be up to 16 characters long. **LEMON83** is a good filename to use. Key the name and press <RETURN>. The disk drive runs for a few seconds and the returns you to the MAIN MENU.

From here on, option selection from the MAIN MENU is 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 chart vertical axis is automatically set to the range of the data - it ranges from the lowest to the highest values of the data values. 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 "\$\$\$ SALES \$\$\$" for the legend. Since we want a normal scale, press <RETURN> (0 is the default). The default minimum value is 0 and we probably want to leave it at that value, so press <RETURN>.

To improve the chart appearance, enter the value 40 for the maximum value instead of 33.15 computed earlier. You'll have to space over the numerals left by: 33.15. The base value is left at 0, the bottom for bar charting options. The number of divisions (horizontal lines) is left at 4, since this gives 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 to [3/2/1]. Key "- 1 9 8 3 -" for the legend. The scale is normal, so press <RETURN> to accept the default (0). The minimum, maximum and number of divisions don't matter, so just press <RETURN>. The GRP NAMES are normally shown horizontally, but because they are 4 characters long (WK10) and overlap, we show them vertically. Key 1 and press <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 the F5-key to return to the MAIN MENU and then go to [3/2/3]. Notice the flashing cursor in the lower left hand corner. Use the cursor up key (with SHIFT) and the flashing cursor moves up. Put it up about halfway between the 0 and 10. You may also move the flashing cursor sideways to allow more room along the left side if needed. Press <RETURN>. Now the flashing cursor is in the upper right corner. Since there is no reason to change anything 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 screen [3/4/1] and key "** LEMONADE STAND SALES **" and press <RETURN>. The flashing cursor in the top line allows you to reposition the title (move it to the right a little using the cursor control keys) and press <RETURN>. Press <RETURN> to use the default color.

Now let's move the data set legend to the right. Go to screen [3/4/2] and move the flashing cursor to the right half of the chart (above WK 6) and then press <RETURN>.

Now let's change the line marking. Go to [3/3/1]. For the ACTUAL (data set 1) use a dot for the plotting symbol. Press SHIFT and Q (large dot) and press <RETURN>. Then choose a solid line for ACTUAL data (press S and <RETURN>). Press <RETURN> to default the color to white. Now for the BUDGET (data set 2), use B for the plotting symbol, a dashed line and the default color (2).

Use option [2] to display your work again.

If you're satisfied, save the chart specifications. First press F5 and then go to [4/2]. After the disk drive device number prompt, you should see the name under which you saved the data. You may use the same name for the specs, since CHARTPAK-64 adds .S in front of the name of specification files. Press <RETURN>. the disk will run for about 10 seconds, and then return 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 screen [1.8] to use the directory. After choosing device 8, the directory is displayed. To temporarily stop the listing, press the space bar. Press it again to continue. The prompt asks you for the number of the filename which is the entry you want to select. Key the number shown along the left side of the screen and press <RETURN>; or key 0 and press <RETURN> to relist the directory. Select filename **LEMON82** (item 1 on the list) and press <RETURN>. The READ DATA FILE screen asks for a device so simply press <RETURN> to accept the default. Then the name of the file you selected is displayed. If OK, press <RETURN>.

The next prompt is **DIF FILE (Y/N)**. Since we're not using a DIF file, press **N**. Now you are 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 CHARTPAK-64 will read the data by pressing 3 and <RETURN>. The next screen shows the next data set in the file (**BUDGET**). Since it is last year's budget, it is worthless, so bypass it by pressing **N**. The next prompt is to choose whether or not to accept data group names (**WK 1, WK 2, 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 the new data set to the letter **L** (last year), and make it a non-connected (**N**) line. Note that you have to review (and may change) the specs for the other lines.

Go to screen [2] to plot the revised chart.

You can easily change this to a bar chart. Press **F5** and go to screen [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> and 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 6 and leave the space between the bars at 1. For each bar you may select the filling option and drawing color. Select fill option 3 (horizontal lines) and default the drawing color for data set 1 (**ACTUAL**). Use fill option 8 (dots) for budget and fill option 2 (vertical lines) for data set 3 (last year).

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** 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. Then go to screen [3/1] to select chart type. Then press Y at the ALTER DISP SEQ? prompt. The four data set names in the computer are shown (note 4 still has a default name). Press 1 and <RETURN> to select data set 1 and then press 3 and <RETURN> to select data set 3. This shows 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 9 pixels 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 us 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>. You can let the other values default. Then draw the chart. Notice how the bars group and down from the 12 value, but they look strange without a line.

Let's add one. Go to the lines screen [3/5]. Press <RETURN> to select line 1 (the default). Then you are asked for the value at the ends of the line. The value at the left should be 12. Normally you want the same value on the other end so that you will have a horizontal line). Enter 12 and press <RETURN>. Then enter a second 12 for the other end unless you want to change it to get a sloping line. Then select a solid line by pressing S and <RETURN>. Enter 2 to choose the 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 4 (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 GRP NAMES 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>. To differentiate the bars, go to the bar chart options [3/3/3]. Press <RETURN> three times to accept the current bar grouping, bar width and bar spacing. For data set 1 (Actual 83), select bar type 102 (white solid fill) and drawing color 2. For the second data set (Actual 82) select type 1 (open bar) and drawing color 2.

Now go to [2] to display the chart again.

You can do a pie chart of the current year sales by going to [3/1]. Select a pie chart by pressing P (and two blanks to clear the B and ") and <RETURN>. When you display the chart [2], you are asked which data set you want to display. Key 1 and press <RETURN>. Then you are asked for the color of each segment. To make it easy to start, key a 2 (white) for each segment color. When the last segment color is entered, the pie chart is drawn.

To improve the distinction between segments of a pie chart, you can select one of four types of lines: horizontal, vertical, and two diagonals. If we want to highlight week 4 (our best week of the summer), simply go to the chart drawing option [2] and select data set 1 again. Let's leave week 4 as it is (2 = solid white). As each of the other weeks is selected, key 302 (white diagonal lines). When the chart is drawn, it should look like the example on page xxx.

See the sample chart printouts in APPENDIX E.

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REFERENCE SECTION

[0] MAIN MENU

This menu is the main control point for CHARTPAK-64. All functions return to this menu. If for some reason the program stops, you may restart it by typing GOTO5 <RETURN>, which brings you to this menu without losing any data or specifications.

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 draws the chart on the screen, based on the data and specifications in the computer. When the chart is completed, press the F5-key to switch back to the CHARTPAK-64 main menu. To see the chart, press the F7-key.
- If you haven't specified a chart type, you are transferred to the CHART TYPE screen [3.1].
- If the chart to be drawn is a pie chart, you are asked to specify the color and fill options of each pie segment.
- If a BASIC error occurs during the drawing of the chart, the drawing process is stopped. Press the F5 key to view the error message. See APPENDIX C - **ERROR MESSAGES** for the messages and their causes.
- 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 **PRINT CHART**
This option reproduces the chart display onto an attached printer. Because this function copies the screen display to the printer, the chart must first be displayed on the screen. See APPENDIX A for more information.
- 0.7 **SAVE/RESTORE CHART SCREEN**
This option lets you save and later restore a complete chart directly to/from the screen. It is useful in cases where a printer is not available or for presentations where it would be time-consuming to recall data sets and recreate the chart.
- 0.8 **EXIT TO BASIC**
This option resets the computer for 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 returns you to the main menu.
- nnnn **BYTES FREE**
Because the data sets and the display programs take up a good bit of room, the number of available bytes of workspace are displayed on the main menu. If the number of bytes free is less than about 400, consider saving the data.

Additional specification parameters may take up the remaining room and the BASIC message "OUT OF MEMORY ERROR" is displayed. The program can be restarted without losing data by typing GOT05 <RETURN>. At this point you should save the data, shorten the legend and titles or cut the number of line or data points and then reload the data and specifications. See screen [1.4] for more details.

[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. Enter the number of the data set desired and press <RETURN>. The list of data sets available in memory is displayed with their numbers. 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)** is displayed to remind you that the data set you selected will be cleared. Press **Y** to continue. Pressing any other key returns you to the MAIN MENU.

The data set is cleared by setting all data values to zero.

Next you are asked to key in a name for this data set. CHARTPAK-64 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 AND NAMES screen [1.2].

Next you are asked to key in the number of points contained in this data set. CHARTPAK-64 supplies a default number (2) if you just press <RETURN>. If you do not want the default, key in the number of your choice and <RETURN>.

The next prompt is **IN SEQUENCE (Y/N)**. If you key **Y**, then CHARTPAK-64 asks you for the point values in sequence. If you key **N**, then you can key the point values in random sequence, and the data is accumulated in each point.

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 automatic X or Y option).

As you key the data, the last 13 values are displayed on the screen.

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

If you are not keying the data in sequence, you are asked for the point number that you want to enter. The current data points around that point

are shown on the screen and you can key the value. That value is ADDED to the point value and the total is displayed on the screen. Then you are 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 data set names and their numbers is displayed. Enter the number of the data set. If you want to change the data set name, key in -1. If you want to change the data group names, 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 display shows the data item number, the data group name and the data 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 data item number and press <RETURN>. Then you are prompted for the new data value. For two-dimensional data, both X and Y data are shown. If you want to add a data item before the entry number (and push the rest of the list up), type an up-arrow (^) and then the data value to be added. If you wish to delete a data 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>. You are then returned to the Main Menu.

