Apple Plot

Apple II
Apple Plot

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APPLE PLOT

CHAPTER 1
GETTING STARTED

WHAT YOU WILL NEED

To use Apple Plot, you will need:

* An Apple II or Apple II Plus computer, with 48K of RAM memory;

* A Disk II disk controller and at least one Disk II disk drive;

* A black-and-white or color video monitor or television.

If you do not have an Apple II Plus, then you will need either

* An Applesoft II Firmware Card,

                    -- OR --

* An Apple Language System and a BASICS: diskette.

In addition, it is helpful (but not necessary) to have:

* A printer, either the Apple Silentype Printer with its own interface card, or a Qume Sprint 5 with a Serial Interface card.

* Additional Disk II disk drives.

ABOUT APPLE PLOT

Apple Plot is a program which allows you to create, manipulate, display, and print graphs and charts. You specify the information (as coordinate pairs) which you wish to plot, and tell Apple Plot the format in which you want it to display the graph (a line graph, bar chart, scatter chart, etc.). You can edit and manipulate the resulting graph, add labels, change the scale, or add other data; when you've finished working with a graph, you can save the information about the data and format of the graph onto an Apple diskette, or get the graph printed out on paper.

Apple Plot is a very flexible program. It was constructed in such a way as to allow you to perform all sorts of manipulations on your data and format specifications. Sometimes when you're trying something

with Apple Plot which you haven't done before, you may run into
strange circumstances in which Apple Plot will do something which you
wouldn't ordinarily expect it to do. In cases like this, it is best
to carefully check the information you've given Apple Plot, to see
that it is correct and self-consistent. To help you with this, in
this manual you will occasionally see this symbol:

It means that the next paragraph contains special information which
will give you a helping hand. The symbol

means that the next paragraph describes something you should watch out
for: an unusual feature of Apple Plot which could cause you to lose
some work or data. The symbol

alerts you to be especially careful: the next paragraph describes a
situation in Apple Plot which could cause to not only lose your data,
but all control of Apple Plot as well. Read this paragraph carefully.

This manual uses CAPITAL LETTERS to represent the dialogue between you
and Apple Plot. Words and numbers such as 5 RETURN in the text mean
"type 5 and press the key marked RETURN." Words or phrases
ON A LINE BY THEMSELVES
describe single-line statements displayed by the Apple.

This manual uses the names of four special keys on the Apple's
keyboard: RETURN, RESET, ESC, and CTRL. The first three words mean
"press the key marked so," but CTRL- followed by a single letter means
"hold down the CTRL key and type the following letter."

STARTING UP

Before you begin to use Apple Plot, you should know a little about
your Apple and its disk drive and operating system. Please read the
manual which was supplied with your disk drive, specifically the
sections which deal with unpacking and setup, care of the drive and
diskettes, and booting the Disk Operating System (DOS).

Insert the Apple Plot diskette in the disk drive (Drive 1 if you have
more than one) and boot the system as described in your DOS manual.

If you have an Apple Language System, then you must boot your system
using the BASICS: diskette supplied with your Language System before
you can boot the Apple Plot diskette. See the section "Using BASIC"
in your Language System Manual.

In any case, after you boot your Apple Plot diskette, the screen
should display the message
LOADING APPLEPLOT
If it does not, consult the DOS manual which came with your disk drive
and try again.

BACKING UP

If you're an experienced Apple user (or reader of Apple manuals), then
you don't need to be told again about the necessity of making
duplicate or "backup" copies of your diskettes. If you're not an
experienced Apple user, then you should learn about the necessity of
backing up. Refer to the manual which came with your disk drive, or
the Disk Operaing System (DOS) for details on how and why to backup
your diskettes.

It's a good idea to keep Apple Plot on one diskette, and save your
data files, slide show, and file converter on a separate, INITialized
diskette. That way, you can boot from the Apple Plot diskette, and
keep your data separate on other diskettes, backed up, and without the
storage constraints that arise when Apple Plot shares diskette space.

CHAPTER 2
USING APPLE PLOT

APPLE PLOT IN ACTION

When Apple Plot has finished loading, it will greet you by displaying
a title page and copyright notice. Press the spacebar to proceed.

Next, the Apple Plot Menu will appear:

```
              APPLE PLOT MENU
   1. GRAPH FORMAT SELECTION
   2. X-AXIS PARAMETERS
   3. Y-AXIS PARAMETERS
   4. DATA ENTRY AND EDITING
   5. DISPLAY GRAPH
   6. SAVE DATA TO DISK
   7. RECALL DATA FROM DISK
   8. CLEAR FOR NEW PLOT
   9. PRINT THE GRAPH

ENTER SELECTION NO. :
       <PRESS  Q  TO EXIT APPLE PLOT>
```
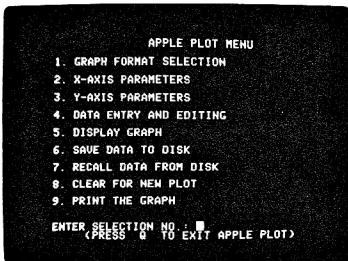
The Apple Plot Menu shows you the nine basic operations of Apple Plot.
To choose one of these operations, simply type the number associated
with the operation and press the RETURN key. For example, type 7 to
select the RECALL DATA FROM DISK operation. The title of the oper-
ation you've selected will appear at the bottom of the screen, with a
request for verification. If this is indeed the operation you want to
perform, press RETURN to proceed. If you change your mind, or you
pressed a wrong key, then press the ESC key to cancel the operation
and go back to the Apple Plot menu.

After each operation is finished, you will be returned to the Apple
Plot menu. If you wanted to leave Apple Plot, you would return to the
Apple Plot menu and press the Q (for Quit) key.

The Apple Plot diskette contains some sample data sets which demon-
strate its features and capabilities. To load one of these data sets,
start from the Apple Plot menu and press 7 RETURN to select RECALL
DATA FROM DISK. You'll then be asked whether you want to recall Data
or a Picture. The meaning of these terms will be explained later; for
now, just type D to indicate Data and press RETURN.

Apple Plot will now show you a list of all the files on the diskette:
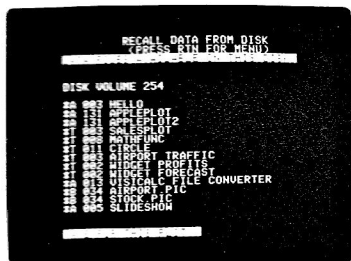
The files which contain Apple Plot data sets are denoted by the letter
T to the left of their file names. The T means that they're Text
files, one of the types of files used on Apple diskettes. All Apple
Plot data sets are stored in Text files, though not all text files
contain Apple Plot data sets.

Get the data set called SALESPLOT by typing the name and pressing
RETURN. If you mistype the name, or specify a name which is not the
name of a valid Apple Plot data set file, then the message
CHECK YOUR INPUT
will appear and you will be asked to respecify the name.

When you've successfully loaded the SALESPLOT data set, you will be
returned to the Apple Plot menu.

DISPLAYING A GRAPH

Now that you've loaded a data set, you can tell Apple Plot to plot it
on the screen by typing 5 to select DISPLAY GRAPH and pressing
RETURN. The following graph will be drawn:
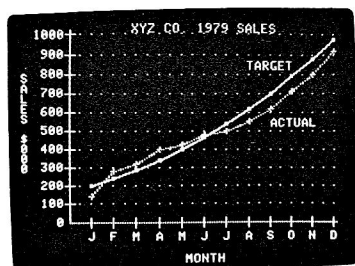
Look carefully at this graph. Notice that the graph consists of
twelve small squares and twelve small crosses. These squares and
crosses are data points, and they represent the information that
you've just loaded from the diskette. The set of all the data points
represented by the squares is called a data list, and the set of all
the data points represented by the crosses is another data list. A
data list can contain up to 100 data points, and the two data lists
together comprise a data set.

There are two graph lines on the screen. Each line connects all the data points in one data list. If you've got a color video monitor, then you'll notice that one line is drawn in white, the other in blue. If you've got a black-and-white television set or video monitor, the lines will appear as solid white and dashed grey.

The corner (origin) of the graph is in the lower left-hand corner. There are labels on the X-axis (horizontal) and Y-axis (vertical), as well as in the graph itself. There is also a title at the top of the screen. The Y-axis is divided into ten segments, numbered by hundreds; the X-axis is divided into twelve parts, each labelled with the initial of the name of a month. There are horizontal grid marks extending from the Y-axis. You can control or change each and every one of these features (called "parameters") to suit your needs.

Press the spacebar to return to the Apple Plot menu.

GRAPH FORMATS

Type 1 to choose GRAPH FORMAT SELECTION and press RETURN. You'll be presented with another menu, called the Graph Format Selection menu:


```
        GRAPH FORMAT SELECTION
          (PRESS RTN FOR MENU)
   1. STANDARD GRAPH
   2. STANDARD GRAPH WITH GRAPH OVERLAY
   3. BAR CHART
   4. GRAPH WITH BAR CHART OVERLAY
   5. MULTIPLE BAR CHART
   6. SCATTER CHART
   7. EXCHANGE PLOTS
   8. CHANGE COLOR OF GRAPHS
   9. OVERLAY ADDITIONAL GRAPHS(ON/OFF)
   ENTER SELECTION NO.: ■
```
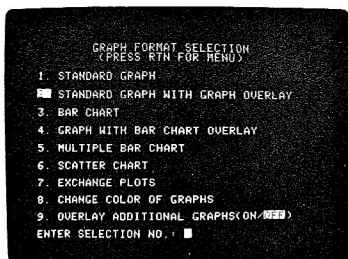
The first six menu selections are the six formats in which you can display your data. Notice that format number 2, STANDARD GRAPH WITH GRAPH OVERLAY, is highlighted: it is the current choice. Type 4 to select GRAPH WITH BAR CHART OVERLAY and press RETURN. The high-lighting will shift to indicate that format number 4, which you just chose, is now the current format. Press RETURN to get back to the Apple Plot menu.

Now display the graph in its new format by typing 5 RETURN, as you did above. Here's what it should look like:
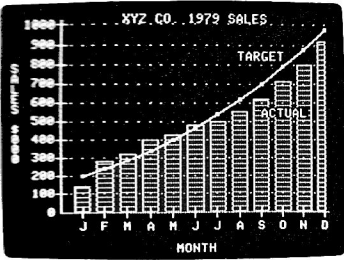
It's the same data, but plotted in a different format. The first data list is still the same as it was before, but the other data list (which was portrayed by a dashed blue or grey line in the previous example) is now shown as a bar chart.

(Notice that the last bar in the bar chart is only half as wide as the other bars. This is normal; Apple Plot doesn't have the space on the screen to draw a full-width bar there. See the section "Display Data" in Chapter 3 if you would like full-width bars.)

Press the spacebar to return to the Apple Plot menu. Press 1 RETURN again to go back to the Graph Format Selection menu, and change the format selection to 1, the STANDARD GRAPH. Return to the Apple Plot menu and DISPLAY GRAPH once again. This time you'll see just one data list:
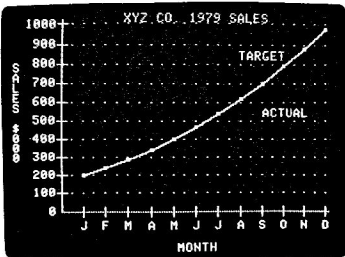
Apple Plot hasn't forgotten the other data list, but you've told it to display only this one. You can display either one or two data lists, both line graphs or bar charts, or one of each.

There's also another way to display your data, called a scatter chart. Let's display the second data list in this format. Get back to the Graph Format Selection menu (by pressing pressing 1 RETURN from the Apple Plot menu) and press 7 to EXCHANGE PLOTS. This simply switches the two data lists, so that the graph formats which plot only one data list will plot the second list, rather than the first. The exchange may take a little time. While the Apple is working, it will display the message
EXCHANGING PLOTS

flashing at the bottom of the screen. When it finishes, it will return you to the Apple Plot menu.

