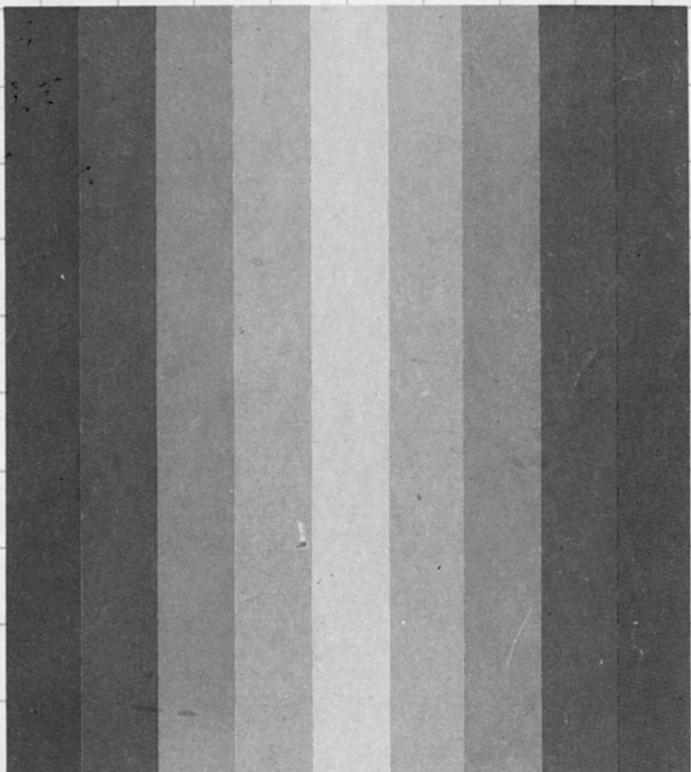


DICK SMITH

VZ200

PP40 Printer Plotter



X-7208

Instruction Manual

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FORWARD

This manual contains a great deal of information of a highly technical nature.

Before using the PP40 PRINTER PLOTTER, this manual should be read and understood thoroughly.

PP40 PRINTER/PLOTTER

A brief introduction

Developed especially by Video Tech to put hi-res 4 colour printing and plotting into the reach of every computer user, the PP40 is a technical marvel.

It is extremely compact and lightweight, yet delivers fine, clear lines in 4 bright colours. It can produce designs, pie charts, bar charts and even portraits. And it can plot sales charts, organization charts and even make maps.

With its elegantly simple printer mechanism, the PP40 avoids many of the common problems that occur with complicated, expensive printer/ plotters. And with simple ball-pen elements, replacement is easy and economical.

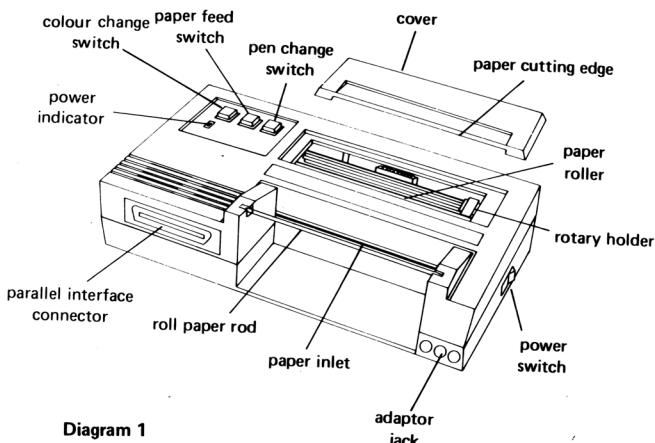
The PP40 PRINTER/PLOTTER

It has everything you've ever wanted in a graphics printer.

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	(Program for LASER 200, Apple [®] II & Dragon system)	

1) EXTERNAL VIEW AND PART NAMES



2) FUNCTIONAL PARTS (refer to Diagram 1)

2.1 AC Adaptor jack –

The power cord from 10V adaptor should plug into the jack.

2.2 Power Switch –

Controls the main power of the whole unit.

2.3 Power Indicator –

The lamp is ON when power is turned on and OFF when it is switched off.

2.4 Cover –

This is both a dust-shield and sound-baffle. Paper can be cut by using its front edge.

2.5 Manual Switches –

i) Paper feed switch:

Paper feeds forward when switch is pressed. Also, if power is turned on and this switch is pressed simultaneously, the self test is performed. (96 ASCII character set is printed)

ii) Change colour switch:

Press this switch and the current colour will be changed.

iii) Pen change switch:

When this switch is pressed, the rotary holder will move to the right-most pen change position.