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

1.3 CLEAR/COPY/MOVE DATA SET

This option presents another menu.

1.3.1 CLEAR

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 <RETURN>.

The message **CLEAR DATA SET - SURE? (Y)** is displayed to remind you that the data set you selected will be cleared. Press Y to continue. Pressing any other key returns you to the MAIN MENU.

1.3.2 COPY

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 data set number and <RETURN>.

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

1.3.3 MOVE

MOVing 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 in the data set number and <RETURN>.

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

The message **CLEAR DATA SET - SURE? (Y)** is displayed to remind you that the data set from which the data was moved will be cleared. Press Y to continue. Pressing any other key returns you to the MAIN MENU.

1.4 DATA SET SIZE

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

WARNING--Because this option establishes arrays in BASIC, all of memory is cleared. Therefore all data values, chart specifications and names are lost when this option is selected.

The message **CLEAR DATA SET - SURE (Y)** is displayed to remind you that all data sets will be cleared. Press Y to continue. Pressing any other key returns you to the MAIN MENU without any changes.

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-dimensional data). Press <RETURN> to accept the default (N). Otherwise key Y and press <RETURN> for two-dimensional data.

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

X OR Y AUTOMATIC? Answer with an X for x-values automatically increasing, a Y or 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 automatic numbering and <RETURN>.

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

At this point, for two-dimensional data, you are returned to the MAIN MENU.

For all other cases, you are asked:

HOW IS THE DATA GROUPED? The first six options are:

1 BY DAY	[SMTWTFs...]
2 BY WEEK	[Wk1..Wk2..]
3 BY MONTH	[JFMAMJJASOND]
4 BY MONTH	[JAN.FEB.MAR..]
5 BY QUARTER	[QTR1.QTR2...]
6 BY YEAR	[1982 1983...]

Key in the number of the starting period and press <RETURN>.

For each of these options you are asked for a starting period (which month, which day, etc.). CHARTPAK-64 later automatically fills the data group names with these selected names.

The seventh option allows you to specify each name:

7 BY OTHER [ACTUAL BUDGET FORECAST..]

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 CHARTPAK-64 asks you to repeat the entry.

You are then 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

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, so for best results you should set up the screen display options first. See [3] DEFINE CHART MENU.

This menu option [1.6] takes you to the data set calculation and printing menu which has the following options:

1.6.1 DATA SET CALCS

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

1.6.1.1 DATA SET ADDITION

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

1.6.1.2 DATA SET SUBTRATION

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

1.6.1.3 DATA SET MULTIPLICATION

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

1.6.1.4 DATA SET DIVISION

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 result 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 the value and press <RETURN>.

You are returned the the main menu when the calculations are completed. You can select option [1.2]: ALTER DATA AND NAMES to see the new values and/or change the name of a new data set.

1.6.2 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 prompts are:

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>.

CHARTPAK-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 (1-3) 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 the letter and press <RETURN>. Next select the line color (2 is white).

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 option [3.5]: CHART LINES. See the DATA REDUCTION TUTORIAL for a discussion and examples of these concepts.

1.6.3 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.

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 (1-3) 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 (2 is white).

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 lines may be adjusted or suppressed through option [3.5]: CHART LINES. 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).

1.6.4 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 a value and press <RETURN>.

If you selected trend smoothing, you must specify the smoothing factor for the trend. Key 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 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.

1.6.5 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.

1.8

DISPLAY DIRECTORY

This option allows you to scan the diskette directory and to select the file you want to read. CHARTPAK-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 your device number and <RETURN>.

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

- 1 DATA FILES (all files on diskette except those beginning with ".S" or "!.")
- 2 SPECIFICATION FILES (only those beginning with ".S")
- 3 ALL OTHER FILES

Press <RETURN> to accept the default value of 1 (DATA FILES).

The size, name and type of all files on the diskette is displayed. There is also an entry number at the left edge of the screen. You may temporarily stop the scrolling of the display by pressing the SPACE BAR. Press it again to resume scrolling.

To select a file to read, key the entry number corresponding to the name and press <RETURN>. The filename corresponding to the entry number is automatically supplied at the next filename prompt. If you want to see the entire list again, key 0 (zero) and press <RETURN>.

If for some reason you do not see the name you want, select one anyway. You are taken 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. The first prompt is for the disk drive device number. Enter the device number and <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 is automatically shown here. Otherwise enter the filename and press <RETURN>.

The final prompt is: DIF FILE (Y/N). If you are not reading a DIF file, answer N and the following prompts will appear:

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

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

If you are reading a DIF file, answer Y to the DIF FILE (Y/N) prompt. See section entitled DIF FILE EXAMPLE on page xxx for prompts and responses.

[2] DISPLAY CHART

When this option is chosen CHARTPAK-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 supply the number of the data set to be displayed. The list of data set names is shown. Key a number and press <RETURN>. Then you will be asked to select the color and line type options for each data point in the data set. Key a color number 1-16 to select a solid color for a segment of the pie chart. If you want segment filled with lines, add 100, 200, 300 or 400 to the color value for the type of line you want (diagonal lines in blue would be 300 + 7, so key 307).

If the segments are too close together, go to [3/3/4] to change the segment separation.

[3] DEFINE CHART MENU

Options:

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 PLOT
```

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 display a chart [2] and no chart type 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 **CHARTPAK-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 number 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 **<RETURN>** and you can redo the selection process.

For a chart type **C** (comparison), data set selection is required, as you must select the 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 menu has three options:

3.2.1 INDEPENDENT AXIS INFO

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

NORMAL (0) OR LOG (1) SCALE - You can select a normal or logarithmic scale along this axis. All values must be greater than 0 for log scale to work. Key 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 keying [1.1] or file reading [1.9]. Key in the desired value and press <RETURN>.

NUMBER OF DIVISIONS - This is the number of reference lines and values (in addition to the minimum line) along the axis. Normally you adjust the minimum, maximum and number of divisions to get even values long 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. For example, -4 means 4 divisions with only tic marks.

GRP NAMES -> (0) or V (1) - This option lets you control whether the 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>.

COLOR - This option lets you select a color for the axis, legend, group names and scale lines. Key in the number of the color desired and press <RETURN>.

You are then returned to the MAIN MENU.

3.2.2 DEPENDENT AXIS INFO

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

NORMAL (0) OR LOG (1) SCALE - This options allows either normal or 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 value after keying [1.1] or file reading [1.9]. Key in the desired value and press <RETURN>.

MAX VALUE - This is the largest value along the axis. This value defaults to the largest value after keying [1.1] 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 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 maximum to the largest positive number, the minimum to the largest negative number and then the base value to 0. This draws the bars going both up and down.

NUMBER OF DIVISION - This is the number of reference lines and values (in addition to the minimum line) along the axis. Normally you adjust the minimum, maximum 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. For example, -4 means 4 divisions with only tic marks.

COLOR - This option lets you select the color for the axis, legend, group names and scale lines. Key in the number of the color desired and press <RETURN>.

You are then returned to the MAIN MENU.

3.2.3 SELECT GRAPH RECTANGLE

This option lets you adjust the shape of the chart by moving the two diagonal corners with the cursor control keys. When this option is selected, the graphics screen (displaying the last chart drawn) is shown with a flashing cursor 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 cursor appears in the upper right corner. Again, move the cursor with the cursor control keys and then press <RETURN>. You are then returned to the MAIN MENU.

3.3 CHART OPTIONS & COLORS MENU

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

3.3.1 SELECT LINE CHARTING OPTIONS

This process repeats for each data set:

PLOTTING SYMBOL - The default for each plotting symbol is the data set number. You may change to any letter (or two letters) or graphic symbol. 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>.

LINE COLOR - The default line color is white (2). Key in the number of the color desired and press <RETURN>.

When all line are reviewed, you are returned to the MAIN MENU.

3.3.2 SELECT SCREEN COLORS

This option lets you select:

SCREEN COLOR - This is the background color of your chart. Key in the number of the color desired and press <RETURN>.

BORDER COLOR - This is the border color surrounding the background color. Key in the number of the color desired and press <RETURN>.

CHAR SET (1-4) - This lets you change the char-

acter set to upper and lower case (3) or the reversed normal characters (2) or reversed upper and lower (4). You may have to shift the screen to read options 3 & 4 on the entry screens. Do this by pressing both the shift and C= keys at the same time.

You are then returned to the MAIN MENU.

See APPENDIX C for color numbers.

3.3.3

BAR CHART OPTIONS

BAR GROUPINGS - 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 all of data set 2 is shown next, etc.

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

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

CHARTPAK-64 computes the minimum and maximum values after the data is entered, assuming normal bar charting is used. Therefore when you select stacking, the maximum value of the dependent axis needs to be increased to handle the sum of the data values.

You also must enter:

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

SPACE BETWEEN BARS - This is the number of pixels left between each bar. Enter the desired number of pixels and press <RETURN>.

BAR FILLING OPTIONS - There are 24 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 RIGHT DIAG BARS - the bar is filled with diagonal bars going down from left to right
- 6 LEFT DIAG BARS - the bar is filled with diagonal bars going up from left to right
- 7 DIAG CROSSHATCH - the bar is filled with both diagonal bars creating a diagonal crosshatch
- 8 DOTS - the bar is filled with dots

The first 4 options fill bars much faster than the others. Bars may be filled with colors. Simply enter the color number + 100 (101 = black, 102 = white, etc.).

There are two cautions. First because of the way the Commodore 64 high resolution mode works, there may be color bleeding into adjacent bars or points unless there is a lot of room around each bar. Second, unless you are using a color printer, colors give no difference on a printout, so all bars look alike on paper.

The last prompt asks for the bar drawing color. This is useful with the bar filling options to give color on the screen although there is still no difference on the printout. Enter the color number (1-16). See APPENDIX C and APPENDIX H.

You are then returned to the MAIN MENU.

3.3.4 **PIE CHART SEGMENT SEPARATION**

The separation of each section of the pie chart from the center of the circle is specified. This may be reduced from the default value, at the risk of some color bleeding.

3.4 **CHART DESCRIPTIONS**

This option lets you add descriptive information to your chart. You can give the chart a title or add legends to the chart.

3.4.1 **CHART TITLE**

The first prompt asks you for the title of the chart. Key the title (which may be 40 characters long) and <RETURN>.