Now get back to the Graph Format Selection menu again and choose 6, the SCATTER CHART. Return to the Apple Plot menu and display this graph. It should look like this:
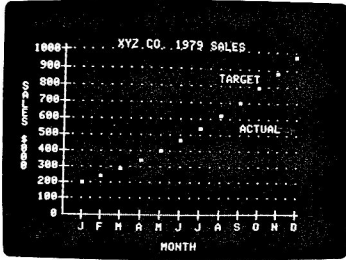
All that you see are the data points in the second data list and nothing else. If you hadn't exchanged the lists, you would have seen the data points for the first data list and nothing else.

Press the spacebar to return to the Apple Plot menu.

DESIGNING YOUR OWN GRAPH

So far you've been using Apple Plot with a sample data set which was included on the Apple Plot diskette. Now you'll see how to create and format your own data sets.

From the Apple Plot menu, press 8 to choose CLEAR FOR NEW PLOT and press RETURN. Apple Plot will warn you that you are about to erase the information for the SALESPLOT graph. Since the information is still stored on the diskette (you haven't changed or removed it), and you want to start working on another data set, it's all right to lose the SALESPLOT data. Press the ESC key to clear the data. The message CLEARING
will flash on the screen for a few seconds, and you'll be returned to the Apple Plot menu.

Suppose that you have information about the daily closing prices of common stock for the Widget Corporation for the month of January, and you want to plot this data. You've got a table which looks like this:

Day	Close Price	Day	Close Price
1	60 1/4	16	65
2	60 1/2	17	63 11/2
3	60	18	62
4	60	19	(closed)
5	(closed)	20	(closed)
6	(closed)	21	54 (stock split)
7	62 1/2	22	54 1/2
8	63	23	54 1/4
9	64 1/4	24	54 .
10	65	25	53 1/2
11	64 3/4	26	(closed)
12	(closed)	27	(closed)
13	(closed)	28	57
14	65 1/8	29	57 3/4
15	65 1/4	30	58 1/2
		31	59

This is a simple graph; just one line through 23 data points. You'll
use only one data list for this graph. The valuable things you'll
need to tell the Apple are:

> * the information (the number of the day and the stock's value
>   for that day) for each data point in the data list;

> * which data points in the data list you want to display;

> * information about the format of the final graph, which
>   includes titles, labels, etc.

You can specify this information in any order, and change it at any
time. For clarity, let's enter the data first. From the Apple Plot
menu, choose 4, DATA ENTRY AND EDITING, and press RETURN.

DATA ENTRY

When you enter this section of Apple Plot, you'll see another menu,
called the Data Entry and Editing menu:


```
     DATA ENTRY AND EDITING
      (PRESS RTN FOR MENU)

1. PLOTTING RANGE
2. DATA ENTRY
3. DISPLAY DATA




SELECTION NUMBER: ■
```

From this menu, you have three choices. We'll exercise all of these choices in this section; first, select PLOTTING RANGE by typing 1 and pressing RETURN.

Apple Plot will ask you four questions about your data. After each question, Apple Plot will wait for you to type your reply to its question. It will also display a number after each question; if you answer any question by simply pressing RETURN, Apple Plot will assume that you want it to use the reply that it provided for you. This reply is called the _default_ reply. You'll be using it a lot in Apple Plot; it's the easiest way to both see what the current values of important parameters are, and to change only a few values without having to retype everything.

The first two questions deal with the number of the first and last data points in your graph. You've got a total of 23 data points (not 31, because the market is closed on weekends). The first question is STARTING PT FOR PLOT #1:. Your starting data point will be number 1. Since you haven't entered any data points yet, Apple Plot has given you a default reply of 0; change this to the number you want by typing 1 and pressing RETURN. The next question is ENDING PT FOR PLOT #1; the default reply is again 0. Since you have 23 points, you should change this. Type 23 RETURN.

The next two questions deal with the second graph. Since you're only using one data list, you can ignore these values. Press RETURN twice to tell Apple Plot to use its default replies for these questions. Now that this task is complete, you'll be returned to the Data Entry and Editing menu.

Now it's time to enter the data. From the Data Entry and Editing menu, choose 2, DATA ENTRY, and press RETURN. You'll be asked which data list you want to work on; answer 1 RETURN to work on the data list for the Widget stock graph (you're not using the other one). Now you'll be placed into the Data Editor:
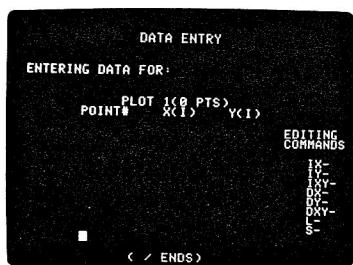
The Data Editor is a tool for entering, examining, and changing data points. Each data point has three parts:

  * The NUMBER of the data point. There are 100 possible data points in each data list, numbered 1 through 100. Each data point has a unique number associated with it. When you display the graph, Apple Plot plots the data points one by one, in the order of their data point numbers.

* The X-VALUE of the data point. This number represents the
  position of the data point along the horizontal axis. An X-
  value may be any positive number of any magnitude, it does
  not need to be unique, and it need not be related in any way
  to the number of the data point.

* The Y-VALUE of the data point. This number represents the
  height of the data point along the vertical axis. This also
  may be a number of any magnitude, does not have to be
  unique, may be positive or negative, and does not need to
  have any relation to the number of the data point.

To enter a data point, all you have to do is type the number of the
data point, the X-value of the data point, and the Y-value of the data
point, all separated by presses of the RETURN key. In the Widget
stock graph, the first data point is for the day January 1, when the
value of the stock was 60 1/4, or 60.25 in decimal numbers. So you
would type:

1 RETURN 1 RETURN 60.25 RETURN

As you enter each number and press RETURN, the number is placed in
its appropriate column. Similarly, for the next few data points,
type:

2 RETURN 2 RETURN 60.5 RETURN
3 RETURN 3 RETURN 60 RETURN
4 RETURN 4 RETURN 60 RETURN

If you entered any data item wrong, simply retype it in its entirety,
beginning with the data point number. Apple Plot will substitute the
new data for the old automatically. Don't try to use the Apple's
backspace key to go back and correct mistakes; it won't work. If you
find you've typed a data point wrong, just finish entering the point
and then re-enter it the correct way.

You should have three columns, each containing four numbers:
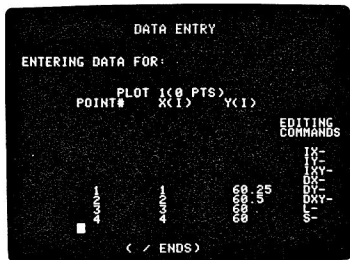
Now since the stock market is closed on weekends, you have no data for
the 5th and 6th of January, so your fifth data point will be the data

for January 7th:

5 RETURN 7 RETURN 62.5 RETURN

Here's the table of stock prices again. You've already entered the
first five data points; now enter the remainder into the Apple Plot
Data Editor.

Point	Day	Price	Point	Day	Price
1	1	60.25	12	16	65
2	2	60.5	13	17	63.5
3	3	60	14	18	62
4	4	60	15	21	54
5	7	62.5	16	22	54.5
6	8	63	17	23	54.25
7	9	64.25	18	24	54
8	10	65	19	25	53.5
9	11	64.75	20	28	57
10	14	65.125	21	29	57.75
11	15	65.25	22	30	58.5
			23	31	59

Your final data item should be:

23 RETURN 31 RETURN 59 RETURN

Now that you've finished entering the data, type a slash (/) followed
by RETURN to go back to the Data Entry and Editing menu.

To look at the data you've entered, select 3, DISPLAY DATA, and press
RETURN. Once again, you'll be asked which data list to use. Reply 1
RETURN. Apple Plot will start displaying the data points, one by one.
If you have an Apple Silentype printer, then the data points will be
printed on the Silentype, as well as on the screen. Only a portion of
the screen is used to display data; when this portion is filled, the
data point values start scrolling off the top and disappearing. You
can tell Apple Plot to pause by pressing the spacebar; the display
will hold as it is until you press the spacebar again.

After Apple Plot shows you data points numbered 1 through 23, it will
continue displaying data points numbered 24 through 100, even though
you didn't enter any data for those points. All data points to which
you haven't assigned values automatically have both their X and Y
values set to zero. Since you don't care about these values (in the
PLOTTING RANGE section you said you were going to use only the first
23 points), you can stop the listing by pressing RETURN. You'll be
returned to the Data Entry and Editing menu. Press RETURN again to
return to the Apple Plot menu.

A FIRST LOOK

Before you begin to construct the format for this graph, take a look at it. Choose 5 to DISPLAY GRAPH and press RETURN. Apple Plot will first scan your data list, to find the minimum and maximum values for both axes. Since this is the first time it's processed your data, it will display a frame telling you the minima and maxima it found, and adjust the scales of both axes to fit the data. Press the spacebar to display the graph. This is what you should see:
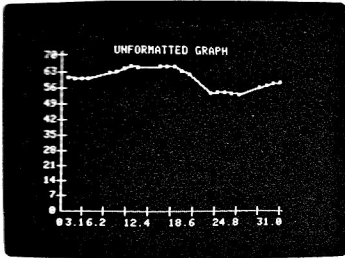
Notice how Apple Plot has constructed the graph. The title is "UNFORMATTED GRAPH" and the axes are labeled simply "X" and "Y". The range of the X-axis is from 0 to 31.0, with ten divisions. The range of the Y-axis is from 0 to 65.3, which is the largest Y-value in the data set. The Y-axis also has only ten divisions. There are no labels in the graph itself, and there are no grid lines extending from either axis.

This doesn't really look right, so let's make a specification for what the graph should look like. First, the title should be "WIDGET CORP. STOCK", the X-axis should be labeled "JANUARY", and the Y-axis should be labeled "STOCK PRICE". The X-axis should have 31 divisions, not 10, with dotted vertical lines extending from each grid mark. And since the Y-values are all between 54 and 66, and we would like the Y-axis to be ruled in even numbers (not strange decimals), the upper Y-limit should be 70, the lower limit should be 50, and there should be 10 divisions. Furthermore, it would be useful to have a label in the graph indicating the stock split on January 21. All of these formatting features are possible with Apple Plot.

CHANGING X-AXIS PARAMETERS

If you're still looking at the graph, press the spacebar to get back to the Apple Plot menu. Now choose 2, X-AXIS PARAMETERS, and press RETURN. The X-AXIS PARAMETER section is like the NUMBER OF DATA POINTS section: not a menu, but a series of questions with default replies. If you make a mistake in answering a question, don't worry; you'll be given a chance to go back and fix mistakes after you finish

the list of questions.

Many of the questions ask you for numerical replies. If the number
you type is too large for Apple Plot to use, then Apple Plot will
instead use the largest number it can. It will not tell you that it
is not using the number you typed. The situation is similar for
numbers too small for Apple Plot to use: it will use the smallest
value it can. You can see if Apple Plot has changed any of your
values by going through the list of X-AXIS PARAMETER questions again,
after you finish setting all the parameters.

The first few questions concern the number and range of divisions
along the X-axis. REMEMBER: this has nothing to do with the number of
data points you have! In the examples you've seen, there has been one
X-division for each data point, but this is not necessary. You can
have as many as 100 data points, and as many as 31 divisions of the X-
axis, with any range you choose, as long as the maximum X-value in the
X-AXIS PARAMETERS is greater than or equal to the largest X- value in
your data set.

First, Apple Plot asks you if this is a monthly plot. Since the X-
values in your graph are days, not months, you should answer NO to
this question. In anticipation of your negative response, Apple Plot
has supplied a default reply of N. To accept its answer, simply
press RETURN.

