TYMSHARE MANUALS
TYMCOM-IX

EASYPLOT

ALL PURPOSE PLOTTING

JULY 1970

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CUPERTINO, CALIFORNIA 95014

C01-1190

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Price $2.00

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INTRODUCTION

EASYPLOT is an applications language unique to the Tymshare system that provides a simple yet versatile means of using the CalComp or Zeta Plotters. Some of the outstanding features of this language are:

- Brief, easily learned commands.
- Program input from a file and/or the terminal with editing.
- Data input from a file; therefore the ability to plot data generated by programs written in any language.
- Automatic, semi-automatic, and manual scaling options.
- Log, semi-log, and linear scaling.
- Simple instructions for drawing grids and axes.

EASYPLOT allows the user to set his own specifications for each detail of the plot if he desires to do so, but will automatically supply default specifications. Therefore, a beginning user of EASYPLOT needs to know only a few instructions to write a useful program, and yet a full set of instructions is available as he gains familiarity with the language.

EASYPLOT programs are the same for both Zeta and CalComp plotters. Unless otherwise noted, all commands and procedures explained in this manual can be used to display data on either a Zeta Plotter or a CalComp Plotter.

To run the EASYPLOT programs described in this manual, log in to the Tymshare system and call #EASYPLOT.

To call #EASYPLOT from the EXECUTIVE, type

```
-#EASYPLOT↲
```

When EASYPLOT is ready for a command, a colon (:) will be printed. Any of the commands listed in the table below can be given after a colon. The two important commands are ZETA and CALCOMP. To use a Zeta or CalComp plotter, type

:ZETA↩ or :CALCOMP↩

When EASYPLOT responds with a box (□), the program can be run.

ZETA	Calls the Zeta Plotter.
CALCOMP	Calls the CalComp Plotter.
CAPABILITIES	Describes EASYPLOT capabilities.
INSTRUCTIONS	Tells how to use EASYPLOT.
HELP	Prints this list.
CREDITS	Written by Tymshare.
CHARGES	No premium charge.
QUIT	Returns to the EXECUTIVE.

A SAMPLE PROGRAM

This sample program shows briefly some of the EASYPLOT commands. More detailed explanations are contained in subsequent chapters.

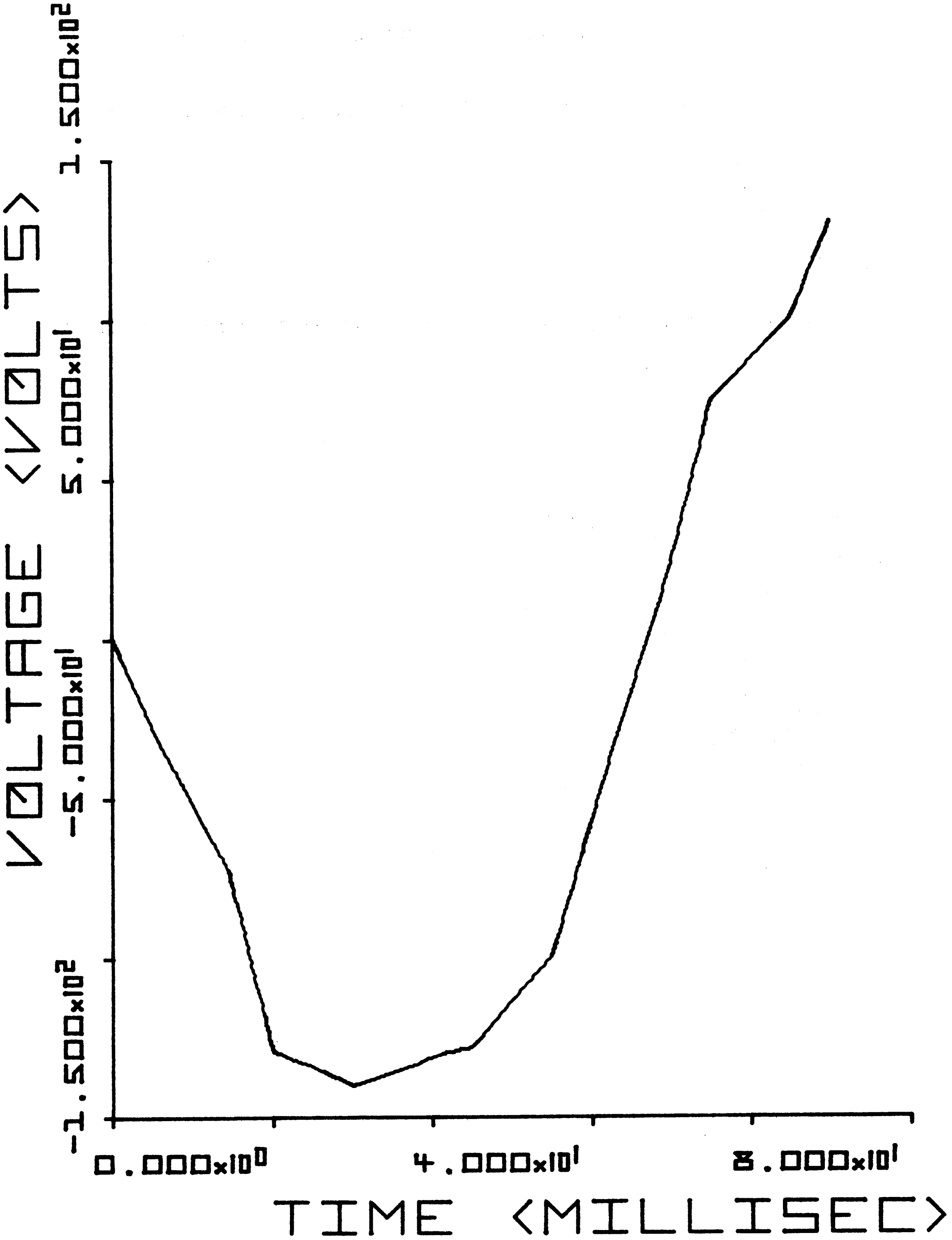
After EASYPLOT was called, the following commands were typed.

```
⎕ OPEN MYDATA↵
⎕ RUN EZPLT↵
⎕ EXECUTE↵
```

The following EASPLOT program was stored on the file EZPLT so that it could be used repeatedly.

```
REGION 5,6
X AXIS
     LENGTH=5
     LABEL="TIME (MILLISEC)"
Y AXIS
     LENGTH=6
     LABEL="VOLTAGE (VOLTS)"
Y SCALE
X SCALE
     START=0
     INCREMENT=20
DATA
PLOT
     LINES
```

The resultant plot is shown below.



OPEN MYDATA opened the data file MYDATA. All data to be plotted is taken from MYDATA until another file is opened.

RUN EZPLT transferred control to the file EZPLT. Instead of taking commands from the terminal, EASYPLOT took all commands from the file until the file was completely read. The OPEN and EXECUTE statements could have been stored on the file, or alternatively, all of the statements could have been entered from the terminal.

Each of the commands stored on this particular file causes a certain specification to be stored in EASYPLOT. No action is taken, however, until the EXECUTE command is encountered. This command instructs EASYPLOT to do whatever has been specified up to that point. In this sense, the commands written in the sample program may be called indirect commands, which store specifications that are not carried out until the direct command EXECUTE is given.

Any of the specifications can be changed simply by retyping the specification before giving the EXECUTE command.

The REGION command defines the size of the plotting area in inches. Wherever the pen is located when the EXECUTE command is given will be the lower left-hand corner of the plotting region, called the reference point. This REGION command describes a plotting region extending 5 inches to the right of the reference point and 6 inches above the reference point.

The X AXIS and Y AXIS commands specify that these axes should be drawn. Beneath the AXIS commands, LENGTH and LABEL are used to indicate the length of each axis in inches and the label to be printed on each axis. EASYPLOT does not consider the omission of these specifications to be an error. Axes do not require labels, and EASYPLOT will assume the length of each axis to be eight inches if the user does not specify a length. It is this feature of automatic specification that makes EASYPLOT so simple and foolproof: simple because so few commands are necessary to run a program; foolproof because the accidental omission of most specifications will not cause EASYPLOT to terminate execution.

The Y SCALE command in the sample program indicates that EASYPLOT should automatically scale the data so that all points will fit within the 6" vertical plotting region defined by the REGION command. Additional specifications were typed beneath the X SCALE command, setting the X SCALE manually to start at zero and increase 20 units per inch. Any data with an X value not between 0 and 100, is not plotted because it would extend the plot beyond the 5" horizontal REGION specification.

The DATA command specifies that a block of data is to be read from the data file. The numbers 9999.,.0 followed by a Carriage Return are included in the file to indicate the end of a data block.

The PLOT command indicates that the data read from the file is to be plotted. LINES specifies that lines will be drawn between data points in the order that the points were listed in the data file.

The specifications such as LENGTH, LABEL, and LINE are indented in the sample program only to show clearly which command they refer to, and beneath which they must be typed. The indention is not required.

In addition, the order in which the indirect commands are typed is arbitrary, as long as the secondary specifications are typed beneath the related command. Thus, DATA could be the first command in the sample program; or PLOT followed by LINES could be typed first. LABEL could precede LENGTH under the X AXIS or Y AXIS commands. The reason for this arbitrary order is that when the EXECUTE command is given, EASYPLOT carries out the specifications in a predetermined order. For example, if axes are to be drawn, this will be done before the data is plotted, even if PLOT is specified before the AXIS commands.