The graphic screen (displaying the last chart drawn) is shown with a flashing cursor in the title position (normally the upper left corner)

Use the cursor control keys to move the flashing cursor to the desired position and then <RETURN>.

Next you are asked for the color number of the title. Key in the number of the color desired and press <RETURN>.

You are then returned to the MAIN MENU.

3.4.2 DATA SET LEGEND POSITIONS

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

3.5 CHART LINES

You may add up to three "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 values, 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 (1-3) and then <RETURN>.

VALUES

< and up-arrow END. This is the value (or x & y coordinates) of the left end of the line in the vertical graph or bar case, or the upper end in the horizontal or bar graph case. Key in the value desired and press <RETURN>.

>V END. This is the value of the right or lower end of the line. Key in the value desired and press <RETURN>.

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

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

COLOR - Key the color number of the line and then <RETURN>.

3.8 **DISPLAY DIRECTORY**

The prompts and their meanings are the same as the DISPLAY DIRECTORY screen [1.8].

A FILE TYPE of 2 (SPEC FILES) is the default.

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 into the computer [1.9].

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

The second prompt is for the filename. The filename must not have ".S" as the first character. Enter the filename and press <RETURN>.

CHARTPAK-64 saves the data file to disk. If a file with the same name already exists, you see the prompt: **REPLACE? (Y/N)**. If you press Y, the data from memory overwrites the old file on the disk and will do a diskette **COLLECT**. If you press any other key (including <RETURN>), you are returned to the start of this menu.

4.2 SAVE SPECIFICATIONS

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. Enter the filename and press <RETURN>.

CHARTPAK-64 saves all of the specs to disk. If a file with the same name already exists on the disk, you see the prompt: **REPLACE? (Y/N)**. If you press Y, the specs from memory overwrite the old file on the disk and CHARTPAK-64 will do a diskette **COLLECT**. If you press any other key (including <RETURN>), you are returned to the start of the menu again.

4.8 DISPLAY DIRECTORY

The prompts and their meaning are the same as the **DISPLAY DIRECTORY** screen [1.8].

A **FILE TYPE** of 0 (**ALL FILES**) is the default.

[5] FILE COMMAND MENU**5.1 DELETE DATA FILE**

This option removes the specified data file from the disk.

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

The second prompt is for the data 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 <RETURN>.

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

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

5.4 COPY FILE - SINGLE DISK

This option allows you to make a copy of a file on the same diskette.

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

The second prompt asks you to enter the name of the destination and source files in the form "new=old".

5.5 NEW DISKETTE

This option initializes 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 a two-character (alphanumeric) identifier and press <RETURN>.

5.8

DISPLAY DIRECTORY

The prompts and their meaning are the same as the DISPLAY DIRRECTORY screen [1.8].

A FILE TYPE of 0 (ALL FILES) is the default.

[6] PRINT CHART

This option reproduces your chart onto an attached printer.

6 PRINT CHART

Enter the printer device number to be used to print the chart. The default is device 4. Printing takes about 1.5 minutes on an EPSON FX-80 and about 4.5 minutes on a CBM-1525. After printing is completed, you are returned to the MAIN MENU.

See APPENDIX A for information about printer support.

The first prompt is the device number. The default of 4 is supplied. If your printer is attached as device 4, press <RETURN>. If some other number, key that number and press <RETURN>.

The first time you go through this option after resetting all data sets [1.4], you will also be asked to supply the following:

GRAPHIC SECONDARY ADDRESS. This is a secondary address which is used to setup interfaces if used. See Appendix A for usual values.

ASCII TRANSLATE (0/1) In some cases it is necessary for CHARTPAK-64 to pre-translate ASCII codes to printer interfaces. See Appendix A for these values.

For Commodore 1525, 1526 and MPS 801 and Okimate printers, use the default values 0 and 0.

Last you are asked if you want a small (0) or large (1) size chart. The small size prints one printer pixel for each screen point, the large one is double in both directions. There will probably be some stretching distortion in one direction or other, as most printers do not have the same proportions as monitors or TVs.

[7] SAVE/RESTORE GRAPH SCREEN**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 the 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 then you will get the "FILE EXISTS" message. Press <RETURN>. The chart IS NOT SAVED and you are returned to the start of this menu. You will have change the name of the file you want to write or go to menu option [5.1] and delete the file on disk and then save the chart.

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. Select FILE TYPE 3 to see chart screen files.

A FILE TYPE of 3 (OTHER FILES) is the default.

[8] EXIT TO BASIC

8 EXIT TO BASIC

This option resets the computer for normal BASIC operation. Before the resetting process starts, you are asked: ARE YOU 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 powerful package, there are a series of data file and chart specifications included on the distribution diskette. To see these, simply follow these instructions:

If CHARTPAK-64 is not in the computer, load and run it.

Go to screen [1/8] and select data files (1). Select data file name DATA.1 (2) and press <RETURN>. Then press <RETURN> two more times and the disk drive should start reading. All of the demonstration files are non-DIF files, so answer N the prompt. You are 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 to screen [3/8] to read in the spec file. After the disk drive device default, select spec files (2) and <RETURN>. Select .SDATA.1A (1) and read it into CHARTPAK-64.

When the MAIN MENU reappears, go the screen [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).

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