The next question is similar, asking you if your plot is a yearly one.
Once again, the default response is the proper one. Press RETURN.
(Monthly and Yearly plots are discussed in Chapter 3).

The next question asks you for the number of divisions along the X-
axis. The number of divisions specifies how many tic marks there will
be on the X-axis. Since you want one tic mark for each day of the
month, answer 31 RETURN.

Next, you'll be asked about the maximum X-axis value, which is the
value of the extreme right-hand tic mark along the X-axis. When you
entered the data (above), Apple Plot took the largest X-value in your
data set to be the maximum X-axis value, and that's why 31 is the
default reply. You can increase this value if you wish, but you can
never decrease it below the maximum X-value in your data set. (If you
do, Apple Plot will automatically adjust it the next time you display
the graph.) For now, accept the default reply by pressing RETURN.

The next question is about the minimum X-axis value. Apple Plot has
set this to zero.

NOTE: The minimum X-axis value is <u>not</u> the value assigned to the first
tic mark, but the value of the origin (the point of intersection of
the X-axis and the Y). Thus, if you want the data point with the

smallest X-value to fall directly above the first tic mark (as you do
in this graph), you should set the minimum X-axis value to be less
than the value you want assigned to the first tic mark. For example,
in the Widget stock graph each tic mark represents one day, and the
first tic mark is day 1. Therefore the minimum X-axis value should be
1 less than 1, which is zero.

An easy way to remember this is to subtract the minimum X-axis value
from the maximum X-axis value. The difference of the two should be an
even multiple of the number of X-axis divisions.

Since the default setting for the minimum X-axis value is the value
you want, accept it by pressing RETURN.

Next, you'll be asked some questions about the labels on this graph.
Apple Plot will first ask you about the label of the X-axis. The
default for this is simply "X", but you can change this to "JANUARY"
by typing the word itself and pressing RETURN.

You can have up to two additional labels. These labels are different
from the labels on the X- and Y-axes in that they are allowed to
"float" anywhere in the graph: you decide where to position them when
you display the graph. Since you want to label the stock split on
January 20, use floating label #1 to do this.

When Apple Plot asks you, USE LABEL #1 ?, answer Y (for YES) RETURN.
The next question is CHANGE LABEL #1 ?. Since the default label is
blank, you should change this label. Answer Y RETURN again. Apple
Plot will respond by displaying the current text of label #1, and
asking you CHANGE TO :. Type SPLIT -> and press RETURN. The hyphen
and right caret (->) make an arrow which will point to the data point
on the graph where the stock actually split. You'll position the
label later, when you display the graph.

After you define label #1, you'll be asked if you want to use label
#2. Since you don't need another label, accept the default NO reply
by pressing RETURN.

Apple Plot will now ask you if you want EXTENDED VERTICAL GRID LINES.
These are dotted lines extending up from each X-axis tic mark. Answer
Y RETURN to use these in your graph.

The final question for the X-AXIS PARAMETERS is ANY CHANGES (Y/N) ?.
This is your chance to go back and fix anything you may have mistyped.
If you answer Y RETURN, you'll begin the series of questions again.
All the replies you just entered will be the new default replies.
This lets you review all you've done by simply pressing RETURN for
every question.

If you answer N RETURN (or simply RETURN), you'll be returned to
the Apple Plot menu.

Y-AXIS PARAMETERS

Now that you've specified the format for the X-axis, it's time to format the Y-axis. From the Apple Plot menu, select 3, Y-AXIS PARAMETERS, and press RETURN. This is another set of questions, similar to the list for X-AXIS PARAMETERS. Again, if you give Apple Plot a number for a Y-AXIS PARAMETER which is too large or too small for it to use, it will use the largest or smallest number it can for that parameter, without notifying you of the change.

The first question concerns the number of divisions along the Y-axis. In the specification for this graph, it was decided that there should be ten divisions on this axis. Coincedentally, this is the default value! Accept the default value by pressing RETURN.

The next two questions Apple Plot will ask you concern the maximum and minimum Y-axis values. These are the values you want Apple Plot to assign to the top tic mark and the origin, respectively. In the specification for this graph, it was decided that the Y-axis should range from 50 to 70, so enter 70 RETURN for the maximum Y-value and 50 RETURN for the minimum value.

Next, you'll be asked to enter the label for the Y-axis. Since the Y-axis is the "STOCK PRICE", type this label and press RETURN.

In the next question, Apple Plot asks you the title for this graph. Since this is no longer an "UNFORMATTED GRAPH", type WIDGET CORP. STOCK and press RETURN.

Apple Plot will then ask you whether you wish to have EXTENDED HORIZONTAL GRID LINES. These are just like the EXTENDED VERTICAL GRID LINES on the X axis; since the specification indicated only vertical lines, you don't need the horizontal ones. Since the default reply is NO, accept this reply by pressing RETURN.

The final question for the Y-AXIS PARAMETERS is ANY CHANGES (Y/N) ?. This is your chance to go back and fix anything you may have mistyped. If you answer Y RETURN, you'll begin the series of questions again. All the replies you just entered will be the new default replies. This lets you review all you've done by simply pressing RETURN for every question.

If you answer N RETURN (or simply RETURN), you'll be returned to the Apple Plot menu.

A SECOND LOOK

One more thing left to do: choose 1 for GRAPH FORMAT SELECTION and press RETURN. From the Graph Format menu, choose 1, STANDARD GRAPH

(since you have only one data list), and press RETURN once, then again, and you'll be back at the Apple Plot menu.

Now choose 5 to DISPLAY the GRAPH and press RETURN. This is what it should look like:
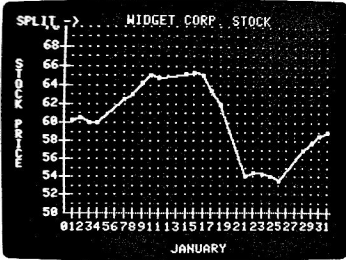
It has everything the specification ordered: the X-axis labeled JANUARY and ruled from 1 to 31; the Y-axis labeled STOCK PRICE and ruled from 50 to 70 in ten divisions; vertical lines extending up from the X-axis, and entitled WIDGET CORP. STOCK.

There's only one thing wrong: the label, SPLIT ->, which was meant to point to the stock split on the graph, is instead nestled in the upper left-hand corner. You need to position it.

Look at these four keys on your Apple's keyboard:
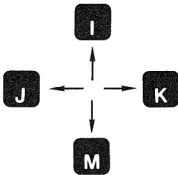
You will use these four keys to move the label around the screen. Press the letter K. The label will disappear and reappear a bit to the right. Press it again; it moves further right. Press M and the label will move down. The I key will move the label up, and J will move the label left. (These are the same four keys which control cursor movements in ESCape mode if you've got an Autostart ROM). When you move the label around, it will erase parts of the graph as it moves across them. Not to worry, you can restore the full graph later.

Using these four keys, move the label so that it's near the downslope

on the graph which indicates the fall in the stock's price when it split:
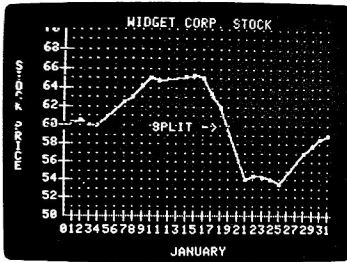
That's good, but not great; it would look better if it were a little closer to the graph. Type a CTRL-A. Now try to move the label around using the same four keys as above. The label still moves the proper directions, but it moves in much smaller increments. You can use this "fine tuning" to place the label precisely where you want it. If you want to go back to the "coarse tuning", type a CTRL-S.

When the label is right on target, press RETURN. The Apple will beep, indicating that you've fixed the label at its current position. Once you position a label, you won't have to reposition it unless you change the text of the label (in X-AXIS PARAMETERS).

If you had used the second label, you would have positioned it in exactly the same manner as you did the first. Once the label(s) are in place, press the spacebar to return to the Apple Plot menu, and, if you like, you can display the graph again to see how it looks in its finished form.

SAVING YOUR WORK

You've spent a bit of time entering all the data for this graph, and a little more specifying the format. But if you turn the Apple off now, or start running another program, or even try another Apple Plot example, you'll lose all the work you've done up to this point. For this reason you'll probably want to save this graph onto the diskette, either to experiment with later or to remind you what the various parameters do. Even if you don't want to save this particular graph, you'll certainly want to save others you will create with Apple Plot.

From the Apple Plot menu, select 6, SAVE DATA TO DISKETTE, and press
RETURN. Apple Plot will present you with the following:

```
            SAVE DATA TO DISK
            <PRESS RTN FOR MENU>



            DATA / PICTURE?

              <D / P> ■



 <USE X,D# FOR ALT DRIVE.  E.G. D,D2>
```
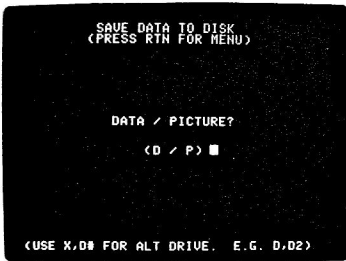
There are two forms in which you can save this graph: Data form, in
which the data and the formatting specifications are stored on the
diskette, and Picture form, in which only the visual image of the
graph itself is stored. Most of the graphs you will be using will be
stored in Data form; it takes up much less room on the diskette, takes
less time to save and recall, and lets you modify the data and format
specifications at will. By storing the graph in Picture form,
however, you can display more than one data set on the same graph by
using overlays. This feature will be discussed in Chapter 3.

Select D for Data and press RETURN. Apple Plot will then display the
contents of the diskette:

```
               DATA TO DISK
            <PRESS RTN FOR MENU>


   DISK VOLUME 254

   *A 003 HELLO
   *A 131 APPLEPLOT
   *A 131 APPLEPLOT2
   *T 003 SALESPLOT
   *A 000 MATHFUNC
   *T 011 CIRCLE
   *T 003 AIRPORT TRAFFIC
   *T 002 WIDGET PROFITS
   *T 002 WIDGET FORECAST
   *A 013 VISICALC FILE CONVERTER
   *A 014 AIRPORT PIC
   *B 034 STOCK PIC
   *A 005 SLIDESHOW
```
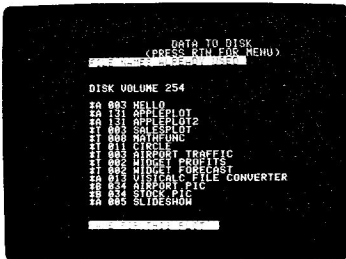
Notice that this looks much like the RECALL DATA FROM DISKETTE
operation. There's a difference, though: you should type a name
that's not on the list on the screen. Since this graph is a plot of
the stock for the Widget Corporation, type WIDGET STOCK and press
RETURN. As soon as Apple Plot saves your information, it will return
you to the Apple Plot menu.

Once your data set is saved on the diskette, it will remain there.
You can call it back at any time, modify it if you like, and resave
it; remember that none of the changes that you make to the data or the
format will become permanent until you save the data set onto the
diskette.

You can DELETE, RENAME, LOCK or UNLOCK, or VERIFY a file which
contains an Apple Plot data set by leaving Apple Plot and using the
appropriate DOS command. See your DOS manual; Apple Plot data set

files are sequential-access Text files and the format of these files is described in Chapter 4 of this manual.

When you SAVE DATA TO DISKETTE, if you type the name of a file which is already on the diskette, the information that was in that file will be lost and the new data will replace it.