EASYPLOT creates a file in the user's directory named /**SCR**/. To avoid storage charges, delete this file with the EXECUTIVE command

```
-DELETE /**SCR**/↲
```

Although all commands in the sample program are spelled out in full, each can be abbreviated to its first three characters.

SECTION 1
USING EASYPLOT

CREATING THE DATA FILE

The EASYPLOT data file can be created in EDITOR or in any of the Tymshare languages. Alternatively, the data file can be read into the Tymshare system from a paper tape.

Integer values (numbers without a decimal point) will not be accepted from the data file by EASYPLOT; only decimal or E notation is permitted.

The data may be written in a free form (the x value, a comma, the y value, and a Carriage Return for each data pair) as long as each value occupies fewer than 12 character positions in the data file.

At the end of the data file the numbers 9999.,.0 should appear. These numbers tell EASYPLOT to stop reading the data file. If several blocks of data are to be plotted, the terminator 9999.,1. may be used. This terminator tells EASYPLOT to re-execute using the next block of data. The use of these terminators is discussed in more detail under the DATA command on Page 19.

Creating A Data File In A Tymshare Language

When the data file is created in a programming language, the x, y pairs can be written as described above or as follows:

Language	Format	Termination
SUPER BASIC	S="2(12#)/" WRITE ON 2 IN FORM S:X, Y	WRITE ON 2: "9999.,0."
CAL	WRITE ON 2 IN FORM 1:X, Y FORM 1: ########### ############ (11 total) (12 total)	WRITE ON 2: "9999.,0."
SUPER FORTRAN	WRITE (2, 11)X, Y 11 FORMAT (2E12.6)	WRITE(2) "9999.,0."
BATCH FORTRAN	WRITE(2, 11)X, Y 11 FORMAT (2E12.6/)	WRITE(2, 11) 9999.,0.

Creating A Data File In EDITOR

If the data to be plotted is not program output, the file may be created in EDITOR. For example,

```
- EDITOR↲           This command calls EDITOR from the EXECUTIVE.
*APPEND↲            The * means EDITOR is ready to accept a command.
12.35,67.↲          The data is typed under APPEND↲.
23.78,78.↲
24.11,49.↲
36.06,66.↲
42.83,52.↲
60.85,70.↲
86.93,69.↲
96.71,81.↲
103.56,87.↲
9999.,0.↲           9999.,0. indicates the end of the data block.
D^c                 D^c terminates the APPEND command.
*WRITE PDATA↲
NEW FILE↲
33 WORDS.
*
```

The NEW FILE comment indicates that the user does not already have a file named PDATA. The Carriage Return confirms the command; an ALT MODE/ESC will abort it. Note that writing on an OLD FILE replaces the original contents of that file.

Any typing errors made in EDITOR can be corrected immediately by using EDITOR control characters and commands. For example, a A^c deletes the preceding character typed, and a Q^c deletes the entire line being typed. For more information on the Tymshare editing language, consult the Tymshare EDITOR Manual, Reference Series.

EASYPLOT PROGRAMS

The plotting programs can be entered into EASYPLOT either from a file or from a terminal (for those users who have a plotter). The advantage of creating a program file is that the file can be used repeatedly or altered slightly and reused, whereas a program entered from the terminal is lost as soon as the user terminates EASYPLOT. Terminal input is used primarily for short, one-time plots, or for making minor changes in programs read from a file.

Entering A Program From The Terminal

When EASYPLOT is ready to receive program commands from the terminal, a box (□) is typed on the left. When the box appears, type a command followed by a Carriage Return. Another □ will be printed if the command is accepted. For example,

```
□ DATA↵
□ X SCALE↵
□ Y SCALE↵
□ PLOT↵
□ LINES↵
□ X AXIS↵
□ Y AXIS↵
□ OPEN PDATA↵
□ EXECUTE↵
/P/
□
```

If EASYPLOT cannot understand a command (for example, if the word is misspelled) an error message will be printed followed by another □. The command must then be retyped.

Three control characters can be used when the plotting program is entered directly from the terminal into EASYPLOT.

A^c and Q^c are used for editing in the same way that they are used in the Tymshare EDITOR language. A^c deletes the preceding character typed and prints a ← on the terminal. Q^c deletes the entire line being typed and prints an ↑.

I^c will provide the optional indention for those commands that the user wishes to indent. When I^c is typed, EASYPLOT tabs to print position 4.

Creating A Program File

The EASYPLOT program can be most easily typed in EDITOR under the APPEND command and written on a file. Each line in the EASYPLOT program is followed by a Carriage Return. For example,

```
-EDITOR ↵
*APPEND↵
DATA ↵
X SCALE ↵
   .
   .
   .
EXECUTE↵
Dᶜ
*WRITE PPROG ↵
NEW FILE↵
21 WORDS.
*QUIT ↵

-
```

Any of the editing characters and commands of EDITOR can be used to correct errors made while typing the program.

The QUIT command is used to return to the EXECUTIVE.

Procedure For Users Without A Plotter

Those users who do not have a plotter may simply store certain commands and information on a command file and let one of the operators at the Tymshare computer center run the command file for them.

The command file should contain exactly what the user would type if he were calling EASYPLOT, entering the input files, and logging out at the terminal. For example,

```
-EDITOR ↵
*APPEND ↵
EASYPLOT ↵
ZETA ↵
RUN (M2JONES)PPROG ↵
QUIT ↵
LOGOUT ↵
D^C
*WRITE @GOPLOT ↵
NEW FILE ↵
11 WORDS.
*QUIT ↵

-
```

The user then calls the computer center and gives them his account number, user name, and the name of the command file (@GOPLOT in this example). Tymshare will send the plots or hold them to be picked up at the computer center.

There are three important restrictions which apply only to command file plotting.

1) The command file name must start with @.

2) The OPEN statement, whether in the command file or the program file, must include the account number and user name with the file name in the form:

   OPEN (account number user name) file name

   Examples

   OPEN (M2JONES)PDATA   OPEN (H7JUDD)NUMBERS

3) The data file and the program file must be declared public.

```
-DECLARE PDATA ↵
PRIVATE:
 WRITE ACCESS: N↵
 PUBLIC: Y↵

-
```

SECTION 2
INDIRECT COMMANDS

Indirect commands store specifications which are carried out only when the direct command EXECUTE is encountered. The specifications remain stored after execution. A specification can be changed by re-entering the indirect command. Therefore, to execute two plots that differ only in title, set the specifications, execute, respecify the title only, and re-execute. A specification can be cleared by the direct commands DELETE, SUPPRESS, and CLEAR discussed on Pages 30-31. In EASY-PLOT it is always necessary to respecify only the specific value to be changed. Conversely, every specification to be changed from one plot to another must be changed explicitly; specifications never revert to default values unless a DELETE, CLEAR, or SUPPRESS command is given. There is no limit to the number of times a specification can be changed or cleared. When the EXECUTE command is given, EASYPLOT will always use the last values given for each specification.

Some indirect commands are contained on one line, while others, such as X AXIS, X SCALE, and TITLE, can be followed by several lines of specifications. These secondary specifications are not indirect commands in themselves, but can be used only after the appropriate command. In the sample programs, these specifications are indented to indicate that they are a continuation of the indirect command directly above.

All specifications in indirect commands are given in real inches. The conversion scales set up with the SCALE commands apply only to the data to be plotted.

REGION

The REGION command defines the plotting area in inches. Any data falling outside the defined plotting region will not be plotted. Wherever the pen is located when the EXECUTE command is given will be the reference point for the execution. This reference point is the lower left-hand corner of the plotting region.

REGION = 5,6

defines an area 5 inches horizontally and 6 inches vertically. If the REGION command is omitted, the plotting region is defined by the LENGTH specification under the AXIS commands. If the EASYPLOT program contains no AXIS commands or no LENGTH specifications, the plotting region is 8'' by 8''. There are no secondary specifications used with the REGION command.

X SCALE AND Y SCALE

The SCALE commands specify either automatic, semi-automatic, or manual scaling. When no specifications are typed under X SCALE or Y SCALE, EASYPLOT will automatically scale the plotting region to contain all of the data. That is, EASYPLOT will read the data and then set the scales so that all the x and y data values will fall within the plotting areas. Beneath either or both of the SCALE commands, the user may make his own scaling specifications with START, INCREMENT, REVERSE, LOG, or INTERVAL. Data cannot be read at execution time unless both SCALE commands have been given.

START specifies the x value or y value of the reference point. For example,

START=-5.5

listed under Y SCALE specifies that the data should be scaled so that the y value is -5.5 at the reference point.

INCREMENT defines the units per inch of the x scale or y scale. The command

INCREMENT=.5

under X SCALE indicates a scale factor of .5 units per inch on the x scale.

If only one of the specifications START and INCREMENT is made, the other will be calculated automatically. If INCREMENT is not specified, EASYPLOT will assume a positive increment unless the REVERSE command is given (see below).

A user supplied START or INCREMENT will be accepted even if some of the data points will not fit within the resulting plotting region. An increment or starting value can be changed by giving the SCALE command and the specification to be changed. For instance, the command sequence

```
X SCALE
INCREMENT=.5
START=0
X SCALE
START=-1
```

would result in an x scale with a starting value = -1 and the increment = .5.