Go to screen [3/9] (from now on we will key the filenames directly and always default the device number) and change the 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. The rainbow in the left group is not intentional, it is due to the TV system with high density vertical lines.

Now go to screen [3.9] and select .SDATA.1C spec file 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 combined.

Go to screen [3.9] and read in .SDATA.1D. Again this is the same data, only shown in a vertical graph format.

Go to screen [3.9] and read in .SDATA.1E. 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 fatures of CHARTPAK-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 line on a log chart. Go to screen [3.9] and read in .SDATA.LEL and display it. Note how the dependent (value) scale is compressed at the right side?

Go to screen [3.9] and read in .SDATA.LF and display it. This is an example of stacked horizontal bars. It uses diagonal filling and dots. Note also 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 pictures. The resolution of the printer is higher than most TV sets.

To clear all of the data sets, go through screen [1/4]. Press Y to clear the data sets. Use default sizes - 4 data sets and 55 points. Go to screen [1/9] and after the device default, type DATA.2 as the filename. Accept all data sets and group names. Then go to screen [3/9] and read in DATA.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 are asked for colors, press <RETURN> to accept the saved values.

Again reset the data sets by going to screen [1/4]. Press Y to proceed with clearing the data sets.

Read in data file DATA.3 and spec file DATA.3A. This is a vertical graph comparison of actual data versus budget for a fiscal year.

Reset the data sets [1/4] and read in data file DATA.4 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 CHARTPAK-64 using screen [1/4] and read in data file DATA.5 and spec file 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 (18,800 and 28,200).

Go to screen [3/9] and read in DATA.5AL and see the same data on a log scale.

The next example requires changing the data set size to 1 X 108. Simply go to screen [1/4] and enter 1 for the number of data sets, and 108 for the maximum number of points. Go to screen [1/9] and read in DATA.6 and spec file DATA.6. Note that the bottom of the chart has been moved up, the bar width is 1 and the bar spacing is 0.

The final examples are X-Y charts is 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 use the two defaults for number of data sets and data items. Then go to screen [1/9] and read the data file "SOL-CURVE". Respond Y and <RETURN> to the data set name and number prompts for the three compounds and Y to the data grouping names. Don't worry about the 'funny' characters in the names.

Next go to screen [3.9] and read the chart specifications. The filename is also "SOL-CURVE". Display the chart on screen [2]. Note that the a "help" line (entered on screen [3.5]) was used to extend the line for Potassium Nitrate (P line) down into the lower corner. Note also that this chart uses the upper/lower case features of CHARTPAK-64. The normal character set is "1" which displays upper case and graphics. Character set "3" gives upper/lower case. When using these you must switch the normal screen displays to upper/lower case (press the SHIFT and C= keys at the same time) in order to see the legends, etc. as you enter or alter them.

Look at the charts and notice how all of the curves seem to have a slight bend in them, bending up towards the right. This is ususally the case when a relationship has a constant RATE of increase. To see if this is true, we changed the dependent axis to a log scale. To see the resulting chart, go to screen [3/9] and load "SOL-CURVEL". Then display the chart using screen [2]. Note also how the data set legends are moved to a free space on the chart.

See APPENDIX G for sample charts.

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 sample worksheet). The data we want to chart are 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 the number of data sets and (55) for the number of points. Go to [1/8] to read the directory on device 8. Select data files (option 1) and <RETURN>. You will see all the 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 device 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 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 (rows) 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 CHARTPAK 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 CHARTPAK 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 "reading rest of data" appears for about 15 seconds while the data is read in. You are then returned to the main menu.

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

FILE CONVERSION PROGRAM

To use information from **Busicalc 1** or **Multiplan** spreadsheets in **CHARTPAK-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 formulas)
or

Save the data in **Multiplan** using the **SYLK** option.

Remove the diskette with the data from the drive.

Type: **LOAD"FILE CONVERSION",8 <RETURN>**

Type: **RUN <RETURN>**

You are for the number of data sets and the maximum number of points (just like screen 1.4). Accept 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.

You will be asked the following 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 the 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 **CHARTPAK-64** format.

Then load **CHARTPAK-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 CHARTPAK-64 format.

Then load CHARTPAK-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 column or row. Next you are asked how many of the 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 CHARTPAK-64 format.

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

DATA REDUCTION TUTORIAL

INTRODUCTION

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

If you haven't already done so, load CHARTPAK-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 whats REALLY HAPPENING, so we can plan for the future.

The easiest data reduction methods involve data set arithmetic. In the section A CHARTPAK-64 TUTORIAL you made a chart showing how the two years of lemonade stand sales compare as in Figure 1.

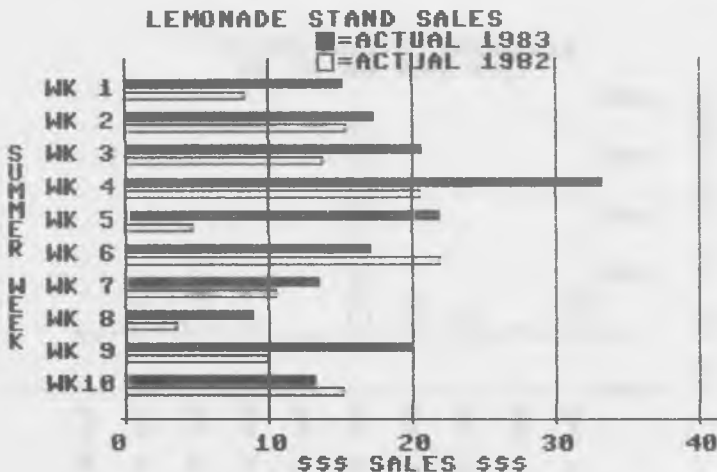


Figure 1

Even that chart didn't really help get at the TRUTH about how much we are ahead or behind last years sales. What we need is a chart showing the percent this year is ahead or behind last year each week. Go to [1/8] and read the LEMONEX data sets into the computer containing both Actual 83 and Actual 82 data. Then go to [3/9] and read the spec file, then draw/display the chart [2]. 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:

[1/6/1/4] (Divide) : DS 3 (ratio) = DS 1 (Actual 83) divided by DS 2 (Actual 82).