PRINTING A GRAPH

If you have either an Apple Silentype or a Qume Sprint 5 printer attached to your Apple, then you can get a printed "hard-copy" of your graph. Once you have properly formatted your graph and you have had it displayed on the screen, select 9, PRINT GRAPH, from the Apple Plot menu and press RETURN. You'll be shown the Printer menu:
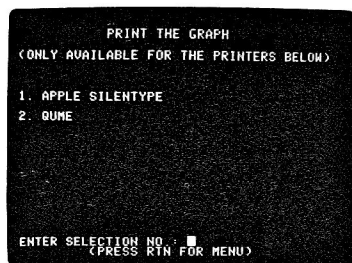
The interface card for the printer (either a Silentype card for that printer or a Serial Interface card for a Qume Sprint 5) should be plugged into slot 1 in the back of the Apple. (For more information on how to connect and set up your printer, refer to the manual which came with your printer or interface card.) Make sure that you have turned on the power to your printer and it is ready to go, then press either 1 or 2 to select the SILENTYPE or the QUME printer and press RETURN.

If you selected the Silentype printer, and the proper printer card is not installed in your system, you will be told
SILENTYPE NOT IN SYSTEM
Press the spacebar to return to the Apple Plot menu.

If your Silentype is present and operational, Apple Plot will ask you whether you wish to CHANGE PRINTER PARAMETERS? (Y/N). Press N RETURN and the Silentype will print your graph.

If you chose the Qume printer, your graph will be printed on the Qume without further questions. Make sure that your printer is connected, turned on, and supplied with paper and ribbon before you select it from the Printer menu.

Once the printer has finished printing your graph, you will be

returned to the Apple Plot menu.

LEAVING APPLE PLOT

When you end your session with Apple Plot and you want to use your
Apple for another purpose, return to the Apple Plot menu and press Q.
When you leave Apple Plot, you will lose all data you were working
with. To keep you from accidentally abandoning important information,
Apple Plot will remind you to save your data before you go. If you
want to go back and save your data, if you want to keep using
Apple Plot, or if you didn't intend to leave Apple Plot and you hit Q
accidentally, you can get back to the Apple Plot menu by pressing
RETURN. If you've already saved your data, or do not wish to do so,
and are really serious about leaving, press ESC. In a flash you'll
find yourself free to use your Apple as you will.

MOVING ON

If you've done everything that this manual describes up to this point,
then you should have a good feel for what Apple Plot can do and how to
make it do it. But Apple Plot has still more features for you to use:
these are explained in full detail in the next chapter. Chapter 3 is
a little different from this one. It is mostly facts and information,
and contains little of the step-by-step instruction you've found in
this chapter. It introduces all the features of Apple Plot in the
order in which they appear in the program, not necessarily in the
order in which you'll use them, with only a few short examples.

In short, it is a reference chapter, one to refer to if you want to
learn more about how Apple Plot works. The best way to learn the
other features of Apple Plot is to use them. If you take an hour and
experiment with Apple Plot, loading the various sample data sets on the
diskette and playing with them, exercising as many features as you
can, then you'll soon become an expert Apple Plotter. Your graphs will
be more attractive and functional. It is your skill and technique
which will make Apple Plot a powerful addition to your Apple library.

TECHNIQUE TIPS

On the subject of technique, here are a few techniques that are
helpful to the efficient use of Apple Plot:

> * Enter the data first, then specify the format. Although you
>   can do these in any order, you can let Apple Plot determine
>   the limits of your data and attempt to plot it in the
>   default format, and then you can look at what's wrong with
>   the default format and start making up the final format from
>   that.

* Don't use too many subdivisions on the axes. Any more than about 15 divisions on the X-axis, or 20 on the Y, cause the labels to come too close together and lose meaning. The graph of your data will still be the same if you use fewer divisions, but the labels will be more easily understood.

* If you have a standard graph format that you use often (as for a weekly sales report), keep a formatted graph with no data on the diskette. Then every week you can recall the format, add this week's data, plot it, and save the result under a distinct name. All of the graphs will have exactly the same format, and you don't have to start from scratch each week.

* If you need more than a one-line title for your graph, you can use one or both of the floating labels as additions to the title. Just position them immediately below the title.

* If you have an Apple Graphics Tablet or another device to let you edit and draw on Apple high-resolution screens, here's a neat trick to make custom graphs. Construct a formatted graph with no data, plot it, and save it in both formatted and picture forms (under different names). Then, using the Graphics Tablet or similar device, add your company's logo or other decorative device to the picture of the dataless graph. Save this picture on the diskette, rerun Apple Plot, recall the modified picture data, and set the GRAPH FORMAT's switch for OVERLAYS to ON. Now recall the formatted data set and add your data. When you plot it, your final graph will appear with your corporate logo in the background!

* When using Bar Charts, Apple plot will plot one bat at each tic. So, the first data point appears as a bar at the first tic, the second data point at the second tic, and so on. Therefore, be careful to set the number of points in the plotting range equal to the number of x-axis divisions, when you're using bar charts. Otherwise, Apple Plot will automatically reset the plotting range for you, with surprising results. For example, if you have 100 data points and 10 x-axis tic marks, the bar graph will only show the first 10 of your 100 data points, one bar at each tic mark. So be careful with bars!

CHAPTER 3
APPLE PLOT REFERENCE

GENERAL NOTES

Apple Plot is composed of two main types of items: menus and question
lists. There are four important menus: the Apple Plot menu, the Graph
Format Selection menu, the Data Entry and Editing menu, and the
Printer menu. In all of these menus, you indicate your selection by
typing the digit associated with your choice. Apple Plot will display
the name of your choice at the bottom of the screen and ask for
confirmation. To confirm your selection, press RETURN. To cancel
your selection, press any other key.

Each menu will tell you the name of the key to press to return to the
previous menu. This is usually RETURN, often abbreviated "RTN". From
the Apple Plot menu, a press of the Q key will let you leave Apple
Plot.

DEFAULTS AND SLASHES

The X- and Y-AXIS PARAMETER routines, the NUMBER OF DATA POINTS
routine, and the GRAPH COLOR routine all are lists of questions.
After many of the questions asked in these routines, Apple Plot will
display a possible reply. This is called the default reply. If you
press RETURN in response to a question which has a default reply,
Apple Plot will assume that you mean to use the default reply. If you
type a response to the question and press RETURN, Apple Plot will
forget the default reply, and the reply you entered will become the
new default reply for that question.

Typing a slash and pressing RETURN in response to a question will
cause Apple Plot to use the default reply for that question and all
following questions in the list, and return you immediately to the
most previous menu. This is the method to use to avoid answering the
remainder of a long list of questions.

NUMBERS

When you indicate your choice from a menu, Apple Plot will accept only
a single digit. When you answer any question regarding data point
numbers or quantities, use only positive integers from 0 to 100.
When you are specifying which data list with which you wish to work,
use only the digits 1 and 2.

When you specify the number of divisions along an axis, you should use positive integers between 1 and 30 for the Y-axis, or between 1 and 31 for the X-axis. When you specify the minimum or maximum X- or Y-axis value, or any X-value for a data point, you may use any positive real number which Applesoft will accept; when you specify the Y-value of a data point, you may use a positive or negative real number. See the syntactic definition for "real" in Chapter 2 of the Applesoft II BASIC Programming Reference Manual.

Most X- and Y-axis parameters have other limits for the range of values which they will accept. Apple Plot will allow you to enter numbers outside these limits; if you do, it will ignore the number you entered and use the closest legal value it can. It will not tell you when you have entered a number which is out of range. To see if Apple Plot has changed any values you entered to keep them within its limits, you should check all parameters after you enter them.

APPLE PLOT MENU

From the Apple Plot menu, you can choose one of the nine following menus or routines:

1. Graph Format Selection
2. X-Axis Parameters
3. Y-Axis Parameters
4. Data Entry and Editing
5. Display Graph
6. Save Data to Disk
7. Recall Data from Disk
8. Clear for New Plot
9. Print the Graph

These nine selections will be described in detail in the following sections.

To leave Apple Plot from the Apple Plot menu, press Q. Apple Plot will ask you to confirm your choice; to do so, press ESC. To cancel the choice, press RETURN.

To reenter Apple Plot after having left it, type
RUN HELLO

GRAPH FORMAT SELECTION

The Graph Format Selection menu has nine choices:

1. Standard Graph
2. Standard Graph with Graph Overlay

3. Bar Chart
4. Graph with Bar Chart Overlay
5. Multiple Bar Chart
6. Scatter Chart
7. Exchange Plots
8. Change Color of Graphs
9. Overlay Additional Graphs (on/off)

The first six options let you choose the form of your graph. The current format for the graph is shown by inverse highlighting on the selection number.

THE SIX GRAPH FORMATS

Selection 1, the Standard Graph, is a graph of data list 1, plotted as white squares and connected by a white line. Selection 2, Standard Graph with Graph Overlay, adds data list 2, plotted as white crosses connected by blue lines, to the Standard Graph.

Selection 3, Bar Chart, will make Apple Plot display data list 1 as a series of solid white rectangles, the bases of which are on the X-axis and the tops of which are at the level of each data point.

Selection 4 plots data list 1 as white squares connected by a white line and data list 2 as a series of open white rectangles with horizontal blue crosshatching.

Selection 5 plots data list 1 as a solid white bar chart and data list 2 as a open bar chart with blue crosshatching.

When you are using selections 3, 4, or 5, each data point in the bar chart(s) must fall exactly above a division of the X-axis. Bar charts will malfunction if the data points fall between divisions of the X-axis. There cannot be more X-values in the data set than there are divisions along the X-axis. Also, the bar for the data point with the smallest X-value in the data set will always be placed on the leftmost tic mark, regardless of the scaling or labeling of the X-axis.

Selection 6, the Scatter Chart, plots data list 1 as a series of white squares with no connecting line.

EXCHANGE PLOTS

Selection 7, Exchange Plots, physically exchanges the coordinate data of the two data lists. The data which was in data list 1 is now in data list 2, and vice versa. Apple Plot will display the message
EXCHANGING PLOTS
flashing at the bottom of the screen while it is working.

EXCHANGE PLOTS does not exchange the PLOTTING RANGEs of the two data lists. You must do this yourself in DATA ENTRY AND EDITING.

CHANGING COLORS

Selection 8 lets you specify colors other than blue and white for your graphs. The GRAPH COLOR routine is a list of two questions, both with default replies. The color names and their associated values are displayed at the bottom of the screen. To change the color in which a data list is plotted, just type the number of the new color and press RETURN.

On a black-and-white television or video monitor, white shows up as a solid white line and all other colors (save black) show up as dashed grey lines of equal intensity. You cannot distinguish green from blue from orange from violet on a black-and-white display.

The color black is only useful when you are using bar charts.

OVERLAYING GRAPHS

Selection 9, Overlay Additional Graphs, allows you to plot more than two data lists on the same graph. This function has two states, ON and OFF. The current state is indicated by reverse highlighting. When you choose selection 9, the state changes, from ON to OFF or vice versa.

When you turn the Overlay Additional Graphs switch ON, then all subsequent graphs you plot will be displayed as data graphs and floating labels only, without axes, axis labels, or titles.

To plot four data lists on the same graph, for example, you would enter the first two lists on one graph, format it, plot it, and save it to the diskette in both Data and Picture forms. Then you would turn the Overlay switch ON, and using the same graph format, enter the data for the next two data lists. You might change the color of these plots so you can tell them apart from the first two. Now when you display the graph, the two new data lists will be plotted on top of the graph of the last two data lists.

If you make a mistake when plotting the second pair of data lists, just recall the Picture of the first data lists, fix the problems, and plot the graph again.

You can use the overlay function to give you more floating labels, let you use multiple scatter charts, or overlay many bar charts and standard graphs. When overlaying standard graphs and bar charts, it is advisable to plot the bar charts first.

THE UNFORMATTED GRAPH

This is a photo of an Apple Plot graph with no data, and all parameters set to their default values:
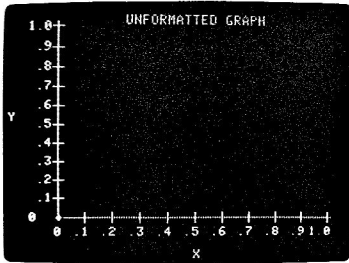
X-AXIS PARAMETERS

The X-AXIS PARAMETERS routine is a list of questions, most of which have default replies. These questions pertain to the limits, range, and labeling of the X-axis.