To return to automatic scaling, the commands

```
DELETE X SCALE
DELETE Y SCALE
X SCALE
Y SCALE
```

must be given. (See discussion under DELETE command, Page 30.) For other indirect commands, the DELETE command alone is sufficient to invoke the default condition. For convenience in performing multiple plots, a different convention is used with the SCALE command. The default condition, automatic scaling, is not invoked until it is explicitly forced by the command sequence above.

<u>REVERSE</u> is given whenever the user desires a negative increment but does not specify the increment himself. The reason for this specification is that EASYPLOT assumes a positive increment unless the user specifies otherwise. For example,

```
X SCALE
  START=5
  INCREMENT=-1
```

clearly specifies a negative increment. However, the commands

```
X SCALE
  START=5
  REVERSE
```

include REVERSE so that EASYPLOT will know the increment chosen should be negative.

LOG defines the scale to be a logarithmic scale. In a logarithmic scale, START still specifies the value at the reference point, but INCREMENT specifies a multiplication factor per interval. For example, in a log scale, an increment of 10 would cause the scale to increase logarithmically one order of magnitude per inch (or per the specified interval).

INTERVAL defines the interval in inches corresponding to the increment. If, in a log scale,

```
INCREMENT=10
INTERVAL=2.5
```

the scale will increase one order of magnitude every $2\frac{1}{2}$ inches.

LINEAR converts a logarithmic scale back to linear.

X AXIS AND Y AXIS

These commands indicate that axes are to be drawn. If one or both of the commands are omitted, EASYPLOT will not draw the axis or axes. If the commands

```
X AXIS
Y AXIS
```

but no further specifications are given, the axes will be 8 inches long starting at the reference point. They will have tic marks every inch and numbers in scientific notation every 2 inches. Any variations in this format can be effected by the secondary specifications, LENGTH, MOVE AXIS, TLENGTH, SPACING, FORMAT, NLOCATION, NSIZE, FACTOR, LABEL, LLOCATION, and LSIZE.

LENGTH specifies the length of the axis in inches. For example,

```
X AXIS
LENGTH=7
Y AXIS
LENGTH=6
```

indicates the x axis should be 7 inches and the y axis 6 inches. If the length is not specified, EASYPLOT will assume an axis length of 8 inches.

MOVE AXIS moves the axis relative to the reference point. The x axis can be moved up or down and the y axis to the left or right with MOVE AXIS. For example,

```
MOVE AXIS=2
```

if listed under X AXIS, specifies that the x axis should be moved two inches up from the reference point. Similarly, if listed under Y AXIS, the command specifies that the y axis should be moved two inches to the right of the reference point. Negative values may be used with MOVE AXIS to specify downward movement (for the x axis) or movement to the left (for the y axis).

Note that moving the axes does not affect scaling or plotting. Since the reference point is not moved and the scaling length is not changed, the plotting region is the same. The axes are simply drawn differently. If MOVE AXIS is not specified, the axis is drawn starting at the reference point. To return the axis to the reference point after a MOVE, give the commands

```
X AXIS
MOVE AXIS=0
```

TLENGTH specifies the length of the tics in inches. If TLENGTH is omitted, the tic length will be .1 inches.

SPACING sets the location of the tics and the numbers on the axis. For example,

```
SPACING=.4,2
```

would create tics along the axis every .4 inches and numbers every 2 inches (every five tics). Axes without a SPACING specification will have tics every inch and numbers every 2 inches.

FORMAT sets the format for the numbers. The FORMAT is described by giving a "picture" of it, putting a % wherever a digit belongs. For example,

```
FORMAT="%%.%%"
```

for a value of 20 would be printed as 20.00.

```
FORMAT="196%"
```

for values of 1, 2, 3 would print 1961, 1962, and 1963. If the value is too large for the format specification, the format will be expanded to accommodate the value. If the value is too small, for instance

```
FORMAT="%%"
```

and value = .1, the space will be left blank.

NLOCATION specifies the distance in inches between the numbers and the axis. The default condition is

```
NLOCATION=.2
```

NSIZE specifies the height of the numbers in inches.[1] The default condition is

```
NSIZE=.1
```

FACTOR causes numbers placed on the axis to differ from the actual scale for use with unit conversions. Thus,

```
FACTOR=.001
FORMAT="%%.%"
```

[1] - Rounded to the nearest tenth of an inch on Zeta plotters.

would cause the values 1×10^{-3}, 2×10^{-3}, etc. to be printed as 1.0, 2.0, etc.

LABEL gives text for labelling the axes. The form of the command is

LABEL="text for label"[1]

LLOCATION defines the distance between the axis and the label in inches. If no LLOCATION command is given, EASYPLOT assumes

LLOCATION=.5

LSIZE defines the height of the upper case characters in the label.[2] If omitted, EASYPLOT assumes

LSIZE=.2

DATA

This command is used to specify that a block of data is to be read from the data file. The data will be read until a block termination number is encountered. EASYPLOT sets this termination number to 9999.,0. (note the decimal points). The number must be followed by a Carriage Return.

If executed more than once, the DATA command will cause the data to be read from the last termination point. For example, if the data file is

```
(block 1)
9999.,0.
(block 2)
9999.,0.
(block 3)
9999.,0.
```

[1] - On Zeta Plotters, three special text descriptions are available:

- @ changes case
- ↑ spaces up a half line
- ← spaces down a half line

See special example for Zeta Plotter on Page 27.

[2] - Rounded to the nearest tenth of an inch on Zeta Plotters.

a program containing the DATA command followed by three EXECUTE commands will cause block 1 to be read the first time DATA is executed, block 2 the second time, and block 3 the third.

EASYPLOT sets another type of termination number to 9999., 1., which, in addition to block termination, causes automatic re-execution of the program for the next block of data. For example, if the data file is

```
(block 1)
9999.,1.
(block 2)
9999.,1.
(block 3)
9999.,0.
```

a program containing the DATA command followed by one EXECUTE command will cause EASYPLOT to read block 1 when DATA is executed, automatically re-execute the program for block 2, execute it again for block 3, and then stop.

The STOP and NEXT specifications may be used under the DATA command to change the block termination numbers from those set by EASYPLOT.

<u>STOP</u> specifies that the data block termination number should be some value other than 9999., 0. For example,

```
STOP=88888.
```

listed under DATA changes the termination number to 88888. . This command must be used if one of the x data values is 9999. .

<u>NEXT</u> sets the re-execution termination number. The block termination number that causes automatic re-execution of the program for the next block of data is assumed by EASYPLOT to be 9999., 1. unless the user specifies a different number using the NEXT command. For example,

```
NEXT=5555.
```

listed under DATA changes this number to 5555. .

PLOT

The PLOT command specifies that the data read from the file is to be plotted. Under this command, plotting specifications may be made with the commands LINES, SYMBOL, SIZE, and SKIP.

NOTE: If the PLOT command is used alone (without LINES, SYMBOL, SIZE, or SKIP), EASYPLOT will print an error message at execution.

LINES indicates that lines should be drawn between data points in the order that the points are listed in the data file. If LINES is omitted, the data points will not be connected.

SYMBOL specifies a symbol to be printed at the data points. For example,

```
SYMBOL=11
```

under PLOT will cause EASYPLOT to print at each data point the corresponding symbol from the appropriate tables in the Appendix. Symbol 11 will be different for each type of plotter.

The symbol numbers for successive plots may be typed after a single SYMBOL command. For example,

```
PLOT
   SYMBOL=5,6,1,2
```

indicates that for the first execution of the PLOT specification, symbol 5 will be used, for the second execution of PLOT, symbol 6 will be used, and so on.

If there are fewer symbols listed than the number of executions of the specification, the list will rotate. For example, if three EXECUTE commands follow

```
PLOT
   SYMBOL=11,3
```

then symbol 11 will be used for the first and third plots, and symbol 3 for the second plot. SYMBOL can be used with or without a LINES specification. No symbols will be printed if LINES is specified but SYMBOL is not.

If the SIZE command is not given, the symbols will be .08 inches high.[1] SIZE may be used to indicate any other height in inches:

```
SIZE=.2
```

SKIP tells EASYPLOT how often to print the symbols.

```
SKIP=5
```

causes symbols to be printed every fifth point. If skip is omitted, symbols will be printed at every point.

OVERLAY

This specification simplifies the process of overlaying several curves on the same area. The use of OVERLAY is illustrated in the following example.

```
OPEN DATA
X AXIS
  LENGTH=6
Y AXIS
  LENGTH=6
X SCALE
  START=0
  INCREMENT=1
Y SCALE
  START=-30
  INCREMENT=10
DATA
PLOT
  SYMBOL=4, 5, 13, 12
TITLE 1
  TEXT="EXAMPLE NO. 6"
  LOCATION=1, 6
OVERLAY=4
EXECUTE
```

[1] - Symbol size rounded to nearest tenth of an inch on the Zeta.

OVERLAY=4 instructs EASYPLOT to plot four curves on the same set of axes without redrawing the axes.

Any AXIS, TITLE, or DSL commands will be suppressed after they are executed once. (Any suppressed AXIS, TITLE, or DSL commands will be restored and then suppressed again after they are executed once.) The meaning of "suppress" and "restore" when applied to EASYPLOT commands is explained under SUPPRESS and RESTORE, Page 31.

