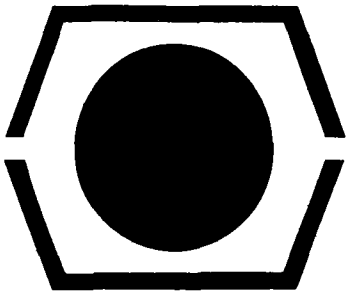

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DECUS NO.	12-78
TITLE	PUBPLOT
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COMPANY	Veteran's Administration Hospital (116) San Francisco, California
DATE	April 25, 1972
SOURCE LANGUAGE	8-MODE and LINC ASSEMBLY LANGUAGES

PUBPLOT

PUBPLOT was written to produce graphic plots suitable for many publication purposes. All input is through the teletype. When fully utilized, PUBPLOT produces a graph with X and Y axes, numerical and character headings for both axes, seven lines of any shape, and a scattergram. Any of these segments of the graph may be deleted according to program specifications.

Initialization:

After DIAL is running, the program is loaded by typing Line Feed and then LO PUBPLOT,0. The program is self-starting and begins by typing command 1). (For the following discussion of commands 1) through 13) please refer to Figure 1.)

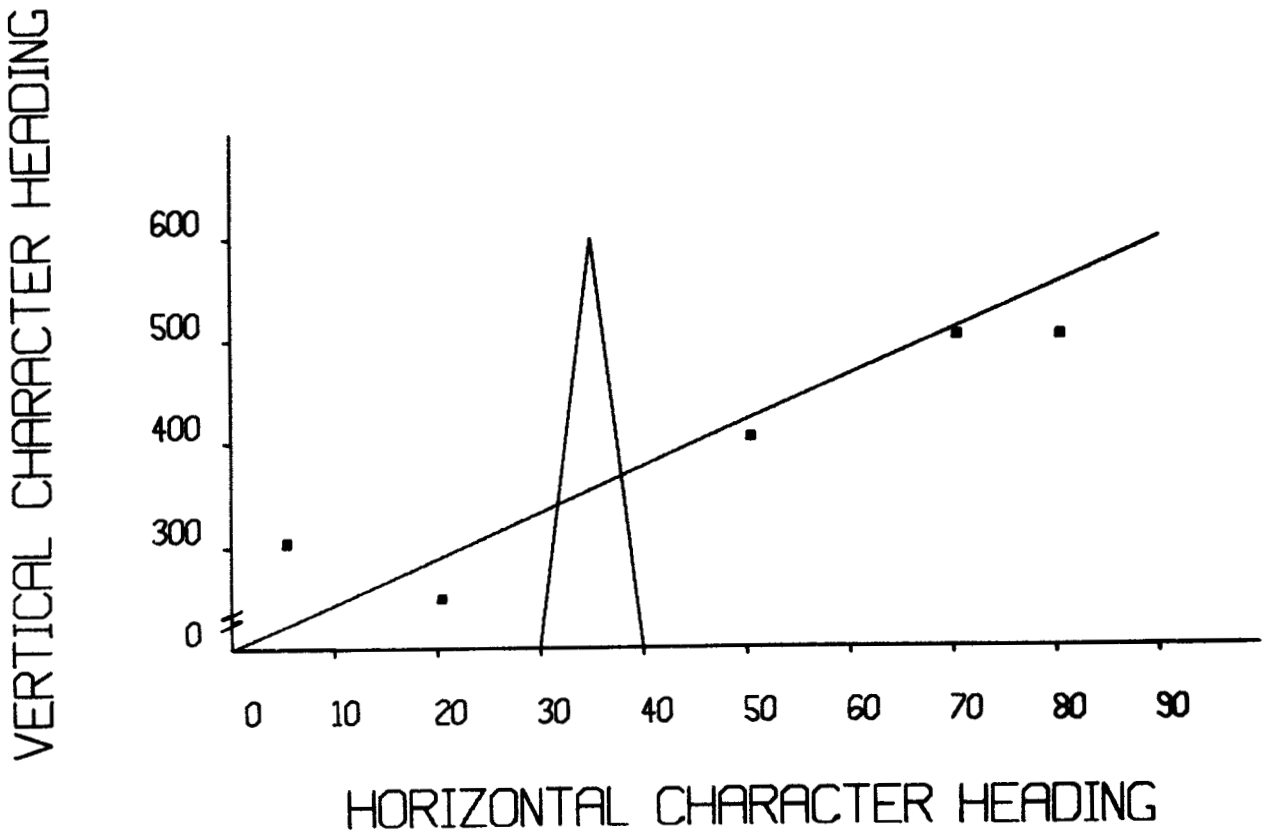

Figure 1. Sample plot.

1) DIGITS PER NUMERICAL HEADING: is the first command typed out. The correct response is to type either number 1, 2, or 3. This number designates the maximal number of digits per numerical heading for both tne X and the Y axes. E. g., for Figure 1 a 3 was typed in because the numbers 300, 400, etc. all contain 3 digits. After 1, 2, or 3 has been typed, the next command will be typed out.

2) HOR. CHAR. HEAD Now type in the correct horizontal character heading. (See Legal PUBPLOT Characters) To center the heading, spaces must be inserted before the characters. This is done by simply hitting the teletype space bar the correct number of times. After the heading has been typed in, type ↵ (where ↵ means to hit the Return key) to terminate the heading and to produce the next command.

3) VERT. CHAR. HEAD See the preceding instructions.