MONTHLY PLOTS

The first question is IS THIS A MONTHLY PLOT?. If you answer NO, Apple Plot will skip to the Yearly Plot question (see next page). If you answer YES, you will be asked for the NUMBER OF FIRST MONTH and NUMBER OF MONTHS. The number of the first month should be an integer from 1 to 12, inclusive. It specifies the label for the first tic mark on the X-axis:

Number	Initial	Name	Number	Initial	Name
1	J	January	7	J	July
2	F	February	8	A	August
3	M	March	9	S	September
4	A	April	10	O	October
5	M	May	11	N	November
6	J	June	12	D	December

The first tic mark on the X-axis will be labeled with the initial of the indicated month and all successive tic marks will be labeled with the initials of successive months.

When you are doing Monthly plots, Apple Plot automatically sets the value of the origin to 0 and the value of the rightmost tic mark to the maximum X-value in your data set. All data points will be plotted in relation to these values, but the actual values of the tic marks will not be displayed. The NUMBER OF FIRST MONTH and NUMBER OF MONTHS are for labeling purposes only; they have no relation to the X-values of the data whatsoever. No matter how you manipulate these two variables, it will not change the position or appearance of the graph, only that of the X-axis tic marks and their labels.

The NUMBER OF MONTHS is the number of tic marks along the X-axis. This can be any integer from 1 to 31, inclusive. Again, this has no effect on the graph itself, only on the appearance of the X-axis.

YEARLY PLOTS

If you replied NO to the Monthly Plot question, then Apple Plot will ask you IS THIS A YEARLY PLOT?. Again, if you answer NO, Apple Plot will skip the next two questions. See the next section, NUMERICAL PLOTS, below.

If you answer YES, then you will be asked to type the BEGINNING YEAR for the plot. This should be a number from 0 to 99. This number will be the label for the origin, not the first tic mark, on the X-axis. The next question is ENDING YEAR?. Enter a number from 0 to 99. Apple Plot will calculate the number of divisions automatically. NOTE: Because of labeling requirements, you can have no more than 12 years in a Yearly plot.

As in Monthly plots, the BEGINNING and ENDING YEAR settings have no effect upon the position or appearance of the graphs. The value of the origin is that of the minimum X-value in your data set; the value of the rightmost tic mark is that of the maximum X-value in the data set. All data points will be plotted in relation to these values. The quantity, spacing, and labeling of the tic marks are independent of the X-values.

It is acceptable for the ENDING YEAR to be less than the BEGINNING YEAR, as in the case of a plot from 1995 to 2005. This will give you ten divisions (and the origin) labeled '95 through '05.

NUMERICAL PLOTS

If you answered NO to both the Monthly and Yearly plot questions, then Apple Plot will ask you three questions regarding the numerical range of the X-axis. The first question is NUMBER OF X-AXIS DIVISIONS?. This is the number of tic marks on the X-axis; this must be a positive integer between 1 and 31.

The next question is MAXIMUM X-VALUE?. This is the X-value assigned
to the rightmost tic mark. This can be any positive real number; if it
contains a decimal point, Apple Plot will display only two digits to
the left of the decimal point.

The next question is MINIMUM X-VALUE?. This is the X-value assigned
not to the first tic mark, but to the origin (where the Y-axis meets
the X). This also may be any positive real number. The minimum X-
axis value must be less than the maximum X-axis value.

For numerical plots (as opposed to Monthly and Yearly plots, discussed
above), the data points are plotted in relation to the X-axis values.
If the maximum X-axis value is larger than the largest X-value in the
data set, then there will be extra space at the right edge of the
graph. If the maximum X-axis value is smaller than one of the X-
values in the data set, then Apple Plot will automatically increase the
maximum X-axis value to accommodate all of the data points next time
you display the graph. Apple Plot handles the setting of the minimum
X-axis value in a similar manner.

A WARNING

You have the responsibility to make sure that the number of tic marks
along the X-axis, the minimum and maximum X-values, the total number
of X-values in your data set, and the settings for Monthly, Yearly,
and Numerical plots are all coordinated. It's very easy to miscount
the number of data points or X-values in a data set: for example, a
data set containing X-values ranging from 5 through 10, by ones,
contains not <u>five</u> X-values, but actually <u>six</u>. If you're using bar
charts with such a data set, and you set the number of divisions to 5,
then the bar charts will not be plotted correctly.

Problems coordinating parameters and modes are manifested most often
when you DISPLAY the GRAPH. If Apple Plot stops suddenly right after
it has drawn the axes, and right before it labels the X- axis or plots
the first data point, you can be fairly sure that Apple Plot found some
inconsistency in your X-axis parameters (which is the most likely place
for inconsistencies to creep in). If this happens, SAVE YOUR DATA
IMMEDIATELY. <u>Then</u> investigate. Data sets may be lost by neglecting
to save data before experimenting with the x-axis parameters.

Problems also crop up when you attempt to plot only a portion of a
data set. Again, make sure that the number distinct X-values you're
plotting is the same as the number of tic marks along the X-axis.
Make sure that the PLOTTING RANGE is set correctly. In general, check
and double-check everything, and if it still doesn't work, try
changing a few parameters. If you save your data before you start
experimenting, you can't lose anything.

LABELS

The next question (regardless of the nature of the X-axis format) is X-AXIS LABEL?. The label can be composed of letters, numbers, or special symbols. It will be centered under the X-axis. Only the first 34 characters of the label will be printed; if the label is longer than this, the extra characters will be ignored.

There is no way to have a blank label; the label must have at least one non-space character. Leading spaces will be ignored.

The next several questions concern the two floating labels. The first question in the series is USE LABEL #1?. If you answer YES, then you will be asked CHANGE LABEL #1?. If you again respond YES, then Apple Plot will display the current text of this label and ask CHANGE TO:. Press RETURN to keep the current text, or type the new text for the label (up to 38 characters) and press RETURN. When you change the text of a label, the next time that you display the graph you will be allowed to reposition the label. See the section on DISPLAY GRAPH in this chapter for details.

When you have answered the questions for label #1, you will be asked a similar series of questions for label #2. Both labels operate in exactly the same manner and are interchangeable and independent.

The next question is whether you wish to have EXTENDED VERTICAL GRID LINES?. These are dotted lines extending up from each X-axis tic mark, with the dots in the line falling on and between the Y-axis tic marks. Answer Y or N.

The last question is ANY CHANGES?. The default reply is NO; this will return you to the Apple Plot menu. A reply of YES will send you back to the first question in the list again.

Y-AXIS PARAMETERS

The Y-AXIS PARAMETERS routine, like its X-axis counterpart, is a list of questions, most of which have default replies. These questions pertain to the limits, range, and labeling of the Y-axis.

The first question is NUMBER OF DIVISIONS?. This is the number of tic marks (not including the origin) on the Y-axis. This should be a positive integer from 1 to 30.

The next question is MAXIMUM Y-AXIS VALUE?. This is the value which will be associated with the uppermost tic mark on the Y-axis; it can be any positive real number. The data points are plotted in relation to the Y-axis values. If the maximum Y-axis value is larger than the largest Y-value in the data set, then there will be extra space at the top of the graph. If the maximum Y-axis value is smaller than one of the Y-values in the data set, then Apple Plot will automatically increase the maximum Y-axis value to accommodate all of the data

Next, you will be asked about the MINIMUM Y-AXIS VALUE?. This is the value which will be assigned to the origin (where the X-axis meets the Y-axis). This can be any positive real number. If the minimum Y-axis value is smaller than the smallest Y-value in the data set, then there will be extra space at the bottom of the graph. If one of the Y-values in the data set is smaller than the minimum Y-axis value, then Apple Plot will automatically decrease the minimum Y-axis value to accommodate all of the data points.

NEGATIVE PLOTS

The minimum Y-axis value should be a positive number. If your data set contains negative numbers, then Apple Plot will automatically display your graph in a format like this:
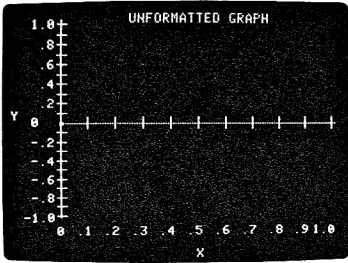
Notice that the X-axis bisects the Y and runs across the middle of the screen. In a positive/negative plot like this, the top tic mark on the Y-axis has the value of the maximum Y-axis value and the bottom tic mark on the Y-axis has the value of the negative of the maximum Y-axis value. The value of the X-axis will always be zero in a plot such as this. In a positive/negative plot, therefore, the minimum Y-axis value is irrelevant, and should be set to zero.

Also, in a positive/negative plot, the number of tic marks is doubled, so that there is an equal number of tic marks above and below the X-axis.

LABELS

The next question is Y-AXIS LABEL?. The label can contain up to 19 characters: additional characters will be ignored. The label can be composed of letters, numbers, or special symbols. It will be displayed vertically, centered alongside the Y-axis. There is no way to have a blank label; the label must have at least one non-space character. Leading spaces will be ignored.

Next, you will be asked to specify the TITLE OF THIS GRAPH. Press
RETURN to accept the current title; otherwise type the new title and
press RETURN. The title can contain up to 32 characters: additional
characters will be ignored. It can be composed of letters, numbers,
or special symbols. The title will be displayed at the top of the
screen (above the topmost Y-axis tic mark) and will be centered on the
screen.

The next question is whether you wish to have EXTENDED HORIZONTAL GRID
LINES?. These are dotted lines extending across from each Y-axis tic
mark, with the dots in the line falling on and between the X-axis tic
marks. Answer Y or N.

The last question is ANY CHANGES?. The default reply is NO; this
will return you to the Apple Plot menu. A reply of YES will send you
back to the first question in the list again.

DATA ENTRY AND EDITING

The Data Entry and Editing menu has three alternatives:

> 1. Plotting Range
> 2. Data Entry
> 3. Display Data

To return to the Apple Plot menu, press RETURN.

PLOTTING RANGE

This routine asks four questions, all of which have default replies.
These questions let you tell Apple Plot which data points in each data
list it should use in plotting your graph.

The numbers you will be using refer to the numbers of the data points
in the data lists. They have no relation whatsoever to the X- or Y-
values of the data.

The first two questions concern the STARTING POINT and ENDING POINT
FOR PLOT #1. When Apple Plot plots the graph of a data list, it
starts with the point you specify for the STARTING POINT and plots
consecutive data points until it has plotted the ENDING POINT.
Usually, the STARTING POINT is 1 and the ENDING POINT is the number of
the last data point in the list, but they can each be any positive
integer, from 1 through 100. The ENDING POINT should not be less than
the STARTING POINT; if you try to set it so, Apple Plot will set it
equal to the STARTING POINT.

For example, in the WIDGET STOCK graph you constructed in the last

chapter, you'd like to see a close-up of the two weeks from January 14
through January 25. By looking at the data you entered, you'll see
that the data point number for the first day of the period you're
interested in is number 10, and the data point for the last day is
number 19. Set the STARTING POINT to 10 and the ENDING POINT to 19
and plot the graph. You'll see something like this:

Only a subset of the data list will appear. To see this subset close
up, change the X-AXIS PARAMETERS for the NUMBER OF DIVISIONS to 12
(the total number of days in the period), the MAXIMUM X-VALUE to 25
(the X-value of the last point), and the MINIMUM X-VALUE to 13 (one
less than the X-value of the first point). Now the screen will be
filled with just that two-week period, even though you still have the
full months' data in the Apple.