As many blocks of data as specified in the OVERLAY command (4 in this example) will be plotted using the same scale. If no scale is specified, the scale will be calculated automatically from the first data block. Each data block should be terminated by a STOP number, not a NEXT number.

The first symbol specified will be used for the first curve, the second for the second curve, and so on. In this example, the symbols used to plot the curves are 4, 5, 13, and 12.

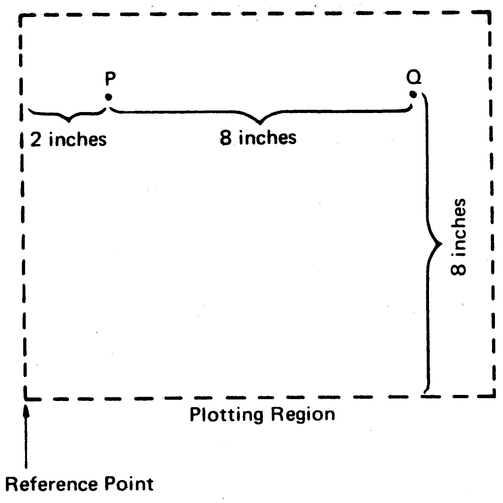
DSL (DRAW STRAIGHT LINE)

One or more DSL (Draw Straight Line) commands may be used to specify that a line or lines be drawn on the plotting paper. With DSL commands the user may have reference lines drawn on his graph or may even specify that a grid (intersecting horizontal and vertical lines within the plotting region) be drawn.

The DSL command is used as follows:

```
DSL 2,8 TO 10,8
```

The x coordinate of each point specifies the number of inches from the plotter reference point in the x direction, positive or negative; the y coordinate measures the distance from the reference point in the y direction. Thus, the above command specifies that a line be drawn between points P and Q in the following diagram.



Lines may be drawn within 50 inches to the left and 50 inches to the right of the reference point; that is, the x coordinate of the DSL points must be in the range -50 to 50.

If the initial point is omitted, a straight line will be drawn from the previous DSL end point to the point given. For example,

```
DSL 1,0 TO 1,4
DSL TO 2,4
DSL TO 2,0
```

will draw a continuous line up 4 inches, over 1 inch, and down 4 inches. If the initial point is omitted in the first DSL, the line will begin at the reference point.

DRAW

The DRAW command may also be used to specify that lines be drawn. The points between which the lines are to be drawn must be listed in the data file; therefore, DRAW is used together with the DATA command. DRAW has the same function as the DSL command, but would more likely be used to draw a large number of connecting lines, since many points can be listed more easily in a data file than in a series of DSL commands.

The x and y coordinates of the points between which the lines will be drawn specify the number of inches from the plotter reference point in the x direction and y direction. Therefore, a data file for a DRAW command has the coordinates in inches, whereas a data file for a PLOT command has the coordinates corresponding to the SCALE specifications. For example, regardless of the SCALE specifications, DRAW, acting on the data

```
2.,8.
10.,8.
10.,2.
2.,2.
2.,8.
9999.,0.
```

is equivalent to the program commands

```
DSL 2,8 TO 10,8
DSL TO 10,2
DSL TO 2,2
DSL TO 2,8
```

It is better to use the DSL command if the lines to be drawn are not connected. If the pen is to be lifted when DRAW is used, DRAW must be re-executed (for example, automatically with a NEXT number).

GRIDS

This command draws sets of parallel lines in the x or y directions over the entire plotting region. The spacing between lines is given in inches.

```
X GRIDS BY 2
Y GRIDS BY 3
```

draws vertical grids over the plotting region every 2 inches and horizontal grids every 3 inches.

To draw logarithmic grids, the GRID command will repeatedly draw sets of parallel lines not necessarily evenly spaced. For example,

```
Y GRIDS BY 3 AT 0., .903, 1.4314, 1.8, 2.097, 2.334, 2.71
Y SCALE
  LOG
  START=1
  INCREMENT=10
  INTERVAL=3
```

will draw lines corresponding to 1, 2, 3, 4, 5, 6, 8, 10, 20, ...

TITLE

The user can specify text to be placed anywhere inside or outside the plotting region. The user can specify TEXT, LOCATION, SIZE, and ANGLE.

EASYPLOT will print up to thirty lines of text, each line specified under a different title command. Each title is assigned a number; in the TITLE command the numbers can be any integers between 1 and 30. Titles can be changed by respecifying the title or by giving the DELETE command. For a respecification, the default values are the values that previously existed for the title. For example,

```
TITLE 3
  LOCATION=5,6
  TEXT="TITLE HERE"
  SIZE=.3
      .
      .
      .
EXECUTE
TITLE 3
   TEXT="2ND TITLE"
EXECUTE
```

The second execution will cause 2ND TITLE to print at location 5, 6 in letters .3 inch high.

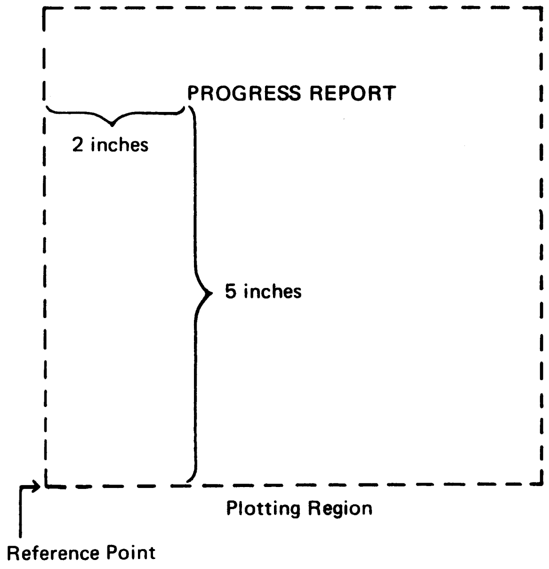
TEXT specifies the text to be drawn.[1] For example,

TEXT="PROGRESS REPORT"

LOCATION specifies the location of the lower left corner of the first letter of the title. The x and y locations are given in inches from the plotter reference point. For example, the commands

TEXT="PROGRESS REPORT"
LOCATION=2, 5

under TITLE will cause the text to be located as shown in the following diagram.



[1] - On Zeta Plotters, three special text descriptors are available:

@ changes case.
↑ spaces up a half line.
← spaces down a half line.

For example,

TEXT="M@ONTHLY @I@NCOME"
would print Monthly Income

TEXT="Y=A←1↑+A←2↑*X↑2"
would print $Y=A_1+A_2*X^2$

Negative values would indicate a location to the left of the reference point (for x) or below the reference point (for y).

If not specified, the location is 0, 0.

The title is ordinarily printed horizontally; that is, at an angle of 0 degrees. The ANGLE command may be used to specify the angle of the title in degrees. For example,

ANGLE=45

under TITLE will cause the title to be printed at a 45 degree angle.[1]

If the SIZE command is not used, the title will be .2 inch high. SIZE may be used to indicate any other height in inches.[2] For example,

SIZE=.7

specifies a height of .7 inch.

PAGE

PAGE is used to move the plotter reference point, thereby moving the plotting region.

PAGE=8, 1

moves the plotting region over 8'' and up 1''.

PAGE=-8

moves the plotting region to the left 8''.

IMPORTANT NOTE: PAGE is always the last specification to be carried out when the EXECUTE command is given. The order in which the specifications are typed has no bearing on when they will be executed. Even if PAGE precedes PLOT, the plot will be made first and then the reference point will be moved.

EASYPLOT only stores one PAGE specification. This means that only the last PAGE set before execution will be carried out.

[1] - On the Zeta Plotter, titles will be drawn at 0, 90, 180, and 270 degrees.
[2] - On the Zeta Plotter, height is rounded to the nearest tenth of an inch.

SECTION 3
DIRECT COMMANDS

Direct commands are executed as soon as they are entered into EASYPLOT. EASYPLOT does not "remember" any direct commands after they are entered and executed. It is important for the user to understand clearly the differences between direct and indirect commands. For this purpose, compare the commands MOVE and PAGE, which perform the same function, except that PAGE is indirect and MOVE is direct. If the user types

```
MOVE TO 8,1
```

the pen will immediately move over 8 inches and up 1 inch. When the EXECUTE command is given, the pen will not move over again. Contrast the commands

```
PAGE TO 8,1
EXECUTE
EXECUTE
```

No action will be taken when the PAGE command is typed. When the first EXECUTE is entered, the pen will move over and the pen will move <u>again</u> for each subsequent EXECUTE until a new PAGE is given or the PAGE command is deleted.

OPEN

The OPEN command tells EASYPLOT which file contains the data to be plotted. There must be a space between the OPEN command and the file name:

```
OPEN DATAFILE
```

The OPEN command closes any file previously opened. To start EASYPLOT reading at the beginning of a data file again, simply reopen the file.

EXECUTE

EXECUTE instructs EASYPLOT to do whatever has been specified by previous indirect commands.

STOP

During execution, the user can type STOP to return control to the terminal. EASYPLOT will terminate execution at the next logical junction; that is, after the particular specification (AXIS, TITLE, etc.) being executed is finished.

CLEAR

CLEAR is used to delete all previously stored specifications.