4) HOR. NO. HEAD Now type in the numbers for the horizontal numerical heading. For command 1) the number of digits which must be provided for <u>every</u> numerical heading was specified. Therefore in Figure 1 to plot 400, the three-digit number 400 was typed in; to plot 40 the three-digit number s40 (where s means to hit the Space Bar) was typed in, and; to plot 0 the three-digit number ss0 was typed in. The numerical headings for the X axis must be typed in from left to right. E. g., to produce the numerical heading as in Figure 1 ss0sl0s20...s90↵ was typed in. Typing ↵ terminated the heading.

5) VERT. NO. HEAD Instructions are much the same as for 4).

The numbers must be typed in from bottom to top. To produce the Y axis numerical heading in Figure 1 ss0300400500600↵ was typed in.

7) SCATTERGRAM

8) FIRST PLOT

9) NEXT PLOT

10) NEXT PLOT

11) NEXT PLOT

12) NEXT PLOT

13) LAST PLOT

The preceding eight commands produce similar results, so they will be discussed together. First an explanation of the graph is necessary. Consider the graph as a Cartesian coordinate system. Between any two hash marks on the X or Y axis lies 100_{10} points which could be plotted. For every X value and for every Y value, four decimal digits must be typed in. Therefore, the origin of the graph lies at (0000,0000); the point at which 80 is designated on the X axis (Figure 1) would lie at (0800,0000), etc.

In response to command 6) the first eight digits typed in determine the (X,Y) coordinates for the first scatterpoint, the second eight digits determine the (X,Y) coordinates for the second scatterpoint, etc. Typing 0050 0010 0200 0035 ↵ (NOTE: The space between the sets of digits is automatically supplied by PUBPLOT.) in response to command 6) would place scatterpoints at (0050,0010) and (0200,0035).

Responses to the plot commands 7) through 13) are the same. However, the points that are typed in are connected by a line, thereby forming a plot. Therefore, if in response to command 7) 0000 0000 0900 0400 ↵ was typed in, the straight line in Figure 1 that begins at the origin and extends to the right upper corner of the graph would be plotted. To produce the inverted V in Figure 1 0300 0000 0350 0400 0400 0000 ↵ was typed in.

Any point to the left of the Y axis or below the X axis contains a negative vector value. Since the decimal values typed in are converted to 12-bit octal values and since bit 0 determines the sign of the value, typing in a decimal value of 2048_{10} through 4095_{10} produces the octal values 4000_8 through 7777_8 which decimally are equivalent to -2048_{10} through -1_{10}. Thus, to type in the break marks at the bottom of the Y axis the following could be typed in after any of the commands 7) through 13):

4085 0020 0010 0030 0000 0025 0000 0035 4085 0030 0010 0040 ↵

(NOTE: Typing in a Y value that cannot be reached freely by the plotter pen (e.g. (0300,1726) or (0593,2060)) will cause the plotter to lose all sense of position.)

There is one option available for use after any command 6) through 13) has been typed out on the teletype. Typing an S (for Stop) in response to one of these commands terminates that command and all those commands following it and begins the actual plotting. If an S is typed as the first digit of one of the four-digit values any time later (e.g. 1926 0200 S) the current command plus the following commands will be disregarded.

Legal PUBPLOT Characters:

The following characters, when struck on the keyboard in response to PUBPLOT commands 2) through 5), will be reproduced by the plotter. Typing any other character will produce no action (i.e., the plotter will not move).

SPACE # ( ) + , - . / 0-9 = A-Z

Correcting Mistakes:

There is no way of correcting errors made in response to the first five commands. The fastest way to recover from an error in this case would be to restart the program (See Restarting Procedures). If detected early enough, errors made in response to commands 6) through 13) can be corrected. If an error is discovered while typing in a four-digit vector value, typing RUBOUT and then the correct four-digit value will correct the mistake. If an error is discovered after a four-digit value has been typed but before the next digit has been typed, typing RUBOUT and the correct four-digit value will correct the mistake.

Restarting Procedure:

1) Rock the STOP switch.
2) Set the Left Switches to 0200.
3) Set Mode to 8-Mode.
4) Press I/O Preset.
5) Press START LEFT SWITCHES.

User Modifications:

LOC 4074 Contains the parameter for character header size. Multiply the parameter by .06" to determine character size. E.g., load 0010 into LOC 4074 and character size will be .48".

LOC 4141 Contains the parameter for numerical header size. Same procedure as for character header.

LOC 4414 Contains the parameter for the scatterplot character size. Same as above.

LOC 4426 Contains the "period" used for scattergram. To get any other legal PUBPLOT character plotted, simply take the character's ASCII value, subtract 240_8 from it, and load into LOC 4426. E.g., load 0070 into LOC 4426 to get an "X" plotted for scatter points.

Limitations:

The total number of PUBPLOT characters (including spaces), X values, and Y values may not exceed 1024_{10}.

Final Note:

All or any part of the graph may be left out by simply typing ↵ after the appropriate command. To leave out the vertical character heading type ↵ after command 3). To leave out the Y axis and its numerical heading type ↵ after command 5). There is no way to produce a numerical heading without getting the corresponding axis plotted also (except through manual means by, for instance, pressing the STOP switch, setting the pen position to UP, pressing CONTINUE, and allowing the axis to be plotted one-half inch above the paper, and then returning the pen position to REMOTE). The axes may be plotted without numerical headings, though, by responding to the correct command with the appropriate number of spaces typed in. Finally, after the plotting is finished, PUBPLOT automatically restarts.