The next two questions are the same as the first, except that they
pertain to the second data list. If you're not using the second data
list, it's good to leave both of these at their default values of 0.
If you are using the second data list, you can use these STARTING
POINT and ENDING POINT controls to define a smaller portion of the
graph of the second data list just as you did above. The set of
displayed points for data list 2 can correspond to that of data list
1, or they can be totally different.

DATA ENTRY

When you choose DATA ENTRY from the Data Entry Menu, you will be asked
about which data list you wish to work on. You can only work on one
data list at a time; choose either 1 or 2.

You will then be placed in the Data Editor. The Data Editor has ten
commands:

	Enter or change a single data point
S	Enter sequential data points
L	List data points
DXY	Delete an entire data point
DX	Delete an X-value
DY	Delete a Y-value
IXY	Insert an entire data point
IX	Insert an X-value

```
IY        Insert a Y-value
/         Return to menu
```

The Data Editor works on a single data list, a set of 100 data
points. There are three parts to each data point:

* The Data Point Number. This is an integer from 1 to 100,
  inclusive, which is unique to each data point in this data
  list. When you display the graph, Apple Plot places and
  connects the data points in the order of their data point
  numbers. The Data Editor also lists data points in order of
  their data point numbers.

* The X-value. This is a positive real number. If the number
  has digits to the right of the decimal point, only the first
  two digits to the right of the decimal point will be
  displayed.

* The Y-value. This is a positive or negative real number.
  If the number has digits to the right of the decimal point,
  only the first two digits to the right of the decimal point
  will be displayed.

These three parts are displayed in separate columns on the screen.
The remainder of this section of the manual will show the values of
data points in columns, as they might appear on your screen, but
headed with the labels #, X, and Y.

Entering Data

To enter a single new data point, or change the X and Y values of an
existing data point, just type the number of the data point, press
RETURN, type the X-value of the data point, press RETURN, type the Y-
value of the data point, and press RETURN again. Do this for each
data point you want to enter. If you make a mistake, just reenter
the entire data point.

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The Data Editor does not allow you to move backwards across columns by
using the Apple's backspace key. You can use the backspace key to
correct a mistake in the number you're typing, before you press
RETURN; but once you do press RETURN, the only way to fix an error in
a data point is to reenter the entire data point.

If you are entering data whose X-values are sequential integers
beginning with 1, then you can use the special Sequential Entry
feature. For example, if you have a yearly rainfall chart, giving
the annual rainfall for a number of years, and you want to enter it
into Apple Plot, you can use the Yearly Plot feature of the X-AXIS
PARAMETERS in conjunction with the Sequential Entry feature to make
entry and display easy. Here's how:

Suppose your rainfall chart gives you the annual rainfall, in inches, for the years 1960 through 1970. The X-values in the data list will indicate the years, and the Y-values will indicate the rainfall amount for those years. The first year, 1960, will be the first data point in the data list, and it'll be called Year 1: its X-value will be 1. The year 1961 will have an X-value of 2, and so on. These values will not change; the X-values will always be in the range from 1 to 11. To associate the year numbers 1 through 11 with the actual years 1960 through 1970, you would use the Yearly plot labels in X-AXIS PARAMETERS (see that section in this chapter.)

Type S1 and press RETURN. You've just set Sequential Entry mode, starting at data point number 1, year number 1. Type the rainfall for year 1 (1960), let's say it's 115 inches. Type 115 and press RETURN. Automatically, Apple Plot has entered this data point as

#	X	Y
1	1	115
2	2	

and now it's waiting for you to type the Y-value for data point 2, which is the rainfall for year 2. Type 98 and press RETURN. You'll see:

#	X	Y
1	1	115
2	2	98
3	3	

All you need to do is type the Y-values; Apple Plot will supply the data point numbers and the X-values for you.

When you run out of data points to enter, type a slash (/) where you would normally enter a Y-value and press RETURN. You'll be back at the Data Editor's command level, and you can continue to edit or examine the data list.

You can use the Sequential entry mode starting with any data point number; for example, to enter data points from number 8 onward, type S8. No other data points will be changed except those numbered 8 through the last one you enter.

Listing Data

To see a list of the X- and Y-values of data points, type L followed by the number of the first data point which you wish to see, and press RETURN. If you omit the data point number, the list will begin with data point number 1. While the list is being displayed, you can cause it to pause by pressing the spacebar. To continue listing, press the spacebar again. To make the listing stop altogether, press RETURN.

Deleting Data

To delete an entire data point from the list, type DXY, press RETURN,
type the number of the data point which you wish to remove, and press
RETURN again. Apple Plot will remove the X and Y values of the data
point, leaving a hole in the list of data point values. It will then
move up all of the following X and Y values to fill up the hole. For
example, if you had a data list like the following:

#	X	Y
1	10	8
2	15	7
3	20	9
4	25	6
5	30	4

and you typed
DXY RETURN 3 RETURN
then the new data list would look like this:

#	X	Y
1	10	8
2	15	7
3	25	6
4	30	4
5	0	0

Apple Plot removed the values 20 and 9 from data point number 3,
leaving a hole. It then moved the values 25 and 6 into that hole from
data point number 4. Then it moved the values 30 and 4 from data
point 5 into data point 4. Finally, having nothing left to use, it
put zeroes into the X and Y values of data point 5.

The DX and DY commands for the Data Editor let you delete just one of
the values from a data point, leaving the other intact. These
commands are valuable when you've made a mistake when entering data
and the X- or Y-values are not synchronized. For example, imagine
that you were entering data into Apple Plot, copying from a rough,
handwritten table, and you had entered the following:

#	X	Y
1	800	3.2
2	820	5.3
3	835	8
4	838	8
5	842	8.5
6	850	8.6

Then you noticed that the Y-value for data point 6 should have been 9,
not 8.6. Then you realized that although you had entered all of the
X-values correctly, you had accidentally used the Y-value of 8 twice,
for data points 3 and 4. The correct Y-value for data point 4 should

be 8.5, the Y-value for point 5 should be 8.6. Type
DY RETURN 4 RETURN
to delete the mistakenly repeated Y-value in data point number 4. The
hole left by the removed value will be filled with the Y-value from
the next data point, and so on down the line. After you delete the
mistaken value, the data list will look like this:

#	X	Y
1	800	3.2
2	820	5.3
3	835	8
4	838	8.5
5	842	8.6
6	850	0

Now change data point 6 to its proper value (by entering the entire
data point again), and you can continue entering points.

The DX command works in the same fashion as DY, above, except that it
deletes X-values, not Y.

Inserting Data

The IXY command allows you to insert a data point into the middle of a
data list, immediately before another data point. Suppose you have a
data list containing days of the month as the X-values and your
checking account balance as the Y-values, and you've entered it like
this:

#	X	Y
1	8	500.00
2	9	429.35
3	11	419.35
4	12	399.35
5	15	649.35
6	16	638.92
7	17	604.84

After you enter this, you realize you've forgotten the 14th, when you
had $349.35. Since the 14th comes between the 12th and the 15th, this
data point should be inserted before data point 5.
Type
IXY RETURN 5 RETURN 14 RETURN 349.35 RETURN

Data point 5 will take on the new values, data point 6 will get the
values formerly belonging to point 5, and point 7 will get the values
of point 6, and so on. The new data list will look like this:

#	X	Y
1	8	500.00
2	9	429.35
3	11	419.35
4	12	399.35
5	14	349.35
6	15	649.35
7	16	638.92
8	17	604.84

The IX and IY commands insert only a single X or Y value, respectively. These commands are valuable when you've made a mistake when entering data and the X- or Y-values are not synchronized. If you have a data list as follows:

#	X	Y
1	20	5
2	25	7
3	30	9
4	40	11
5	45	13
6	50	15
7	?	17

and you discover that you left out the X value 35, which should have been data point 4 with the Y value of 11, you can insert the missing X value by typing
IX RETURN 4 RETURN 35 RETURN 11 RETURN

The X-values for data points 4, 5, and 6 will be bumped down to make room for the newcomer, and the Y-value for data point 4 will be replaced with the new Y-value of 11 you entered, but the other Y-values won't be changed. The resulting data list will look like this:

#	X	Y
1	20	5
2	25	7
3	30	9
4	35	11
5	40	13
6	45	15
7	55	17

The IY command operates in entirely the same manner, inserting a Y-value into a data list and replacing an X-value, rather than inserting an X-value and replacing a Y. The IX, DX, IY, and DY commands are also useful not only for correcting mistakes, but also for shifting your data set along an axis. The DX and DY commands will move a graph towards the origin in the X and Y directions, respectively, and the IX and IY commands will move a graph away from the origin. As always, you must be careful to make sure that all data points you're using have valid X and Y values, and that no X or Y value for a data point

is left unassigned. Otherwise, the results are unpredictible.

LEAVING THE DATA EDITOR

When you wish to leave the Data Editor, type a slash (/) where you
normally would enter a data point or type a command and press
RETURN. Apple Plot will display the word
WAIT
flashing at the bottom of the screen while it updates the data list;
it will then return to the Data Entry and Editing Menu.

DISPLAY DATA

When you choose DISPLAY DATA from the Data Entry Menu, you will be
asked about which data list you wish to see. You can only see one
data list at a time; choose either 1 or 2 and press RETURN.

Apple Plot will start displaying a list of the data points in the
chosen data list. The list will begin with data point number 1, and
will display the values of all data points, whether you are using them
or not. While the list is being displayed, you can cause it to pause
by pressing the spacebar. To continue listing, press the spacebar
again. To make the listing stop altogether, press RETURN. You will
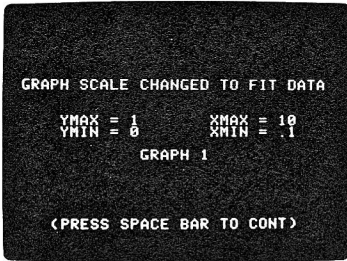be returned to the Data Entry and Editing menu.

DISPLAY GRAPH

Selection 5 from the Apple Plot menu allows you to display the graph
of the data set on which you are working.

First, Apple Plot will scan all of the data points in the plotting
range you specified for each data list. It will determine the minimum
and maximum X- and Y-values in all the data points you're plotting. If
the X- or Y-value of any data point is greater than the maximum (or
less than the minimum) X- or Y-value you've set in X- or Y-AXIS
PARAMETERS, then Apple Plot will automatically adjust the setting of
the proper parameter to ensure that it can plot all of your data

points on the screen. When it does this, it will display a message
such as this:


```
GRAPH SCALE CHANGED TO FIT DATA

    YMAX = 1        XMAX = 10
    YMIN = 0        XMIN = .1
            GRAPH 1


  (PRESS SPACE BAR TO CONT)
```

informing you of which parameter was changed, and also its new value.
Press the spacebar to continue.

If the OVERLAY ADDITIONAL GRAPHS switch of the GRAPH FORMAT SELECTION
is OFF, Apple Plot will then clear the Apple's Page 1 High-Resolution
Graphics screen and draw, in this order:

1) The X- and Y-axes, at right angles to each other. If both
   data sets contain only positive values, then the origin will
   be near the lower-left corner of the screen; if there are nega-
   tive values in either of the displayed data sets, then the X-
   axis will bisect the Y and the origin will be near the middle
   of the left side of the screen.

2) Short, horizontal tic marks along the Y-axis. The number of
   tic marks is determined by the NUMBER OF DIVISIONS setting in
   the Y-AXIS PARAMETERS. If the EXTENDED HORIZONTAL GRID MARKS
   are desired, then Apple Plot will draw a series of dots exten-
   ding horizontally from each tic mark. The dots will fall
   directly above or directly between the X-axis tic marks.

3) Short, vertical tic marks along the X-axis. The number of tic
   marks is determined by the NUMBER OF DIVISIONS setting in the
   X-AXIS PARAMETERS. If the EXTENDED VERTICAL GRID MARKS are
   desired, then Apple Plot will draw a series of dots extending
   vertically from each tic mark. The dots will fall directly
   across from or directly between the Y-axis tic marks.