DELETE

The DELETE command, when given alone, has the same effect as CLEAR. However, DELETE may be used to erase only one set of stored specifications. For example, all previous PLOT specifications may be cleared with the command

```
DELETE PLOT
```

DELETE may be used with any of the indirect commands X or Y AXIS, X or Y SCALE, DATA, PLOT, DSL, DRAW, TITLE, PAGE, GRIDS, or OVERLAY to delete that command and any secondary specifications listed under it. If there are several DSL commands, all these commands will be deleted. DELETE TITLE followed by a number will delete only the TITLE with that number.

The following example of DELETE also illustrates an important feature of X SCALE and Y SCALE.

```
X AXIS
Y AXIS
X SCALE ]
Y SCALE ]────────  Create scale automatically.
DATA
PLOT
  LINES
PAGE TO 8
EXECUTE
DELETE X SCALE ]── Cause original scale (automatically calculated
DELETE Y SCALE ]   START and INCREMENT) to be retained.
EXECUTE
```

The first block of data is scaled automatically. After the data is plotted, the X SCALE and Y SCALE commands are deleted so that the previously created scale will be retained. If X SCALE and Y SCALE were not deleted, a new scale would be created automatically for the second block of data. Instead, the second block is plotted with the same scale used for the first block.

NOTE: When a set of SCALE specifications is deleted, the START and INCREMENT values previously in effect for that scale are retained and will remain effective until changed by another SCALE command.

SUPPRESS AND RESTORE

The SUPPRESS command inhibits specifications but does not clear them. A subsequent RESTORE command would remove the suppression, thus restoring the specifications.

SUPPRESS and RESTORE used alone refer to all previous specifications. SUPPRESS and RESTORE also may be used with X or Y AXIS, X or Y SCALE, DATA, PLOT, DSL, GRID, TITLE, or TITLE followed by a number referring only to the TITLE with that number.

Example

After several curves have been plotted, the user wishes to skip the next two blocks of data in his data file. He gives the commands

SUPPRESS	Suppresses all previous specifications.
DATA	Specifies that a data block be read.
EXECUTE	Executes DATA, causing the next data block to be read.
EXECUTE	Re-executes DATA, causing the next data block to be read.
RESTORE	Restores all previous specifications.
EXECUTE	Re-executes the entire program for the next block of data.

DATA was specified both before and after SUPPRESS, but the EXECUTE command after RESTORE caused only one block of data to be read, as usual. Making the same specification more than once is superfluous since, like a nagging wife, it amounts to telling EASYPLOT more than once to do the same thing. Thus, the EXECUTE after RESTORE merely regards the second DATA specification as superfluous. NOTE: The same effect could be obtained with the SCAN command, see Page 34.

Any changes made to suppressed specifications will be retained after RESTORE. If the DATA command in the above example were followed by

```
STOP=7777.
```

this new termination number would still be in effect after RESTORE. RESTORE does not clear any specifications made after SUPPRESS.

RUN

The RUN command orders EASYPLOT to take commands from a file.

```
RUN PLOTPROG
```

will cause EASYPLOT to take commands from the file PLOTPROG one by one until the entire file is read. Any commands that can be entered from the terminal can be read from a file, including the RUN command.

A plotting program stored on a file can be run repeatedly and is always ready to go without a lot of typing at the terminal. If the file includes the OPEN command and the EXECUTE command, only one command from the terminal is required to generate the plot. Often it is convenient to have a few specifications which are used often stored on a file. For instance, if a user did many plots with the same scales and axes but different text for titles and label and different data files, he might have the SCALE, AXIS, PLOT, and TITLE on a file. After he ran the file, he would need only to open the data file, specify the text, and execute.

The command file is closed after EASYPLOT has read the entire file.

TYPE, PAUSE, AND CONTINUE

These three direct commands may be used when the plotter pen is to be changed during the course of an EASYPLOT program that is entered from a file. The TYPE command is used to print a message to the person at the terminal; for example, an instruction telling him to change the pen. PAUSE causes EASYPLOT to stop taking commands from the program file; a □ prints when PAUSE is encountered. After the printed instruction is carried out (for example, the pen changed), the command CONTINUE may be typed at the terminal to begin continuation from the command following PAUSE.

Example

Suppose a program file to be run at the computer center is set up as

```
(specifications)
EXECUTE
TYPE "CHANGE THE PEN TO RED"
PAUSE
(specifications)
EXECUTE
END
```

After the first set of specifications is executed, the following actions occur at the terminal:

```
CHANGE THE PEN TO RED          The operator running the program
                               changes the pen and then types
⎕ CONTINUE↩                    CONTINUE.
```

Certain specifications are changed and the program is executed again, plotting the next block of data.

SCAN

The SCAN command is extremely useful when a number of separate plots are made from one program, the process is unexpectedly interrupted, and the user wants to continue from the last plot. The interruption might take place if, for example, the user sees a plot that he decides should be a different color or should have different scaling specifications than originally made. Without SCAN, he would need to reload the program and data files, and rerun all plots up to the one that was changed. Instead, he can reload the files and use SCAN. An example of the SCAN command is

```
SCAN TO 7
```

which will not cause any action on the plotter but will read commands and data up to the seventh EXECUTE just as though the program had actually been run to that point.

MOVE

The MOVE command has the same function as the PAGE specification. For example,

```
MOVE TO 8,1
```

causes the plotter reference point to move eight inches in the positive x direction and one inch in the positive y direction. Remember that PAGE, an indirect command, will be carried out only after an EXECUTE command is encountered, and will remain stored after execution. MOVE, a direct command, is executed immediately and is not stored.

If movement in the y direction is not specified, only movement in the x direction will occur. For example,

```
MOVE TO 10
```

will move the reference point ten inches in the positive x direction (advance the plotter paper ten inches).

POSITION

The POSITION command places the reference point a specified number of inches from the bottom of the plotter page. For example,

```
POSITION AT 2
```

at the beginning of a program causes the initial position of the reference point to be two inches from the bottom of the paper. This command is similar to MOVE except that its movement is relative not to the current position of the reference point, but to the bottom of the plotter paper.

PENLOCATION

If no PENLOCATION is given, the position of the pen at the time the EXECUTE is given is the position of the reference point. The PENLOCATION command specifies the position of the pen relative to the reference point. For example, the command

```
PENLOCATION=10,0
```

does not move the pen, but makes the reference point 10 inches to the left of the current pen position.

ROTATE TO 270

This command rotates the plotting region 270 degrees. This means that the positive y axis is in the direction of the 0 degree positive x axis, and the positive x axis is in the direction of the 0 degree negative y axis. The reference point is at the upper left-hand corner of the plotting region. The region is returned to the original condition by the command

ROTATE TO 0

SUPPRESS AND RESTORE MESSAGES AND EXPLAIN

SUPPRESS MESSAGES causes the error messages to be reduced to a few cryptic words for the expert user. EXPLAIN will type the complete message for the last error encountered. RESTORE MESSAGES will reinstate EASYPLOT's full response to an error.

SUMMARY

This command is a debugging aid. It prints the current maxima and minima for the data and the scaling factors. It is useful if the data is not fitting on the plotting region as expected.

QUIT

QUIT terminates EASYPLOT and returns control to the EXECUTIVE. All commands currently stored by EASYPLOT are erased.

SECTION 4
SAMPLE EASYPLOT PROGRAMS[1]

A SIMPLE EXAMPLE OF EASYPLOT

This program takes advantage of EASYPLOT's automatic scaling by using the X SCALE and Y SCALE commands alone, without any secondary specifications typed beneath them. The scale is set by EASYPLOT so that all points fall within an 8" x 8" plotting region. Every other point is plotted because the SKIP=2 specification is used under PLOT.