[1/6/1/2] (Subtract) : DS 3 (ratio-1) = DS 3 (ratio) minus DS 0 (constant value 1)

[1/6/1/3] (Multiply) : DS 3 (percent vs 82) = DS 3 (ratio-1) times DS 0 (constant value 100)

Use [3/1] to change chart type to VB and display sequence (show data set 3 only) and go to [1/2] to change the data set 3 name to "% chg 83 vs 82". Goto [1/3/2] 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 as in Figure 2. You may also want to change bar width, add lines etc.

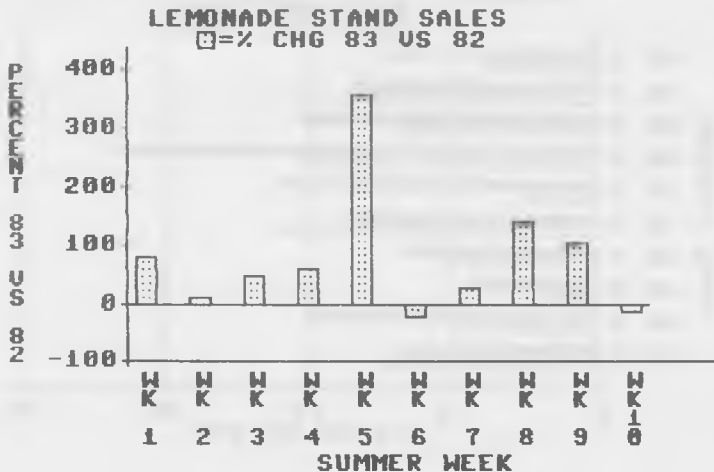


Figure 2

Use [1/6/5] to print the the data in all three data sets as in Figure 3:

PT #	DATA GROUP NAME	ACTUAL 1983	ACTUAL 1982	% CHG 83 VS 82
		> X-VALUE <	> X-VALUE <	> 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	13.88	49.1354467
4	WK 4	33.15	20.6	60.9223301
5	WK 5	21.91	4.8	356.458333
6	WK 6	17.16	22	-22
7	WK 7	13.45	10.5	26.0952381
8	WK 8	8.92	3.71	140.431267
9	WK 9	20.11	9.85	104.162437
10	WK 10	13.17	15.2	-13.3552632

Figure 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.

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 Figure 4 and the chart Figure 5.

PT #	DATA GROUP NAME	ACTUAL SALES : SEASONAL FACT:	
		> X-VALUE <	> 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

Figure 4

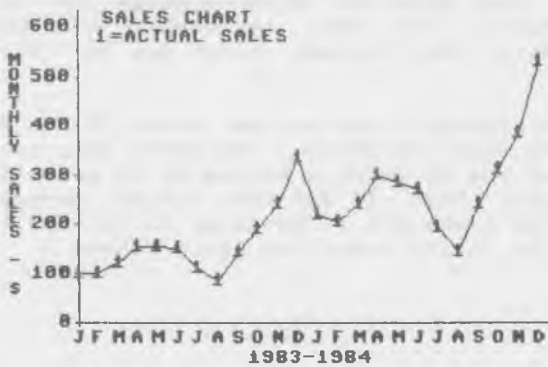


Figure 5

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 Figure 6. PS-THE REAL WORLD IS SELDOM THIS GOOD!



Figure 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 CHARTPAK with 4 data sets of 55 each (default) by going to menu [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 as in Figure 7. If you turn the data group names vertical on the bottom and select no character for the line symbol [3/3/1]. To compute and display the average, go to [1/6/2] and select the price data set (1) to be averaged. Note that the total, average and standard deviation is shown.

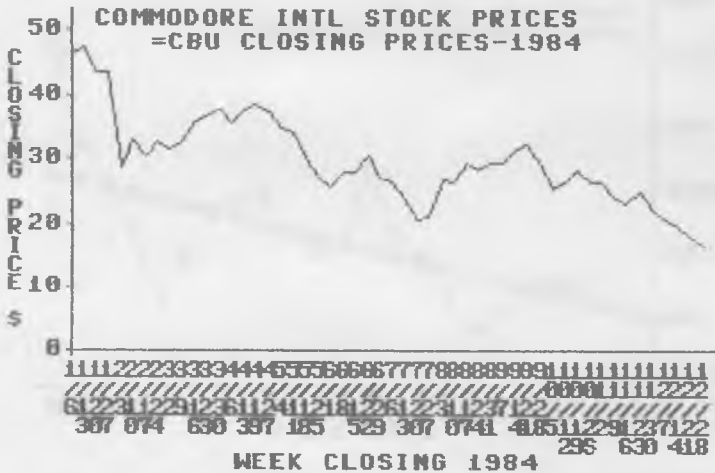


Figure 7

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 or minus one standard deviation ($29.85 \pm 6.79 = 36.64$ 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 (2=white).

The next prompt asks 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 (press 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 display/draw the chart [2]. See Figure 8.

To further understand the lines, go to [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 standard deviation.

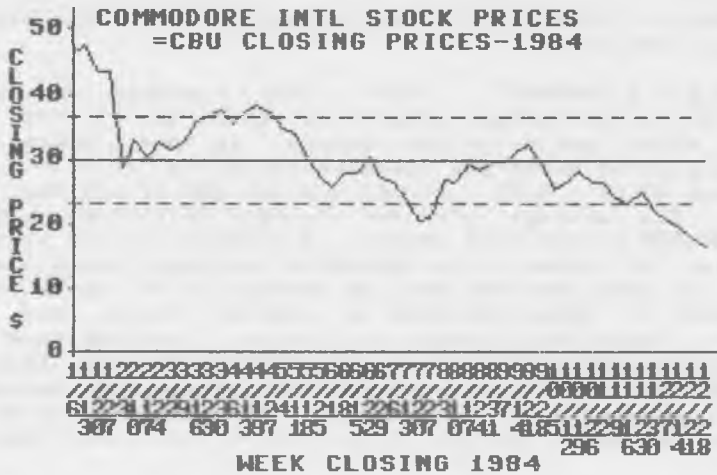


Figure 8

Press the F7-key to display 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 to [1/6/3], 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 Y
 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 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. Since you had line 1 solid before and the two std deviation lines dashed in the average example, you will be able to default through all of the line options. CHARTPAK-64 will automatically change the values. Then select [2] to draw/display the chart as in Figure 9. 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:

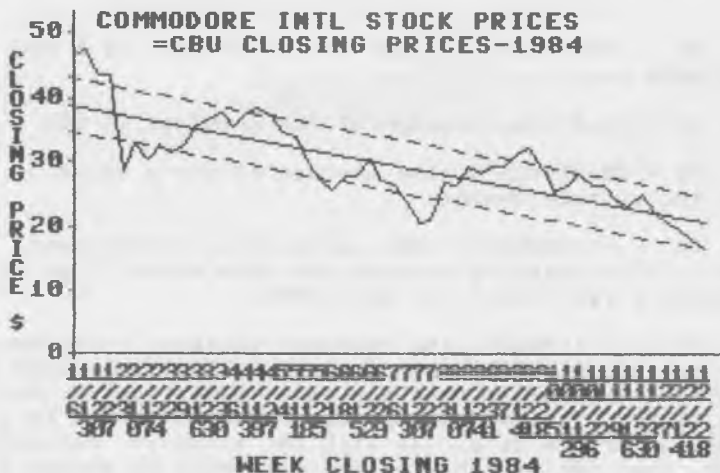


Figure 9

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 1 (go to [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 to [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 to [2] to draw the chart. See Figure 10. This is a scatter diagram of 13 x,y pairs of points. What is the line which best fits the data?

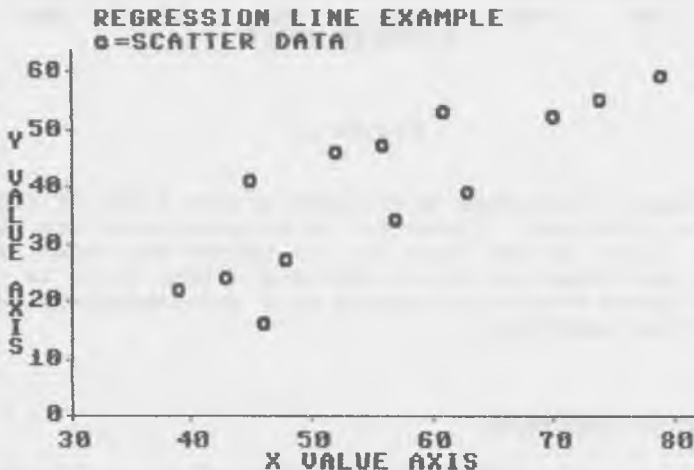


Figure 10

Go to [1/6/3] and select data set 1 as input. Make the regression line solid and the +/- 1 residual variance lines dashed and then plot the chart. It should look like Figure 11. (Note that 8 of the 13 points (61%) are within the residual variance lines).

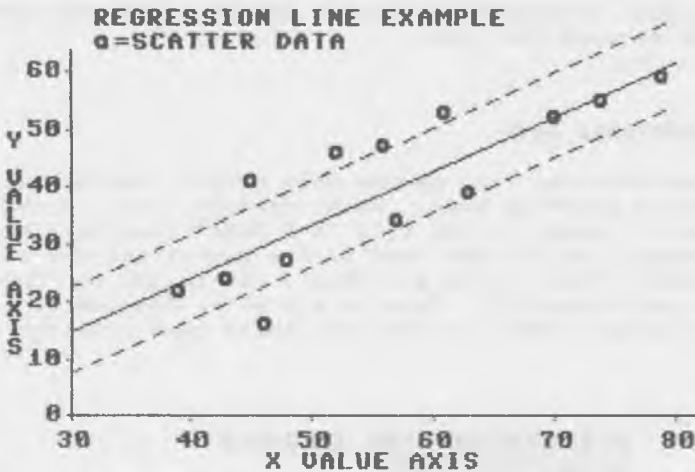


Figure 11

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 .72, .61, .52 and so on downward. This seems to correspond 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:

$$\text{new smoothed value} = (.15 * 121) + (.85 * 100)$$

which equals 103.15, up from 100 the prior month

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

$$\text{new smoothed value} = (.15 * 115) + (.85 * 103.15)$$

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 the data listing in Figure 12 and chart in Figure 13. Note how the line for the trend-adjusted smoothing rises faster (and actually overshoots slightly) the step function. The factor used to multiply times the trend is usually:

$$\frac{(1 - \text{trend smoothing factor})}{\text{trend smoothing factor}}$$

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

STEP FUNCTION IS .15[STEP FU:IT .15[STEP FU:IT 5.666666671					
PT #	DATA GROUP NAME	X-VALUE (<)	X-VALUE (<)	X-VALUE (<)	X-VALUE (<)
1	A	0	0	0	0
2	B	0	0	0	0
3	C	0	0	0	0
4	D	1	.15	.0225	.2775
5	E	1	.2775	.03825	.49425
6	F	1	.385875	.04876875	.66223125
7	G	1	.47798375	.05527125	.7811975
8	H	1	.556294688	.0587257031	.888073672
9	I	1	.622850484	.0599002172	.86228505
10	J	1	.679422812	.0584010487	1.01602885
11	K	1	.727508475	.0577038759	1.05449811
12	L	1	.768383854	.0551793313	1.08106593
13	M	1	.803125596	.0521138128	1.0984372
14	N	1	.832656756	.0487264151	1.10877311
15	O	1	.857758243	.0451826758	1.11378934
16	P	1	.879094586	.041605714	1.11486022
17	Q	1	.89723033	.03808852305	1.11304664
18	R	1	.91264578	.0346847635	1.10919277
19	S	1	.925748814	.0314475189	1.10395152
20	T	1	.936886577	.0284810405	1.09782581
21	U	1	.94635358	.0255689364	1.0911989
22	V	1	.954488552	.0229338482	1.08435888
23	W	1	.96124847	.0205187517	1.07753186
24	X	1	.967054398	.0183138784	1.07083384
25	Y	1	.971896238	.0163088727	1.06440665
26	Z	1	.976186884	.0144819464	1.05831783
27		1	.979767282	.0128537264	1.05268587
28		1	.98288219	.0113889836	1.04729398
29		1	.985381862	.0100687188	1.0423926
30		1	.9873745828	.88851888E-03	1.03789752
31		1	.9889438385	7.8288131E-03	1.03387814
32		1	.9818226366	.89144724E-03	1.03007417
33		1	.992369246	.85972886E-03	1.02678766
34		1	.993513854	5.3224548E-03	1.02367443
35		1	.9844867764	.67882488E-03	1.02095825
36		1	.985313764	.89356867E-03	1.01851865
37		1	.9968166963	.58497376E-03	1.01633155
38		1	.9966141913	1.3685204E-03	1.01438969
39		1	.8871220642	.74258484E-03	1.01266292
40		1	.8875537532	.39588278E-03	1.01113842
41		1	.897828682	.88154894E-03	1.00997276
42		1	.8882325871	.82458426E-03	1.008857185
43		1	.8884876991	.59867181E-03	1.00751151
44		1	.998723844	1.3858729E-03	1.00657632
45		1	.9988145871	.28672348E-03	1.00575269
46		1	.9988773891	.85813675E-03	1.00502818
47		1	.9992157889	1.3374759E-04	1.00439158
48		1	.9893334217	.94813288E-04	1.00383283
49		1	.9894334886	.89989314E-04	1.00334288
50		1	.8895183875	.88171233E-04	1.0029137
51		1	.9895986365	.28131637E-04	1.00253885
52		1	.8886528424	.51322555E-04	1.00228854
53		1	.8887842353	.81453254E-04	1.00182247