4) The label for the Y-axis, with the characters stacked
   vertically. The label appears on the far left edge of the
   screen, centered vertically next to the Y-axis.

5) The label for the X-axis, drawn horizontally. The label
   appears at the very bottom of the screen, centered hori-
   zontally under the X-axis.

6) The title of the graph, drawn horizontally. The title appears
   at the very top of the screen, centered horizontally above
   the X-axis.

7) Scale marking labels for the Y-axis. These appear as strings

of digits, centered next to the tic marks which they represent. If labels contain digits to the right of the decimal point, only one digit to the right of the point will be displayed.

If a label contains five characters (including the sign or decimal point), then its first character will run into the Y-axis label; if a label contains more than five characters, then that label will not be displayed. This occurs most often when the Y-axis values are too large (over 10,000) or when the values of the tic marks are not whole numbers (when the Y-axis range is not evenly divisible by the number of tic marks).

If the tic marks on the Y-axis are too close together, then Apple Plot will label as many tic marks as it can without causing labels to overlap.

8) Scale marking labels for the X-axis. These appear as strings of digits, with the last digit of each string centered under the tic mark which it represents. If a label contains digits to the right of the decimal point, then only one digit to the right of the point will be displayed.

If the tic marks on the X-axis are too close together, then Apple Plot will label as many tic marks as it can without causing labels to overlap.

9) The graph of the first data set. For a SCATTER CHART, STANDARD GRAPH, or STANDARD GRAPH WITH GRAPH OVERLAY Apple Plot will plot the selected individual points in the data set (determined by STARTING and ENDING POINT in NUMBER OF DATA POINTS) as small squares. If the graph is not a SCATTER CHART, then Apple Plot will start with the first displayed data point and draw a line from point to point.

If the graph is a BAR CHART, a BAR CHART WITH GRAPH OVERLAY, or a MULTIPLE BAR CHART, Apple Plot will draw a rectangle for each data point. The width of each rectangle will be 2/3 the distance between tic marks, and the height of each rectangle will be determined by the Y-value of the data point. These bars will be drawn in a solid color, unless the graph is a BAR CHART WITH GRAPH OVERLAY, in which case the bars will be drawn as open rectangles with colored horizontal hash marks.

Bars on the rightmost tic mark or on the origin will be drawn half width. If you want these bars to appear at their full width, then add another tic mark on the right side of the graph by increasing the MAXIMUM X-AXIS VALUE and NUMBER OF DIVISIONS (or NUMBER OF MONTHS or LAST YEAR TO PLOT).

10) The graph of the second data set. For a STANDARD GRAPH, BAR CHART, or a SCATTER CHART, this data set will not be displayed.

If the graph is a STANDARD GRAPH WITH OVERLAY or a BAR CHART WITH GRAPH OVERLAY, then Apple Plot will plot the selected individual points in the data set (determined by the STARTING and ENDING POINT in NUMBER OF DATA POINTS). Apple Plot will then start with the first displayed data point and draw a line from point to point.

If the graph is a MULTIPLE BAR CHART, then Apple Plot will display the second data set as a bar chart, as described above. This bar chart will be drawn in outline, with colored horizontal hash marks.

11) Label #1, if it is used. Apple Plot will clear out a rectangle the size of the label, and then write the label horizontally. If you have already positioned the label, and have not changed it since you last displayed the graph, it will appear in its previous position.

If the label is new, or you have changed the text of the label since the last time you displayed the graph, then you must position the label. To do this you use the keys I, J, K, and M on the Apple's keyboard as directional controls. Each time you press a key, the label moves in the direction indicated by that key. The I key moves the label up, the K key moves it right, the J key moves it left, and the M key moves it down. The label moves 20 dot positions each time. Typing CTRL-A changes this increment to 1 dot position. Typing CTRL-S changes the increment back to 20 dots. If a label hits any edge of the screen while you are moving it, it will stop and move no farther in that direction.

When you have positioned the label, press RETURN. Apple Plot will beep to tell you that the label has been fixed. Since positioning a label destroys parts of your graph as you move the label around, it is recommended that you redisplay the graph after you position a label.

12) Label #2, if it is used. Apple Plot will clear out a rectangle the size of the label, and then write the label horizontally. If the label has already been positioned, it will appear in its previous position.

If the label is new, or you have changed the text of the label since the last time you displayed the graph, then you must position the label. You position this label in the same manner as you positioned label #1 (see above).

If the OVERLAY ADDITIONAL GRAPHS switch of the GRAPH FORMAT SELECTION

is ON, then Apple Plot will perform only steps 9 through 12 of the above, without erasing the Apple's high-resolution graphics screen. It will, however, perform range checking and adjustment on your data set.

After the graph is complete, it will remain on the screen until you press the spacebar. You will then be returned to the Apple Plot menu.

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If Apple Plot can't interpret one of the parameters you have set, or you committed some other subtle sort of error, then Apple Plot may stop in the middle of displaying the graph and return immediately to the Apple Plot menu. If this happens, SAVE YOUR DATA IMMEDIATELY. Then re-check your data, your parameters, and your graph format closely. Try changing things around and see if it works. Make sure that the GRAPH FORMAT SELECTION is set to plot the correct data sets in the correct formats, that the PLOTTING RANGE is as you wish it to be, aand that the X- and Y-axis ranges and number of divisions correspond with the X-axis labels and the minimum and maximum values in your data set.

SAVE DATA FROM DISK

There are two forms in which you can save Apple Plot data onto an Apple diskette: pure Data and Picture. When you save Data, you are saving the data points in both data sets, the GRAPH FORMAT you have chosen, and all of the X- and Y-AXIS PARAMETERS you have specified. When you save data in Picture format, you are saving none of this: all you are saving is the Apple's High-Resolution screen image of the most recently displayed graph.

Data is stored in Apple Disk II text files. The format of these files is discussed in the next chapter. Pictures are stored in binary files as 8,192 byte screen images, starting at memory location 8192 (hexa-decimal $2000). This is the same format as used by most programs which manipulate high-resolution picures.

When you choose selection 6 from the Apple Plot menu, you will be asked in which of these forms you wish to store your graph. Answer D or P and press RETURN. Apple Plot will then display a catalog of the contents of the diskette in drive 1. If the catalog is longer than the screen can hold, then you will have to press a key to see the remainder of the catalog before proceeding.

If you have two disk drives and you would like to save your data on the diskette in drive 2, then follow the D or P in the previous step with a comma, a D, and the number of the drive which you would like to use. For example, to save Data onto drive 2, you would type D,D2.

Next, Apple Plot will ask you for the name of the file in which you wish to store your data. You can type any valid Apple DOS file name; see your DOS manual for details.

You can save information into a file which already exists, or you can save it in a newly created file. If you try to save data in an extant file, then that file must be of the same type (text or binary) as the data which you are trying to save. When you do save the data, the previous contents of that file are lost and unrecoverable.

If you simply press RETURN when asked for a file name, you will be returned to the Apple Plot menu with your data unsaved but unchanged.

RECALL DATA FROM DISK

You can recall any data set which you have stored on a diskette, in either Data or Picture form. When you recall a Picture file, none of your data or formatting information is altered; when you recall a Data files, the picture of the previous graph is not removed from the high-resolution screen. Thus, if you set the OVERLAY ADDITIONAL GRAPHS switch to ON, you can recall and plot data set on top of data set, as much as you please.

When you choose selection 7 from the Apple Plot menu, you will be asked in which of these forms you wish to recall your data. Type D or P and press RETURN. You will be shown a catalog of the contents of the diskette; if the catalog is longer than the screen is tall, then you will have to press a key to get all of it.

If you have two disk drives and you would like to recall your data from the diskette in drive 2, then follow the D or P in the previous step with a comma, a D, and the number of the drive which you would like to use. For example, to recall a Picture from drive 2, you would type P,D2.

When Apple Plot asks you for a file name, type the name of the file which you wish to recall, exactly as it appeared in the catalog listing, and press RETURN. If you don't want to recall new data, just press RETURN alone and you'll be sent back to the Apple Plot menu, with your current data set and screen picture unchanged.

When you recall a Data file which does not have formatting information (see Chapter 4 of this manual for instructions on how to create these), Apple Plot sets the formatting paramaters to their default values (see CLEAR FOR NEW PLOT, below). It then reads through all of the data points and finds the maximum X- and Y-values in the data sets. It uses these to set the maximum axis values in X- and Y-AXIS PARAMETERS. While it is doing this, it displays the message RANGING DATA
flashing in the middle of the screen.

If Apple Plot encounters an error or inconsistency when trying to
recall data from the diskette, it will beep three times and display
CHECK YOUR INPUT
and return you to the Apple Plot menu. Perhaps you misspelled the
file name, maybe it's the wrong type of file, or the data in it is
scrambled. Try it again, making sure that you're doing everything
correctly.

CLEAR FOR NEW PLOT

This procedure sets all parameters to their original default values
and clears both data sets. It takes a few seconds to finish; while it
is working, it displays
CLEARING
flashing in the center of the screen. Here, section by section, are
the default values:

DEFAULT VALUES

GRAPH FORMAT SELECTION:
       Standard Graph with Graph Overlay
       Overlay Additional Graphs: OFF
       Color for plot 1: White
                 plot 2: Blue

X-AXIS PARAMETERS:
     Monthly plot: N
       First month: 1
       Number of months: 12
     Yearly plot: N
       Number of first year: '80
       Number of last year: '90
     Number of divisions: 10
     Maximum X-axis value: 1 (or maximum in data set)
     Minimum X-axis value: 0
     X-axis label: X
     Use label #1: N
       Change label #1: N
        Text for label 1: (blank)
     Use label #2: N
       Change label #2: N
        Text for label #2: (blank)
     Extended vertical grid lines: N

Y-AXIS PARAMETERS:
        Number of divisions: 10
        Maximum Y-value: 1 (or maximum in data set)
        Minimum Y-value: 0
        Y-axis label: Y
        Title of graph: UNFORMATTED GRAPH
        Extended horizontal grid lines: N

DATA ENTRY AND EDITING:
        PLOTTING RANGE:
            Starting point for plot 1: 0
            Ending   point for plot 1: 0
            Starting point for plot 2: 0
            Ending   point for plot 2: 0
        DATA ENTRY:
            All data points, X-value: 0
            All data points, Y-value: 0
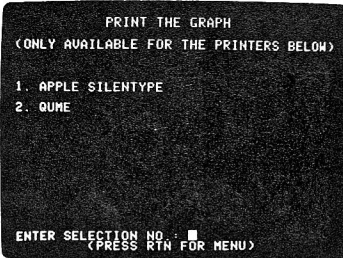
DISPLAY GRAPH:
        Location of label 1: upper left-hand corner
        Location of label 2: upper left-hand corner

PRINT THE GRAPH

Selection 9 from the Apple Plot menu allows you to get a printed copy
of the most recently plotted graph. When you select PRINT THE GRAPH
from the Apple Plot menu, you will be shown another menu, called the
Print The Graph menu:

You have two choices from this menu: use the Apple Silentype printer,
or use a Qume Sprint 5 printer. If you do not wish to print the graph
at this time, press RETURN to return to the Apple Plot menu.

USING THE SILENTYPE

If you wish to use the Apple Silentype printer, its interface card
should be plugged into slot 1 of the Apple's backplane. Refer to your
Silentype manual for installation and setup instructions.

Make sure that your Silentype is set up properly, and that it is
loaded with paper. Press 1 RETURN from the Print The Graph menu to
begin printing. If your Silentype interface card is malfunctioning,
or you have no Silentype attached to your Apple, Apple Plot will
display the message
SILENTYPE NOT IN SYSTEM
Press the spacebar to return to the Apple Plot menu.