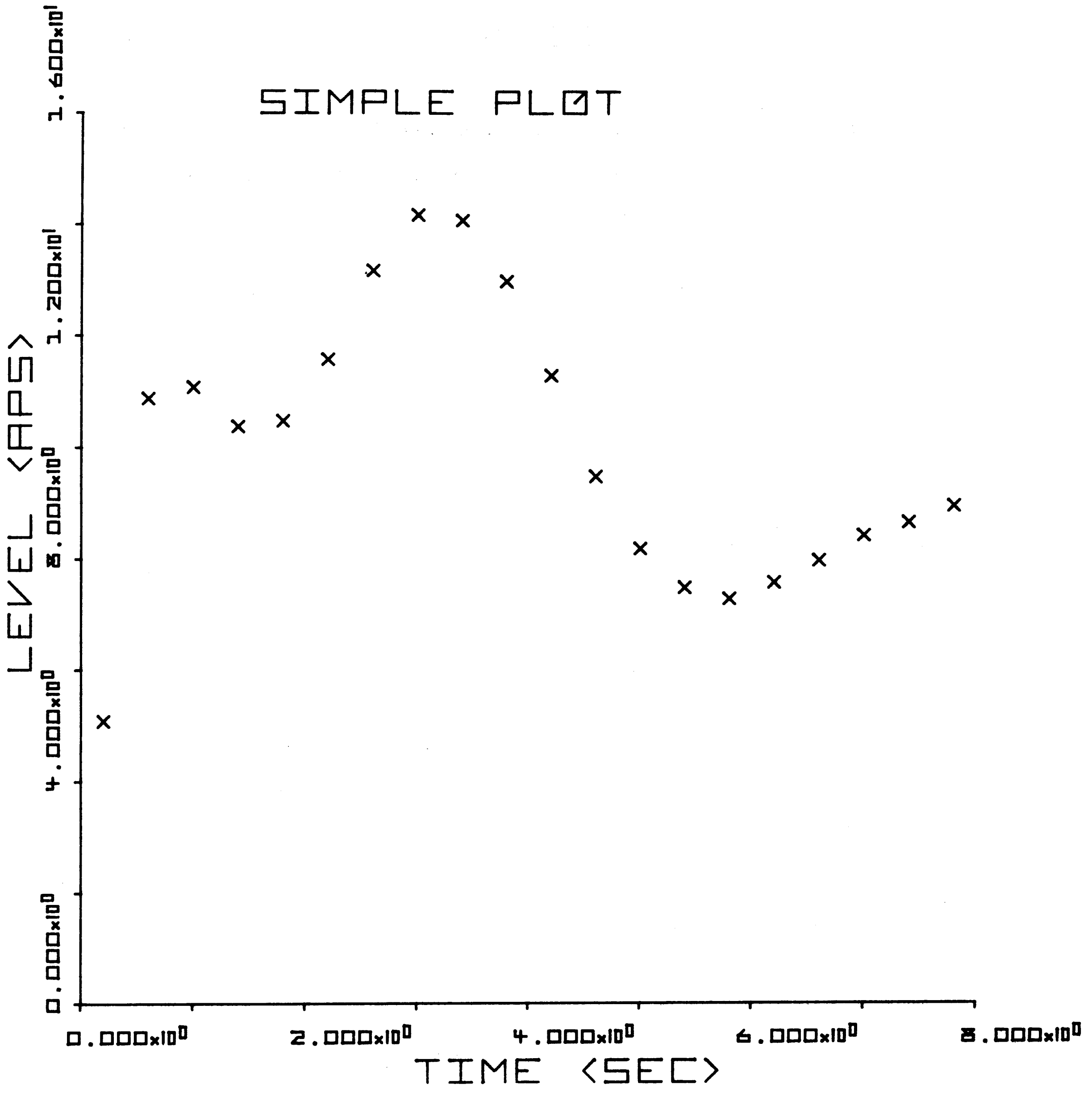
EASYPLOT Program

```
OPEN SIMPLEDATA
X SCALE
Y SCALE
X AXIS
 LABEL="TIME (SEC)"
Y AXIS
 LABEL="LEVEL (APS)"
DATA
PLOT
 SYMBOL=56
 SKIP=2
TITLE 1
 TEXT="SIMPLE PLOT"
 LOC=1.6,8
EXECUTE
```

[1] - The graphs shown in this manual were executed on a Zeta plotter.

Data File

```
.2,5.
.4,9.
.6,10.8
.8,11.2
1.,11.
1.2,10.6
1.4,10.3
1.6,10.2
1.8,10.4
2.,11.
2.2,11.5
2.4,12.3
2.6,13.1
2.8,13.7
3.0,14.1
3.2,14.2
3.4,14.
3.6,13.6
3.8,12.9
4.0,12.0
4.2,11.2
4.4,10.2
4.6,9.4
4.8,8.6
5.0,8.1
5.2,7.7
5.4,7.4
5.6,7.2
5.8,7.2
6.0,7.3
6.2,7.5
6.4,7.7
6.6,7.9
6.8,8.15
7.0,8.35
7.2,8.5
7.4,8.6
7.6,8.7
7.8,8.9
8.0,8.9
9999.,0.
```


SIMPLE PLOT
1.600×10^{1}
1.200×10^{1}
8.000×10^{0}
4.000×10^{0}
0.000×10^{0}
LEVEL <APS>
0.000×10^{0}
2.000×10^{0}
4.000×10^{0}
6.000×10^{0}
8.000×10^{0}
TIME <SEC>

HISTOGRAM

Two methods of producing a histogram are shown below. The first method uses a data file and the DRAW command. The second uses DSL commands to draw all of the lines.

Note the use of the ANGLE specification under TITLE.

Method 1

EASYPLOT Program

```
TITLE 1
       TEXT="GENERAL BUDGET"
       SIZE=.3
       LOCATION=0,7
TITLE 2
       TEXT="FOR 1970"
       SIZE=.3
       LOCATION=.5,6.5
TITLE 3
       TEXT="EDUCATION"
       SIZE=.1
       ANGLE=90
       LOCATION=.55,1
TITLE 4
       TEXT="HEALTH AND WELFARE"
       SIZE=.1
       ANGLE=90
       LOCATION=1.55,.3
TITLE 5
       TEXT="PUBLIC SAFETY AND CORRECTIONS"
       SIZE=.1
       ANGLE=90
       LOCATION=2.55,1
TITLE 6
       TEXT="RESOURCES"
       SIZE=.1
       ANGLE=90
       LOCATION=3.55,1
TITLE 7
       TEXT="OTHER"
       SIZE=.1
       ANGLE=90
       LOCATION=4.55,1.5
OPEN BARDATA
DATA
DRAW
EXECUTE
```

Data File

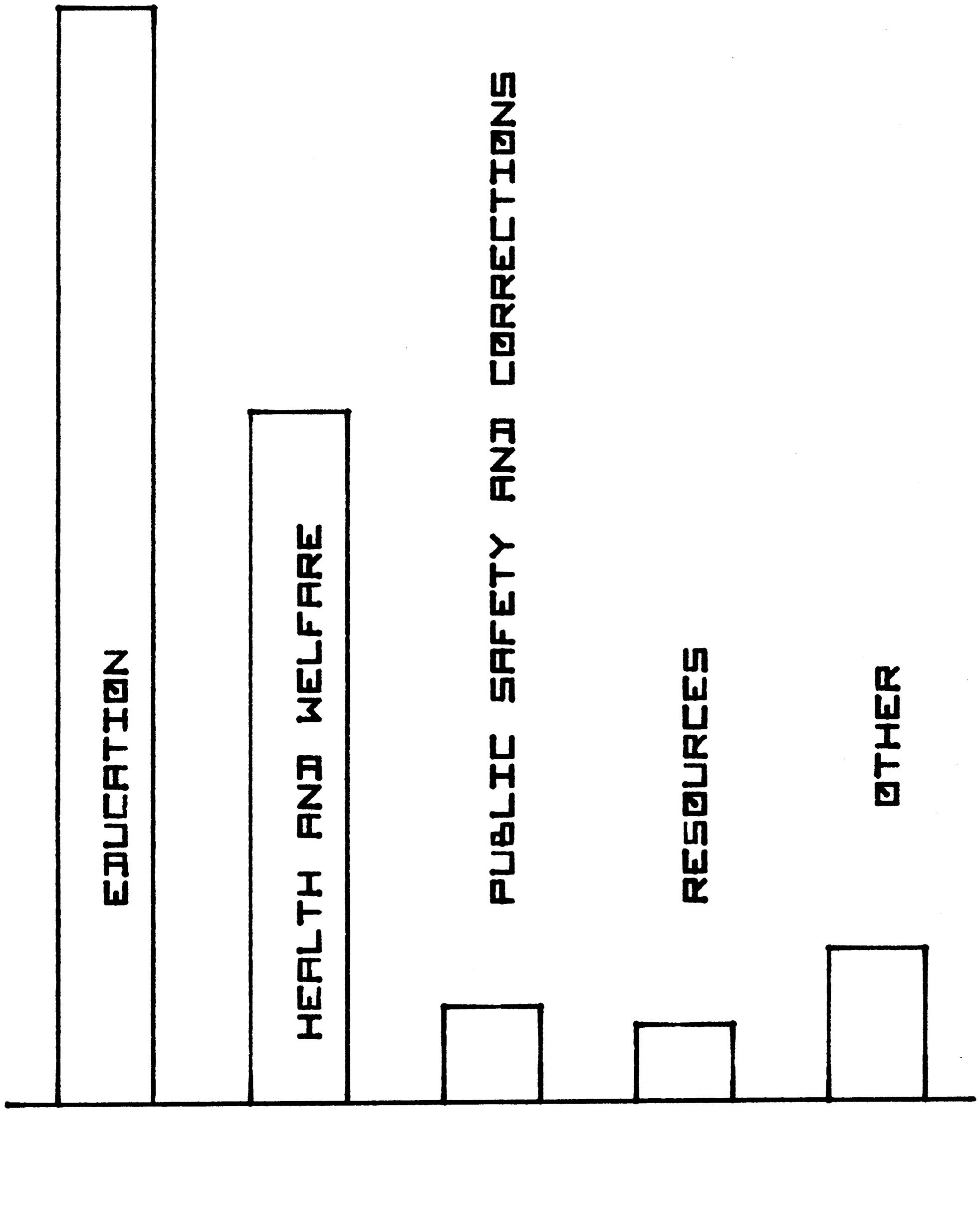
```
.25,0
.25,5.7
.75,5.7
.75,0.
1.25,0.
1.25,3.6
1.75,3.6
1.75,0
2.25,0
2.25,.5
2.75,.5
2.75,0
3.25,0.
3.25,.4
3.75,.4
3.75,0
4.25,0
4.25,.8
4.75,.8
4.75,0
5,0
0,0
9999.,0.
```