54		1	.88874863	.38388873E-04	1.00167181
55		1	.88978631	2.8413797E-04	1.00145388
56		1	.8888183642	.54825388E-04	1.00126237
57		1	.8888456892	.28688318E-04	1.00108618

Figure 12

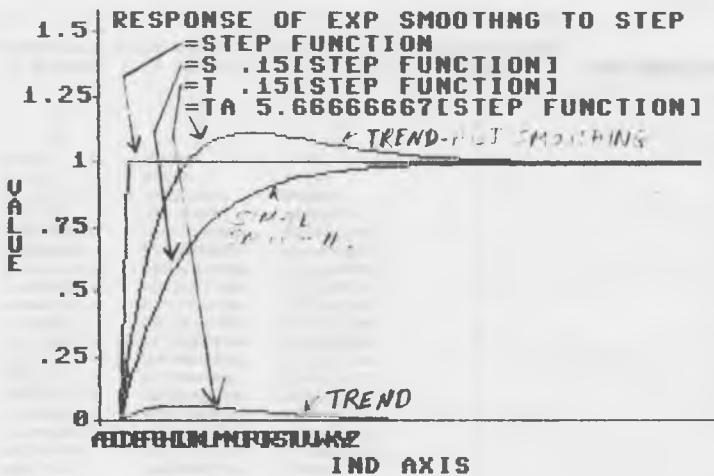


Figure 13

To see this in action, reload the Commodore stock price data. Restart CHARTPAK with 4 data sets of 55 each (default) by going to menu [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 [3/9]. Draw the chart (option 2) to confirm that it is loaded correctly.

Go to [1/6/4] 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.

Go to [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 as in Figure 14. Note that the trend only moves slightly. If you wanted to highlight it you could multiply it by 10.

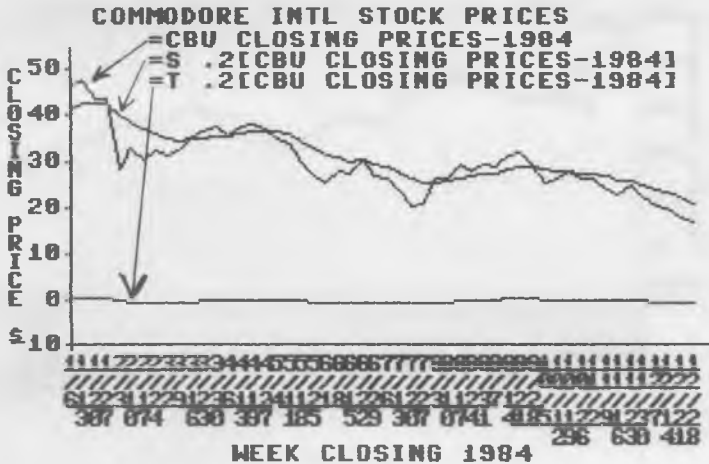


Figure 14

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.

Go to [3/1] and change the display sequence to 1 (raw prices) and data set 4 (trend-adjusted). See Figure 15. Compare the simple smoothing from Figure 14 with the new trend-adjusted smoothing.

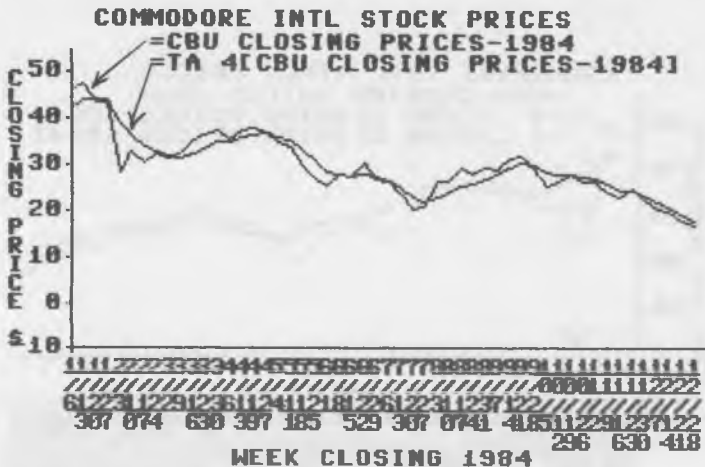


Figure 15

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) as in Figure 16. 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.

PT #	DATA GROUP NAME	CBU CLOSING P16 .2(CBU CLOSIT .2(CBU CLOSITA 4(CBU CLOS:			
		X-VALUE (>)	X-VALUE (>)	X-VALUE (>)	X-VALUE (>)
1	1/6	46	41.2	.240000001	42.16
2	1/13	47.75	42.51	.454000001	44.326
3	1/20	43.625	42.733	.407000002	44.3642
4	1/27	43.75	42.8364	.366920002	44.40408
5	2/3	28.5	40.04912	-.283818999	38.81344
6	2/10	33	38.638296	-.509100799	36.6029928
7	2/17	30.375	36.9864368	-.737052478	34.0350268
8	2/24	32.75	36.1391495	-.759739454	33.1001916
9	3/2	31.625	35.2363196	-.78035754	32.0028804
10	3/8	32.5	34.6800557	-.740130816	31.7285004
11	3/16	35.075	34.9262445	-.544673278	32.7475514
12	3/23	36.5	35.2489956	-.372708405	33.749842
13	3/30	37.625	35.7177965	-.202870549	34.9863143
14	4/6	35.75	35.7242372	-.161000299	35.080204
15	4/13	37.75	36.1293898	-.0477761276	35.9382052
16	4/19	38.375	36.5705118	.0516035092	36.7849259
17	4/27	37.375	36.7378095	.0731423364	37.0303709
18	5/4	35	36.3902476	-.0109985101	36.3462535
19	5/11	34.125	35.837198	-.0994087102	35.5395632
20	5/18	38	34.7497584	-.317814089	33.4816889
21	5/25	27.25	33.2498068	-.55360225	31.0353878
22	6/1	25.625	31.7248454	-.74787407	28.7333491
23	6/8	28	30.8788763	-.747293072	27.998704
24	6/15	27.75	30.3339011	-.72702051	27.425703
25	6/22	30.5	30.3671209	-.574979649	28.0672023
26	6/29	27.125	29.7186867	-.588668554	27.3680225
27	7/6	26.625	28.8990573	-.58540271	26.7180265
28	7/13	24	28.0789659	-.680384461	25.356428
29	7/20	28.75	26.6139727	-.837506204	23.2638478
30	7/27	21.125	25.5161702	-.888563071	21.8570227
31	8/3	26.75	25.7629425	-.662298223	23.1137496
32	8/10	26.375	25.885354	-.505356278	23.8638208
33	8/17	28.375	26.5832832	-.264691184	25.5244865
34	8/24	28.125	26.8916266	-.150898676	26.2912638
35	8/31	29.375	27.3883013	-.0207376031	27.3053509
36	9/7	28.25	27.760641	.0578778671	27.9921525
37	9/14	31.625	28.5335128	.200076654	29.3370194
38	9/21	32.25	29.2768103	.30936081	30.5142535
39	9/28	28.075	28.1864402	.231416238	30.1221132
40	10/5	25.375	28.4321586	.0322750622	28.5612588
41	10/12	26.5	28.0457269	-.0514662921	27.8398617
42	10/19	28.25	28.0865815	-.0330021071	27.9545731
43	10/26	26.625	27.7842652	-.0848649447	27.4548054
44	11/2	26.625	27.5604122	-.114662563	27.1017619
45	11/9	24	26.8483287	-.234146536	25.8117436
46	11/16	23	26.0786639	-.341258417	24.7136621
47	11/23	24.875	25.837831	-.321146686	24.5533435
48	11/30	22.5	25.1703448	-.39043475	23.6886058
49	12/7	20.5	24.2362759	-.489161593	22.2396295
50	12/14	20	23.3880207	-.568790308	21.1138985
51	12/21	18	22.3112166	-.670595073	19.6280763
52	12/28	16.75	21.1888732	-.75891672	18.1633064

Figure 16

APPENDIX A

PRINTER / INTERFACE SUPPORT

CHARTPAK-64 support the Commodore 1525E, MPS801 and 1526 printers if they are connected directly to the Commodore 64 or 1541 disk drive.

CHARTPAK-64 also supports the Epson MX-series with Graftrax; EPSON FX-series; EPSON RX-series; STAR Gemini; C. Itoh Prowriter 8510A; OKIDATA Microline 92, 82A w/Okigraph, 83A w/Okigraph, 93 and 84 Step 2; Okimate 10 Color; Siemens PT88/89. To support these printers you must connect the printer to the Commodore 64 or 1541 disk drive with one of the following parallel printer interfaces:

<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SECONDARY ADDR</u>	<u>TRANSLATE</u>	<u>SWITCHES ON</u>
CARDCO	CARD?/A	5	N	
CARDCO	CARD?/G	25	N	
ECX, INC.	C-6401	0	N	*
MICROWORLD ELECTRONIX	MW-302	0	Y	3,4
		0	N	3
MSD INC.	CPI	0	N	1,3,5

* requires that the three position switch is set completely on.

The **SECONDARY ADDRESS** and **ASCII TRANSLATE?** prompts should be answered as per the above table.

When using the Prowriter the secondary address/switch settings for the interface are the same as with the MX-80 if the Prowriter sw 1-7 is OPEN and sw 1-8 is CLOSED

APPENDIX B

ERROR MESSAGES

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 screen [3/3/3] to change the bar width and/or space between the bars.

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 is handled by asking you if you want to replace the file or not.

GREATER THAN MAX-RESIZE - occurs when trying to put a data item into the computer which exceeds the size of the arrays set up. If the data must be read in, go to screen [1/4] to adjust the size of the data set, but beware that all of the data in memory is erased during the resizing.

TOO LONG-REINPUT - occurs when the length of a data group name exceeds 9 characters. Simply abbreviate the name and re-enter.

ERROR-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 on screen [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 minimum-maximum range at the time. Enter a number within the range.

OUT OF RANGE - occurs when selecting a data set outside of the range of number 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 change on screen [1.4], but all data in the computer is erased.

OTHER BASIC ERRORS - Should you encounter any BASIC errors when using CHARTPAK-64, you can recover without losing any data by typing GOTO5 and pressing <RETURN>.

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.

APPENDIX C
COLOR NUMBER TABLE

<u>COLOR_NUMBER</u>	<u>COLOR</u>
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

CHARTPAK-64 FILE FORMAT

DATA FILES

Data files written and read by CHARTPAK-64 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)

BUSICALC FILES

Although CHARTPAK-64 cannot create BUSICALC files, it can read them. BUSICALC files have an ! as the first position of the filename on dis. The file is organized as follows:

N 1 column number of the upper left cell in the file