If your Silentype is present and operational, then Apple Plot will ask
you if you wish to CHANGE PRINTER PARAMETERS? (Y/N). Press RETURN to
return to the Apple Plot menu. Press N RETURN to print the graph.

If you answer Y RETURN, then you will be asked four questions about
the output parameters for the Silentype. For a thorough description
of these paramaters, see your Silentype manual.

The four questions are in a list similar to the X- and Y-AXIS
PARAMETERS questions. Pressing RETURN accepts the default reply for a
question; typing a slash and pressing RETURN lets you skip the
remainder of the questions.

Regardless of whether you changed the parameters or not, you can now
press the spacebar to let Apple Plot print your graph. If you press
CTRL-C at any time during the printing, Apple Plot will stop, eject the
paper, and return you to the Apple Plot menu.

After it has finished printing, the Silentype will eject enough paper
for you to be able to tear off the print of the graph, and return you
to the Apple Plot menu.

USING THE QUME

If you wish to use a Qume Sprint 5 printer, then before you select
option 2, QUME, from the Print The Graph menu, make sure of the
following:

Have an Apple Serial Interface card with a P8A prom plugged into
slot 1 inside the Apple. Make sure that your printer is properly
initialized. Check that both the printer and the interface card are
working at the same baud rate. Verify that the printer is loaded with
paper and ribbon. See that the printer cable is firmly connected to
the interface card.

Once you've made all these checks, type 1 to select the QUME and press
RETURN. The Apple's screen will show your graph, with a blinking bar
scanning frantically across it. As the bar zips across the screen,
your Qume's print head will fly across the paper, printing black dots
as it goes. In less than a minute, your print will be complete, and
you will be returned to the Apple Plot menu.

If you do not have a Serial Interface card installed in slot 1 of the
Apple, then Apple Plot will display the message

PRINTER CARD NOT FOUND
and return you to the Print The Graph menu.

The QUME printer routine will not work with any printer other than a
Qume Sprint 5. It also needs the Apple Serial Interface card with the
Letter Quality Prom P8A.

If anything at all goes wrong while Apple Plot is printing your graph,
you will have to press RESET and reboot your system. All data will
be lost.

If you will be printing many graphs using the Qume, we suggest that
you get a printwheel with a reinforced or metallized "period"
character. It is with this character and this character only that
Apple Plot prints graphs; thus, it is likely to wear out quickly if
you print many graphs.

CHAPTER 4
GOING FURTHER

This chapter is meant for those of you who may have some experience
programming the Apple, and using the Applesoft II BASIC programming
language with Apple's Disk Operating System. For more information on
the commands and terminology used in the following sections, refer to
the Applesoft II BASIC Programming Manual (Apple product number
A2L0006) and the DOS manual which was supplied with your disk drive.

DATA FILE FORMAT

An Apple Plot Data file is a sequential-access text file which contains
the data point values and formatting information for a data set.

The data is organized into records, which are pieces of information
separated by RETURNs. The first record contains the number of data
points for the first data list, and the second record contains the
number of data points in the second data list. If there are no data
points in one of the data lists, then the record which contains the
number of data points for that list will be zero.

If there are any data points in the first data list, then their values
will occupy the next records. Each data point value is stored with
its X-value in one record and its Y-value in the next.

After the last record of the data point values for the first list come
the data point values for the second list. These are also stored
with each data point's X-value in one record and its Y-value in the
next.

Pictorially, the beginning of a data file looks like this:

Record number		Contents
0	n	Number of data points in first data list
1	m	Number of data points in second data list
2	X1	X-value of first data point in data list 1
3	Y1	Y-value of first data point in data list 1
4	X2	X-value of data point 2, data list 1
5	Y2	Y-value of data point 2, data list 1

```
  .           .    .    .
  .           .    .    .
  .           .    .    .
 2n        |   Xn   |       X-value of last data point in data list 1
           +----------+
 2n+1      |   Yn   |       Y-value of last data point in data list 1
           +----------+
 2n+2      |   X1   |       X-value of first data point in data list 2
           +----------+
 2n+3      |   Y1   |       Y-value of first data point in data list 2
           +----------+
 2n+4      |   X2   |       X-value of data point 2 in data list 2
           +----------+
 2n+5      |   Y2   |       Y-value of data point 2 in data list 2
  .           .    .    .
  .           .    .    .
  .           .    .    .
 2(m+n)    |   Xm   |       X-value of last data point in data list 2
           +----------+
 2(m+n)+1  |   Ym   |       Y-value of last data point in data list 2
           +----------+
```

In files which were created by Apple Plot, the data point values are
followed by the values of all of the X- and Y-axis parameters, the
Graph Format parameters, and other variables which control the
appearance of the graph. These values are for Apple Plot's use only.

CREATING YOUR OWN DATA FILES

If you have some output data from a program which you then want to
enter into Apple Plot to be graphed, there are two ways to do it: you
can run your program, print (or record manually) its output, and then
enter it into Apple Plot's Data Editor; or you can have your program
create an Apple Plot data file (in the format given above) so that
Apple Plot can read it in directly, and you won't need to do any data
entry at all. Here's how:

Suppose you've got a program to print the sine and the cosine of
numbers from 0 to 6.27, going in 100 steps. It would look like this:

```
NEW
100 REM PROGRAM TO PRINT SINE AND COSINE VALUES
150 REM THERE ARE 100 VALUES, FROM 0 TO 6.28
200 PRINT "VALUE","SINE"
250 FOR X=0 TO 6.27 STEP .0628
300 PRINT X,SIN(X)
350 NEXT X
400 PRINT
450 PRINT "VALUE","COSINE"
500 FOR X=0 TO 6.27 STEP .0628
550 PRINT X,COS(X)
600 NEXT X
650 END
```

This program can be easily modified to send its output not to the screen, but to a text file in a format suitable for Apple Plot.

The first thing it must do is to create the text file. These statements:

```
110 D$=CHR$(4): REM DOS CONTROL CHARACTER
120 REM CREATE THE TEXT FILE FOR OUTPUT
130 PRINT D$;"OPEN SINECOS"
140 PRINT D$;"WRITE SINECOS"
```

do just that. Since there is one set of numbers for the sine, and another for the cosine, let's use Apple Plot's first data list to hold the data points for the sine graph, and its second data list to hold the points for the cosine graph.

The first two items in the file must be the number of data points in each data list. Since there are 100 data points in each list, the statements

```
160 PRINT 100 : REM 100 DATA POINTS IN FIRST LIST
170 PRINT 100 : REM 100 DATA POINTS IN SECOND LIST
```

will place those two numbers at the beginning of the file.

Now the format in which the original program displayed the values of X, SIN(X), and COS(X) must be modified in order to fit Apple Plot's liking. The printed column headers VALUE, SINE, and COSINE are for your benefit only; Apple Plot will choke on them if they are included in its data file. Delete these by typing:

```
DEL 200,200
DEL 400,450
```

Now the PRINT statements in lines 300 and 550 need to be changed. At the moment they will print out the values and their sines and cosines in two columns; Apple Plot wants the sines and cosines on their own lines, immediately following their associated values. Retype these lines:

```
300 PRINT X:PRINT SIN(X)
550 PRINT X:PRINT COS(X)
```

Only one thing left to do: when the program is finished, it should close the file in which it has stored all of the data points:

```
610 PRINT D$;"CLOSE SINECOS"
```

Now this program is finished. You can store it on the diskette, to be modified or added to later, by typing

SAVE DATA FILE MAKER

Now RUN this program. It should grind along, cranking out sines and cosines for about 25 seconds, with the disk's IN USE light on all the while. When it finishes, there should be a file called SINECOS in your disk's catalog.

Now type

RUN HELLO

to get back into Apple Plot. Select RECALL DATA FROM DISKETTE by typing 7 RETURN. When Apple Plot asks you what type of file you wish to recall, answer D RETURN; when it asks you for the name, type SINECOS.

Apple Plot will then spend a few minutes reading your data file, and another few minutes calculating the minima and maxima of the data points. While it is doing this, it will display the message
RANGING DATA
flashing in the middle of the screen. Once it's finished, you can display the graph as you would display any other.

APPENDIX A

INTERFACE TO VISICALC™

Apple Plot has the ability to plot the graphs of data sets created by
Personal Software's VisiCalc (tm) program. On the Apple Plot diskette
is a program which will allow you to convert data files which were
created by the VisiCalc program into the format compatible with Apple
Plot. For more information on VisiCalc, see your VisiCalc manual.

VisiCalc models are rectangular arrays of numbers, arranged in rows
and columns. The conversion program can pick any number of adjacent
columns (up to 100) out of any two rows out of a VisiCalc model and
convert them into Apple Plot data lists. In order for the conversion
program to work, you first must save your VisiCalc model onto
diskette.

You will use VisiCalc's /PD command to save a portion of your VisiCalc
model onto the diskette. The conversion program will ask you which
rows and columns of the portion you saved you wish to convert into
Apple Plot data lists. Therefore, you should save a portion of your
VisiCalc model which contains the rows and columns you're interested
in, and you should remember the position of those rows aand columns in
the portion you saved. You should also make note of the column width
that your VisiCalc model is using; the conversion program needs this
information.

Boot your VisiCalc diskette and load your model. Use the arrow keys
to position the cursor at the top left corner of the portion of the
model you wish to save and type /PD (for PRINT to DISK). When
VisiCalc asks you for a file name, type the name of the file into
which you wish to store the information (this should not be the same
as the file name of your model!). Now either type the coordinates of
the lower-right hand corner of the portion you wish to save, or use
the arrow keys to move the cursor down to this position. Press
RETURN, and VisiCalc will save that portion of your model onto the
VisiCalc diskette, into the disk file you specified.

Now boot your Apple Plot diskette, get to the Apple Plot menu, and
type Q to Quit, and press ESC. Now type

FP
RUN VISICALC FILE CONVERTER

From the Conversion Menu, select 1 to INPUT A VISICALC FILE and press
RETURN.

You will first be asked the COLUMN WIDTH you had set in VisiCalc.
Type the number and press RETURN.

The conversion program will now ask you which row you wish to use for data set number 1. This row number specifies the row in the portion you saved; the top row in the portion you saved is row number 1, the next one is number 2, et cetera. Type the number of the appropriate row and press RETURN.

Next, you'll be asked which row to use for the second data list. If you want only one row, then just press RETURN; otherwise, type the row number and press RETURN.

Now you'll be asked the number of the column which contains the first data point in both data lists. Once again, the column numbers are relative to the first column in the portion you saved; the first column you saved is column number 1, the second is number 2, et cetera. The VisiCalc names for the columns are not used in the conversion program. Type the number of a column in your model and press RETURN.

Next, the program will ask you how many columns you wish to use. The file conversion program will take one data point from each column in the row(s) you specified. Type a number and press RETURN.

Now insert the VisiCalc diskette (on which you saved your model) into the disk drive. The program will ask you which disk drive the disk is in; type the number of the drive and press RETURN.

One more question: you will be asked to verify the above information. If you mistyped anything, type N RETURN; you will be asked the entire list of questions again. If everything's correct, type Y RETURN.

Now the file conversion program will display a catalog of the contents of the diskette in the drive you chose. Type the name of the file in which you stored your VisiCalc model (using the /PD command, above) and press RETURN.

If all of your data was correct, then the program will convert the file, store the result in a file called NAME.X-Y.PLOT (where NAME is the name of the VisiCalc file, X is the number of the first row you chose, and Y is the number of the second row), and you will be returned to the File Conversion menu. Type 2 RETURN to run Apple Plot. Then you can type 7 RETURN to RECALL DATA FROM DISK. Select D RETURN for a Data file; when Apple Plot asks you for a file name, type the name of the file as the conversion program stored it, and press RETURN. Now you're free to display and format the graph as you please.

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