Method 2

EASYPLOT Program

```
TITLE 1
       TEXT="GENERAL BUDGET"
       SIZE=.3
       LOCATION=0,7
TITLE 2
       TEXT="FOR 1970"
       SIZE=.3
       LOCATION=.5,6.5
DSL 0,0 TO 5,0
DSL .25,0 TO .25,5.7
DSL TO .75,5.7
DSL TO .75,0
DSL 1.25,0 TO 1.25,3.6
DSL TO 1.75,3.6
DSL TO 1.75,0
DSL 2.25,0 TO 2.25,.5
DSL TO 2.75,.5
DSL TO 2.75,0
DSL 3.25,0 TO 3.25,.4
DSL TO 3.75,.4
DSL TO 3.75,0
DSL 4.25,0 TO 4.25,.8
DSL TO 4.75,.8
DSL TO 4.75,0
TITLE 3
       TEXT="EDUCATION"
       SIZE=.1
       ANGLE=90
       LOCATION=.55,1
TITLE 4
       TEXT="HEALTH AND WELFARE"
       SIZE=.1
       ANGLE=90
       LOCATION=1.55,.3
TITLE 5
       TEXT="PUBLIC SAFETY AND CORRECTIONS"
       SIZE=.1
       ANGLE=90
       LOCATION=2.55,1
TITLE 6
       TEXT="RESOURCES"
       SIZE=.1
       ANGLE=90
       LOCATION=3.55,1
TITLE 7
       TEXT="OTHER"
       SIZE=.1
       ANGLE=90
       LOCATION=4.55,1.5
EXECUTE
```

GENERAL BUDGET FØR 1970



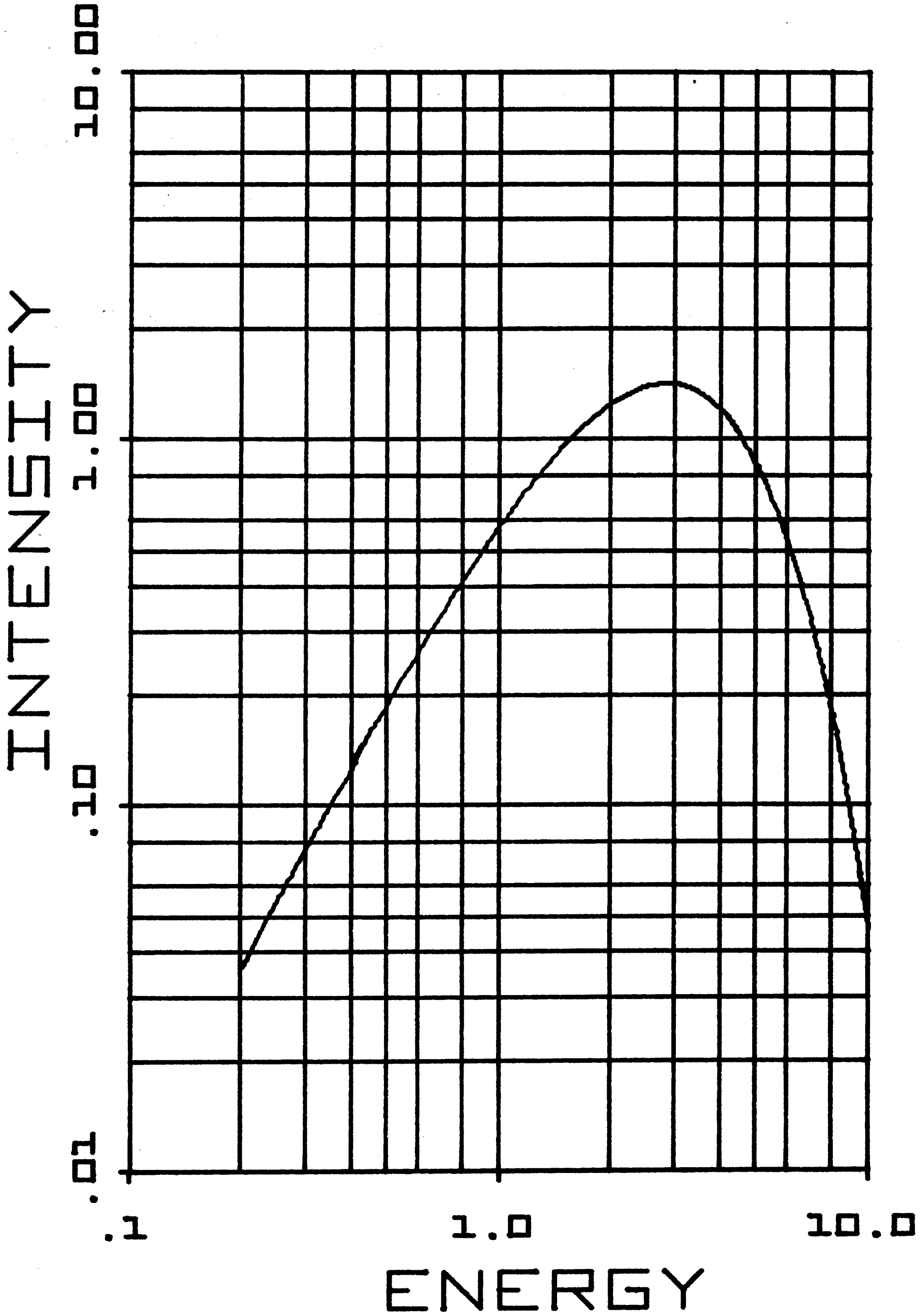
LOGARITHMIC PLOT

This sample program illustrates the use of logarithmic scaling and the GRID commands. Both the x and y scales are set to 2 inches per order of magnitude. In each decade, the grid lines are drawn at the values 1, 2, 3, 4, 5, 6, and 8. The locations, in inches, given in the GRID commands were calculated by the algorithm:

Location (inches) = 2*LOG$_{10}$ (value on scale)

EASYPLOT Program

```
OPEN /A/
X SCALE
 LOG
 START=.1
 INCREMENT=10
 INTERVAL=2
Y SCALE
 LOG
 START=.01
 INCREMENT=10
 INTERVAL=2
X AXIS
 FORMAT="%.%"
 LABEL="ENERGY"
 SPACING=2,2
 LENGTH=4
Y AXIS
 FORMAT="%.%%"
 LABEL="INTENSITY"
 SPACING=2,2
 LENGTH=6
X GRIDS AT 2 BY 0,.602,.9542,1.2,1.389,1.556,1.8
Y GRIDS AT 2 BY 0,.602,.9542,1.2,1.389,1.556,1.8
DATA
PLOT
 LINES
EXECUTE
```


INTENSITY
10.00
1.00
.10
.01
.1
1.0
10.0
ENERGY

THREE CURVES ON ONE GRAPH

This example shows two ways to plot more than one curve on the same graph. In the first program, the axes and titles are drawn; then everything is cleared and the curves are plotted. For this technique, the data blocks are separated by the terminator, 9999.,1. The second program uses the OVERLAY command. For this program the data blocks were terminated with 9999.,0.

The TEXT and LABEL commands in these programs illustrate the lower case and superscript capabilities of the Zeta Plotter.

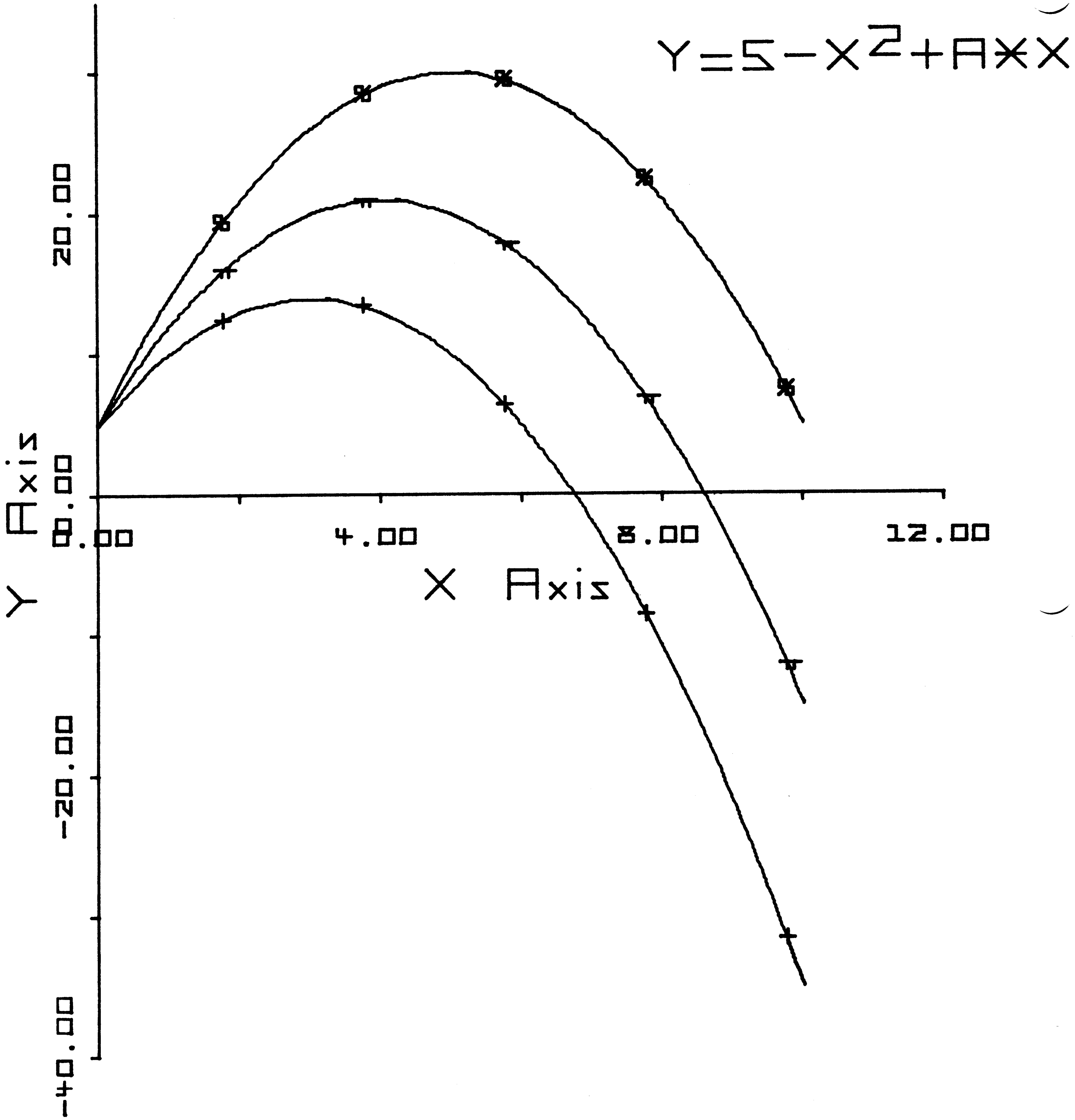
EASYPLOT Program 1

```
X SCALE
 START=0
 INCREMENT=2
Y SCALE
 START=-40
 INC=10
TITLE 1
 TEXT="Y=5-X↑2←+A*X"
 SIZE=.2
 LOC=4,7
X AXIS
 LABEL="X A@XIS"
 MOVE AXIS=4
 LENGTH=6
 FORMAT="%%.%%"
Y AXIS
 LABEL="Y A@XIS"
 FORMAT="%%.%%"
 LENGTH=7.5
EXECUTE
CLEAR
OPEN MATHD
DATA
PLOT
 LINE
 SKIP=8
 SYMBOL=11,6,5
EXECUTE
```

