RECOMP II USERS' PROGRAM NO. 1157

PROGRAM TITLE:	PLOT X THEN Y, FIXED POINT
PROGRAM CLASSIFICATION:	Subroutine
AUTHOR:	R. Doyle
PURPOSE:	To plot a step in a bar graph, given the desired number of x and y plotter increments (0.01 inch) as fixed point integers. First the pen is moved the prescribed number of x units, and then is moved the prescribed number of y units.
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A DIVISION OF NORTH AMERICAN AVIATION, INC.

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Program Title: Plot X then Y, Fixed Point

1. Purpose: To plot a step in a bar graph, given the desired number of x and y plotter increments (0.01 inch) as fixed point integers. First the pen is moved the prescribed number of x units, and then is moved the prescribed number of y units.

2. Restrictions: The numbers X and Y should be consistent with the available plotting space.

3. Method

3.1 This routine utilizes the full word alphanumeric output feature of Recomp. Thus, we define

P_{+X} = word consisting of eight $\underline{+X}$ (22_8) plotter commands
P_{-X} = " " " " $\underline{-X}$ (21_8) " "
P_{+Y} = " " " " $\underline{+Y}$ (30_8) " "
P_{-Y} = " " " " $\underline{-Y}$ (24_8) " "

3.2 If X and Y are both zero return is made immediately.

3.3 Define

$$P_X = \begin{cases} P_{+X} & \text{if } X > 0 \\ P_{-X} & \text{if } X < 0 \end{cases} \qquad P_Y = \begin{cases} P_{+Y} & \text{if } Y > 0 \\ P_{-Y} & \text{if } Y < 0 \end{cases}$$

3.4 Divide $|X|$ by 8 so that $|X| = 8q + r$ where $0 \leq r < 8$.
Output P_X using PNC 7760 command q times. If $r \neq 0$
Output P_X with PNC 7760 + r command; if $r = 0$ skip this output.
Repeat above using $|Y|$ and P_Y

3.5 For a discussion of the plotter output commands see Recomp Technical Bulletin No. 24, paragraphs 4.2 and 4.3.

4. Use: Although by no means necessary, it is intended that one ordinarily use the "Floating Point to Plotter Increment Conversion" subroutine to convert floating point data to the form required by this routine.

4.1 Definition of coordinates:

When facing the plotter
+x is the direction a line is drawn when the drum moves down
-x is the direction a line is drawn when the drum moves up
+y is the direction a line is drawn when the carriage moves left
-y is the direction a line is drawn when the carriage moves right

4.2 Calling Sequence: With X in A register and Y in R register transfer to origin of the subroutine. X and Y must be fixed point integers at a binary scale of 39. After line has been plotted return will be made to the next location.

5. Coding Information

5.1 Locations used

This routine occupies 50_8 locations (from L_o to $L_o + 47$). It destroys the L and V loops and all registers.

5.2 Constants

L_o +	14	P_{+X}	Alphanumeric words, see 3.1
+	15	P_{-X}	
+	16	P_{+Y}	
+	17	P_{-Y}	
L_o +	32	+7.	fixed point, b = 39
	33	+8.	" " "

5.3 Erasable Locations

$L_o + 34$ to $L_o + 37$

5.4 Unused Location

$L_o + 27$

5.5 This subroutine is relocatable by the method of AN-076

6. Remark

It may be desired to change the coordinate system. For this purpose it will be noted that the basic pen commands are stored in locations $L_o + 14$ to $L_o + 17$ as follows (refer to 5.2 and 3.1).

Location	Coordinate	Defined Direction	Octal Code	Alpha Equivalent
L_o + 12	+X	↑	22	L
13	-X	↓	21	Z
14	+Y	←	30	O
15	-Y	→	24	H

(Each of these locations contain a word consisting of eight of the indicated plotter commands.) One need only interchange the contents of these locations to conform with the desired coordinate system.

More specifically, it is to be noted that the contents of the accumulator, upon entry to the subroutine, determine the length and direction (positive or negative) of the line to be plotted first. The plotter commands stored in L_o + 12, 13 determine the coordinate direction of this plot. Similarly, the contents of R specify the length and direction of the line to be plotted secondly; and the plotter commands stored in L_o + 14, 15 determine the coordinate direction of this plot.

```
0000.0
 + CTL 0000.0  + SAX 7760.0
 + CTV 0010.0  + TRA 7763.0
 + 70  0000.0  + TRA 0000.1
 + ADD 7762.0  + STO 0047.0
 + CLA 7760.0  + FST 0034.0
 + TPL 7766.1  + CLA 7775.0
 + TRA 7767.0  + CLA 7774.0
 + XAR 0000.0  + TPL 7771.0

0010.0
 + CLA 7777.0  + TRA 7771.1
 + CLA 7776.0  + PNC 0020.0
 + FST 0036.0  + CTL 0020.0
 + CTV 0030.0  + TRA 7760.0
 + TYW 2451.0  + TYW 2451.0
 + FSB 1430.1  + FSB 1430.1
 + XAR 0614.0  + XAR 0614.0
 + DIV 4512.0  + DIV 4512.0

0020.0
 + CLA 7774.1  + SUB 7773.0
 + TMI 7764.0  + XAR 0000.0
 + CLA 7777.0  + PNC 7760.0
 + XAR 0000.0  + TRA 7760.1
 + CLA 7774.1  + EXT 7772.0
 + TZE 7770.0  + ALS 0001.0
 + ADD 7762.0  + STO 7767.0
 + CLA 0000.0  - CLA 0000.0

0030.0
 + CLA 7775.1  + XAR 0000.0
 + CTL 0040.0  + TRA 7761.0
 + CLA 0000.0  - CLA 0003.1
 + CLA 0000.0  - CLA 0004.0
 - CLA 0000.0  - CLA 0004.0
 - CLA 0000.0  - CLA 0004.0
 + DIV 4512.0  + DIV 4512.0
 + FSB 1430.1  + FSB 1430.1

0040.0
 + XAR 0000.0  + PNC 7760.0
 + CLA 7776.0  + XAR 0000.0
 + SUB 7773.0  + TPL 7760.0
 + CLA 7775.1  + EXT 7772.0
 + TZE 7767.1  + ALS 0001.0
 + ADD 7766.0  + STO 7766.0
 + CLA 7776.0  + PNC 7760.0
 + 70  0000.0  + TRA 3003.0
```