 N 2 row number of the upper left cell in the file
 N 3 column number of the lower right cell in the file
 N 4 row number of the lower right cell in the file
 N 5 the column width
 N 6-n the data values from the cells in column by column sequence

BUSICALC is a product of SKYLES ELECTRIC WORKS

ACHARTPAK-64 SPECIFICATION FILES

CHARTPAK-64 specification files are standard COMMODORE sequential files. The diskette filename has ".S" as the first two characters.

N 1 background screen color number
 N 2 border color number
 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 number
 N 8 dependent axis color number
 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 number
 N 16 auto increment starting number
 N 17 auto increment increment
 N 18 group code selection
 N 19 starting number
 N 20 number of active data sets
 N 21 max. number of points in all data sets
 N 22 min x-value (ind. axis)
 N 23 min y-value (dep. axis)
 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 segment separation
 N 28 data set legend x-coordinate
 N 29 data set legend y-coordinate
 N 30 x-position of upper right graph rectangle
 N 31 y-position of upper right graph rectangle
 N 32 group name switch 0=horiz,1=vertical
 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)
 \$ 36 chart type
 \$ 37 dependent axis legend
 \$ 38 independent axis legend
 \$ 39 bar grouping (M,G or S)
 \$ 40 chart title
 \$ 41 two dimension (Y/N)
 \$ 42 automatic numbering(Y or N or null)

For each active data set:

\$ 43 line type (S,D or N)
 \$ 44 not used
 \$ 45 plotting character
 N 46 line color number
 N 47 bar filling number

For the maximum number of data points:

\$ 48 data group names

For the three possible "help" lines:

\$ 49 line type (S,D, or null)

N 50 line color number
 N 51 end point x-value
 N 52 end point y-value
 N 53 other end point x-value
 N 54 other end point y-value

For the maximum number of data sets

N 55 data set numbers in display sequence

DIF FILE REFERENCE

The DIF-file reading routines in CHARTPAK-64 are in accordance with the DIF file 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 CHARTPAK-64 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 CHARTPAK 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, CHARTPAK recognizes BOT, EOD, and data value items only.

DIF FILE REFERENCES

DIF: A FORMAT FOR DATA EXCHANGE BETWEEN APPLICATIONS PROGRAMS

BYTE magazine, November 1981, pp 174+

Candace E. Kalish & Malinda F. Mayer

DIF Clearinghouse

POB 527

Cambridge, MA 02139

THE DIF FILE

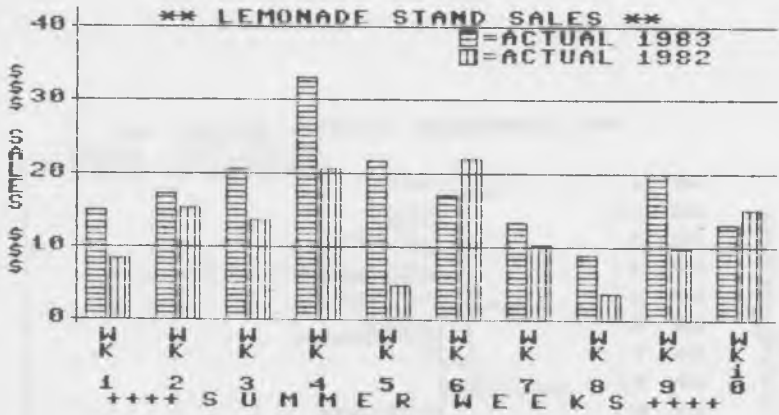
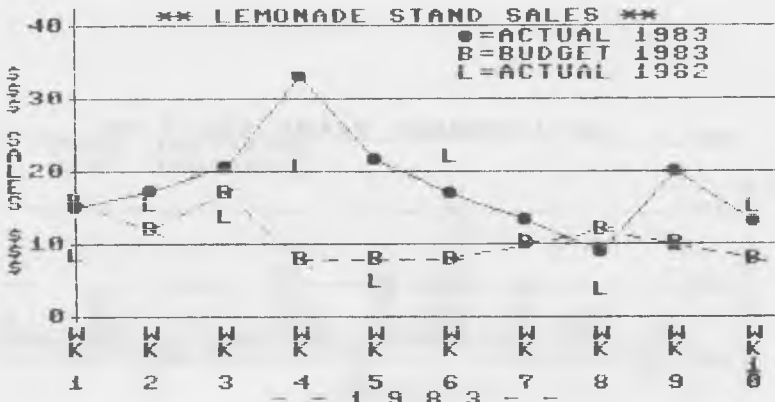
for users of VisiCalc and other software

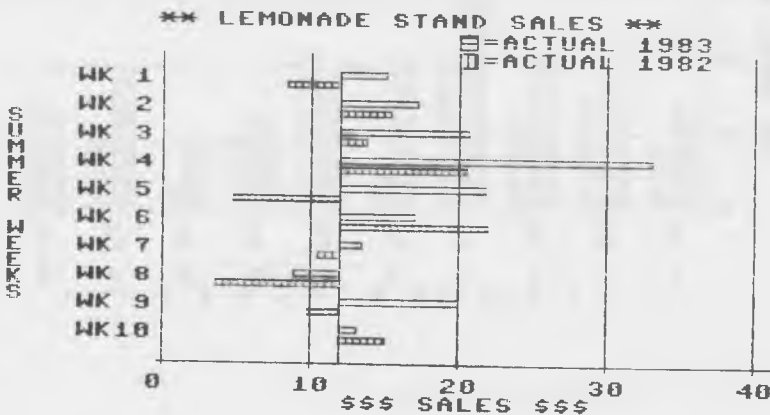
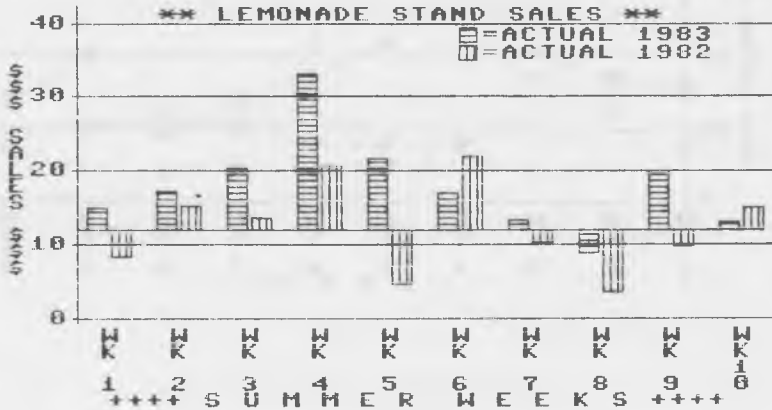
Donald H. Beil

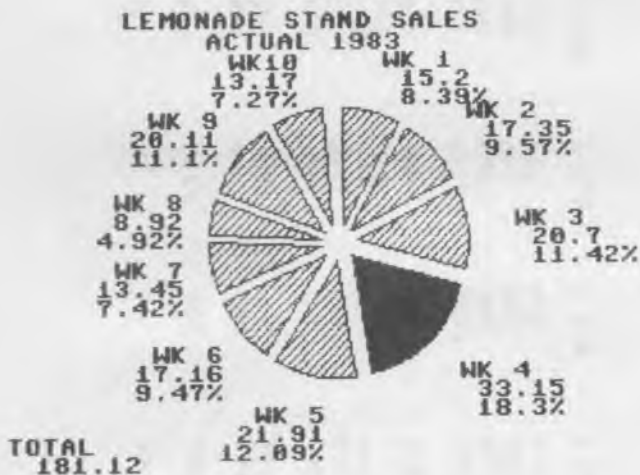
Reston Publishing Company, Inc.

Reston, VA

APPENDIX E
 SAMPLE LEMONDADE STAND CHARTS



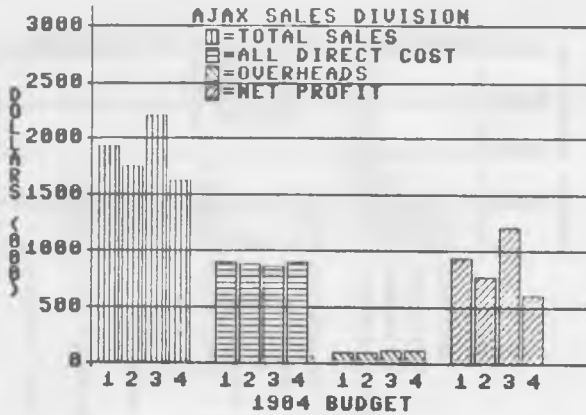
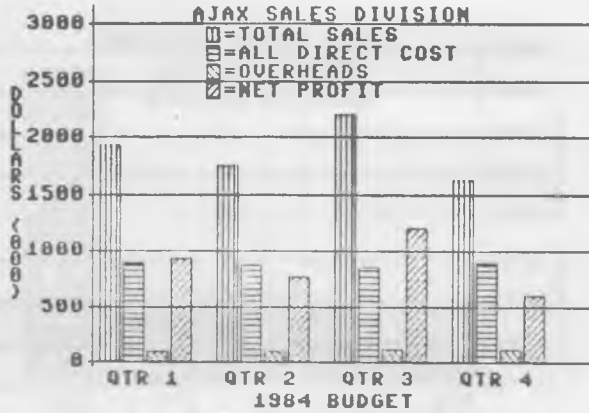


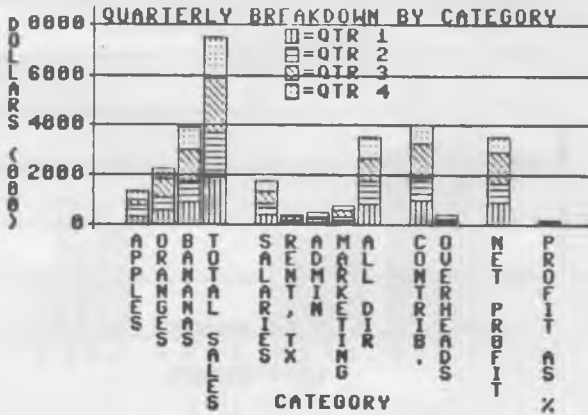
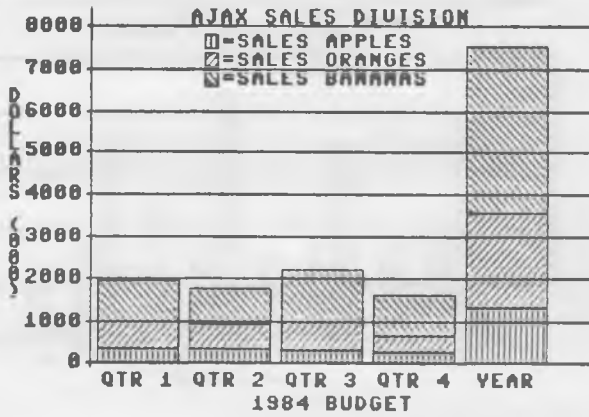


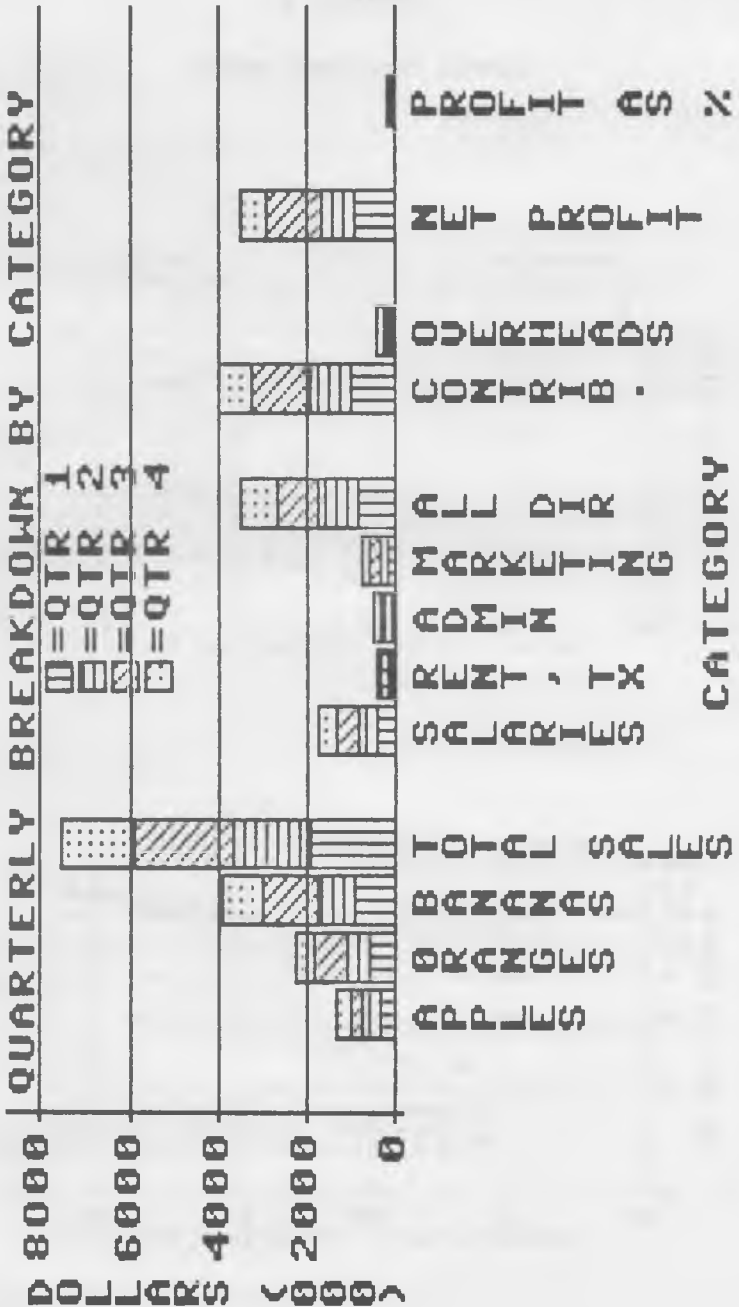
APPENDIX F

SAMPLE DIF CHARTS AND DATA

1984 BUDGET	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
SALES APPLES	375	375	300	275	1325
SALES ORANGES	600	550	700	400	2250
SALES BANANAS	970	830	1200	946	3946
TOTAL SALES	1945	1755	2200	1621	7521
SALARIES	440	440	450	460	1790
RENT, LOCAL TAX	110	115	110	110	445
ADMINISTRATION	140	125	120	140	525
MARKETING	215	195	190	185	785
ALL DIRECT COST	905	875	870	895	3545
CONTRIBUTION	1040	880	1330	726	3976
OVERHEADS	103	100	115	120	438
NET PROFIT	937	780	1215	606	3538
PROFIT AS %	48	44	55	37	47

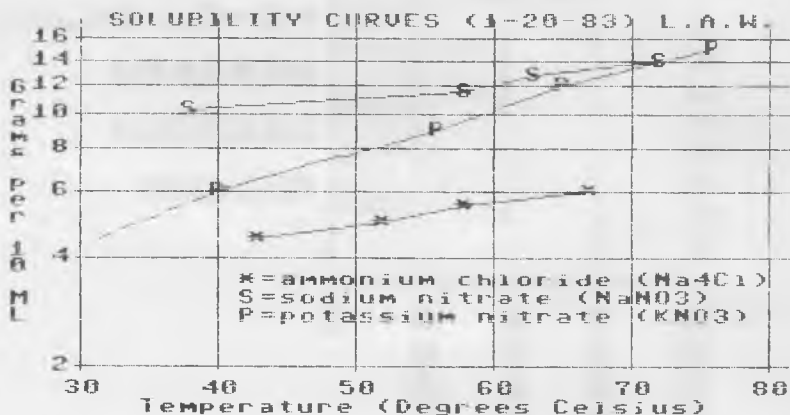
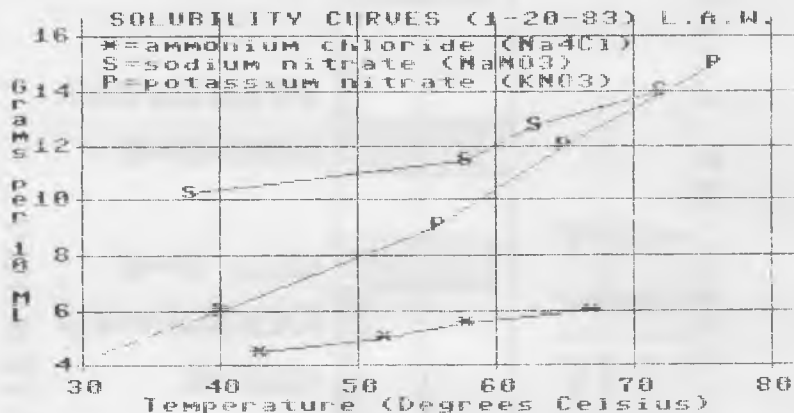






APPENDIX G

SAMPLE CHEMISTRY CHARTS



APPENDIX E

NOTE ON USING COLOR

Chartpak-64 is designed primarily for chart output to an ordinary dot matrix printer, which is black and white. All of the color defaults in the system are set up for white characters on a black screen. All of the black and white printer modules print the writing on the screen (whether white or another color) as black on the printer and the paper supplies the white background.

The color printer modules are different. They put the same colors on the paper as on the screen (black=black, green=green, etc.). Therefore if you print one of the examples out on the color printer in color mode, you will be printing a solid black background with the colors on top. This may be ok, but the black background shows up any slight misregistration of the rows much more than you may want. The solution is to change the background (screen color) of the chart to white (3.3.2), and change the writing colors to black or some other dark color(s) (3.2.1, 3.2.2, 3.3.1, 3.3.3, 3.4.1, 3.5).

The other problem is color "bleeding". The graphic screen on the Commodore 64 is divided into 1000 cells (25 rows of 40 cells per row). This is the same organization as in normal text mode on the screen. In any one cell, only one color is allowed (in addition to the background color). The color that will show in a cell is the last color written to that cell. When you write the reference grid on the screen in white and then plot a line in green, you will see the green change the color of the reference grid where both lines cross through the same cell.

Solutions to this problems are to use bars instead of lines where possible, adjust the bar width and bar spacing to minimize the bleeding (each cell is 8 wide), and use the "tic mark only" option for the number of divisions on 3.2.1 and 3.2.2 to avoid writing the division grid at all. Notice the difference between the DATA.4 examples DATA.4A and DATA.4B. You may also need to adjust the position of the chart title (3.4.1) and/or the position of the data set legends (3.4.2) to eliminate bleeding.

Also note that on the Okimate 10 Color printer, some colors are solid, while others have half-tone patterns. This was necessary to generate the 16 Commodore colors using the three colors of the ribbon. For best color resolution on small printouts, use the solid colors (black, blue, green, red, yellow, cyan).

GET THE MOST OUT OF YOUR
COMMODORE-64



CHARTPAK-64

PROFESSIONAL CHARTS & GRAPHS

For the professional who wants to easily create high quality charts and graphs without programming. 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. CHARTPAK-64 handles up to four data sets totaling 200 points. STATISTICAL ANALYSIS features include data reduction, exponential smoothing, least squares and more. DIF file interchange. OPTIONAL printout (2 sizes) to 1526, 1525E, MPS 801, Epson, Gemini, Okidata, Okimate B/W and Color, Siemens P88 printers.

For Commodore 64 with 1541 disk drive. Printer optional.