EASYPLOT Program 2

```
X SCALE
 START=0
 INCREMENT=2
Y SCALE
 START=-40
 INC=10
TITLE 1
 TEXT="Y=5-X↑2←+A*X"
 SIZE=.2
 LOC=4,7
X AXIS
 LABEL="X A@XIS"
 MOVE AXIS=4
 LENGTH=6
 FORMAT="%%.%%"
Y AXIS
 LABEL="Y A@XIS"
 FORMAT="%%.%%"
 LENGTH=7.5
OPEN MATHD
OVERLAY=3
DATA
PLOT
 LINE
 SKIP=8
 SYMBOL=11,6,5

EXECUTE
```


Y=5-X2+A*X
20.00
0.00
-20.00
-40.00
0.00
4.00
8.00
12.00
X Axis
Y Axis

SECTION 5

SUMMARY OF EASYPLOT COMMANDS

DIRECT COMMANDS

OPEN file name
Opens a data file. Reading commences at the beginning of the file.

RUN file name
Transfers control to the file specified.

EXECUTE
Performs plotting according to stored specifications.

CLEAR
Clears all stored specifications.

DELETE
Same as CLEAR when used alone; also used with X or Y AXIS, X or Y SCALE, DATA, PLOT, DSL, DRAW, TITLE, X or Y GRID, or TITLE n (referring only to TITLE n), or PAGE to clear only that set of specifications.

SUPPRESS
Used alone, inhibits all stored specifications; also used with X or Y AXIS, X or Y SCALE, DATA, PLOT, DSL, TITLE, X or Y GRID, or TITLE n to inhibit only that set of specifications.

RESTORE
Used alone or with commands listed under SUPPRESS to restore suppressed specifications.

TYPE "text" or
TYPE 'text'
Causes text to be printed on the terminal.

STOP
When typed during execution, causes control to return to the terminal at the next logical junction.

PAUSE
Causes EASYPLOT to stop taking commands from the program file; a □ prints on the terminal.

CONTINUE
Typed at the terminal to indicate continuation after a PAUSE in the program file.

SCAN TO n
Causes no plotter action, but reads commands and data up to nth EXECUTE as though program had actually been run up to that point.

MOVE TO n_1, n_2
Moves plotter reference point n_1 inches in x direction, n_2 inches in y direction. MOVE TO n_1 moves in x direction only.

POSITION AT n
Positions plotter reference point n inches from the bottom of the paper.

ROTATE TO 270 or 0
Rotates plotting space.

PENLOCATION= x loc, y loc
Specifies a new position for the pen to come to rest at end of plot.

SUPPRESS MESSAGES
Shortens error messages.

EXPLAIN
Types complete message for most recent error.

SUMMARY
Gives current data minima and maxima and scaling factors.

ACCURACY
Specifies the plotter accuracy in mils.

QUIT
Terminates EASYPLOT; returns to the EXECUTIVE.

INDIRECT COMMANDS		
Command Model	Specifies	If Omitted
REGION x, y	Defines plotting area in inches.	Scale lengths same as specified under AXIS. If no length specified under AXIS, 8 inches square.
X AXIS and Y AXIS	Drawing the axis.	No axis drawn.
LENGTH=n	Axis length of n inches.	LENGTH=8.

LABEL="text"
or
LABEL='text'
	Labelling the axis with specified text.	No label.

MOVE AXIS=n	Moving the axis n inches (x axis up and down, y axis left and right).	Axis drawn from plotter reference point.
FORMAT="%%.%%" ="%%%," etc.	Sets format for numbers.	Numbers in E-notation.
SPACING=n_1, n_2	Causes tics every n_1 inches, numbers every n_2 inches.	n_1=1, n_2=2
FACTOR=n	Causes actual scale to differ from numbers written on axis by the factor n.	n=1
TLENGTH=n	Sets length of tics.	n=.05

NLOCATION=n
LLOCATION=n
	Sets separation of numbers and labels from axis in inches.	

NSIZE=n
LSIZE=n
	Sets sizes to numbers and labels in inches.	n=.1

Command Model	Specifies	If Omitted
X SCALE and Y SCALE	Changing or creating the scale automatically, semi-automatically, or manually.	May not be omitted entirely. May be deleted so scale will not change.
LOG or LINEAR	Specifies logarithmic or linear scale.	LINEAR
INTERVAL=n	In inches, interval for which INCREMENT is given.	n=1 inch
START=n	Scale value of n at plotter reference point.	Calculated automatically.
INCREMENT=n	Scale factor of n units/inch.	Calculated automatically.
REVERSE (given when INCREMENT is not specified)	Increment chosen by EASYPLOT will be negative.	EASYPLOT will choose a positive increment.
DATA	Block of data is to be read from data file.	No data is read.
STOP=n	Data will be read until n is encountered.	STOP=9999.,0.
NEXT=n	Program will be re-executed for next block of data when n is encountered.	NEXT=9999.,1.
PLOT	Plotting data.	No plotting.
LINES	Lines between data points in order listed on data file.	No lines.
SYMBOL=n	Symbol number n at data points.	No symbols.
SYMBOL=n_1, n_2...	Symbol numbers for subsequent plots.	No symbols.
SIZE=n	Height of symbol, n inches.	SIZE=.08*
SKIP=n	Symbol at every nth data point.	Symbol at every point.

*.1 on the Zeta.

Command Model	Specifies	If Omitted
DSLn_1, n_2 TO n_3, n_4 DSL TO n_1, n_2	Drawing a straight line between points specified in inches from plotter reference point.	No action.
DRAW	Same as DSL except points are listed in data file (START value set to 0 on both axes. INCREMENT set to 1 unit/inch.)	No action.
TITLE n	Changing the title numbered n.	No title.

TEXT="text" or
TEXT='text'
	Text to be printed.	No text.

LOC=n_1, n_2	Sets location of lower left corner of title as n_1 inches in the x direction from the reference point and n_2 inches in the y direction.	n_1=0, n_2=0
ANGLE=n	Angle of title, n degrees.	ANGLE=0
SIZE=n	Height of title, n inches.	SIZE=.2
PAGE TO n_1, n_2	Moving the plotter reference point.	No action.
OVERLAY=n	Plots the next n blocks of data on the same axes without redrawing axes or titles.	None.
X GRIDS BY n_1 X GRIDS BY n_1 AT $n_2, \ldots, n_k$ Y GRIDS BY n_1 Y GRIDS BY n_1 AT $n_2, \ldots, n_k$	Draws vertical and horizontal lines at intervals of n_1 inches or at locations n_2 to n_k inches cycled every n_1 inches.	No action.

APPENDIX

EASYPLOT SYMBOLS FOR THE ZETA PLOTTER

No.	Symbol	No.	Symbol
4	$	36	D
5	%	37	E
6	π	38	F
8	<	39	G
9	>	40	H
10	*	41	I
11	+	42	J
12	'	43	K
13	-	44	L
14	.	45	M
15	/	46	N
16	□	47	O
17	1	48	P
18	2	49	Q
19	3	50	R
20	4	51	S
21	5	52	T
22	6	53	U
23	7	54	V
24	8	55	W
25	9	56	X
33	A	57	Y
34	B	58	Z
35	C		

EASYPLOT SYMBOLS FOR THE CALCOMP PLOTTER

Number	Symbol
0	⊡
1	○
2	△
3	+
4	×
5	◇
6	↑
7	⊼
8	Z
9	Y
10	¤
11	✳
12	⧗
13	|
14	☆