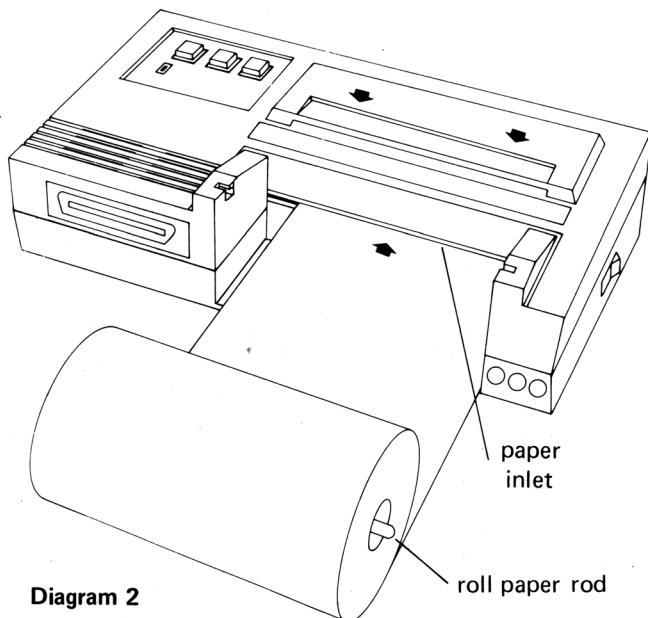
2.6 Parallel interface connector –

Centronic bus plug from external system connects here.

3) INSTALLATION AND SET-UP (refer to Diagram 1)

3.1 Installation

- i) Place the printer plotter on a clear, solid, level surface.
- ii) With the power switch turned OFF, connect the power plug from the adaptor into the adaptor jack.
- iii} Paper Mounting
 - Remove the cover by pushing it backward in the arrow direction and lifting it up as shown in Diagram 2.
 - Cut the paper at right angles to the edge and insert squarely into the paper inlet.
 - Turn the black paper roller upward until paper appears.
 - Pull about 2cm paper out and fit the roll paper rod to the printer plotter.
 - Replace the cover.



- iv) Turn on the power switch. The initialization pattern will be as shown below: (if the ball pens have already been installed)



3.2 Pen Mounting

- i) Remove the cover.
- ii) Press the COLOR CHANGE switch until the desired color pen slot rotates upward.
- iii) Push the corresponding colour pen into the slot firmly (see diagram 3)
- iv) Repeat the above procedure until all 4 color pens are installed.
- v) Replace the cover.

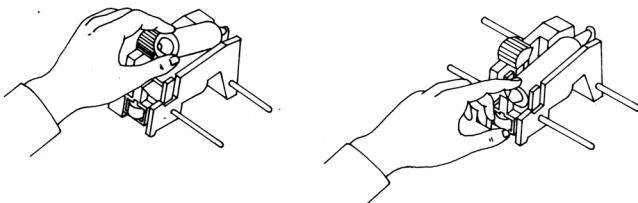


Diagram 3

3.3 Pen changing

- i) Remove the cover.
- ii) Press the PEN CHANGE switch. The rotary holder will move to the right-most position.
- iii) Push the white knob in the direction shown in diagram 4. When the pen tilts up; remove it.
- iv) Install a new pen as described in procedure 3.2.

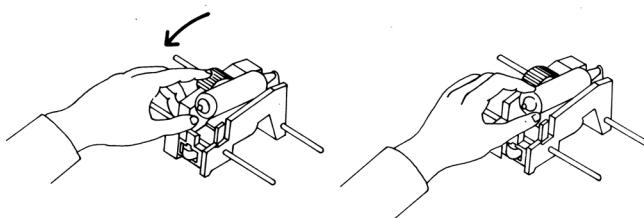


Diagram 4

****Do not move the mechanism manually when power is ON.**

***CAUTION**

- Wait for a while to turn on the power again after it is turned off.
- Do not apply power while you are plugging in or unplugging the input connector.
- Do not stop the printing motion while it is printing.
- Always use the lock-levers after inserting the parallel interface connector.
- Do not expose to direct sunlight.
- Never try to move the print head manually when power is on.
- Do not print or plot without paper, this will damage the ball pen.
- Do not inject water etc, through the end of the pens.
- Switch off the power switch before connecting or disconnecting the power cord.
- Do not use under conditions of extremely low or high temperature or high humidity.

4) OPERATION OF THE PRINTER PLOTTER

The printer plotter receives commands and data through the Centronics parallel bus. It can operate in either Text mode or Graphic mode.

4.1 Switch input functions

On removing the silver cover from the bottom of the printer, a dip-switch can be preset as follows:

Switch No.	ON	OFF
1	Operate CR/LR when 'CR' entered	Operate CR only when 'CR' entered
2	40 columns character size when power on	80 columns character size when power on

4.2 Reset operation

When reset, (e.g. for the time of power-ON), the printer plotter operates the following steps automatically:

- i) Initialize the I/O terminal and internal registers.
- ii) Set the conditions preset by the 4 way dip-switch described in section 4.1.
- iii) Set to text mode waiting for input.

4.3 Combination Operation

By turning on both the paper feed switch and colour change switch simultaneously, the printer plotter resets, returning to the text mode even when in graphic mode, and the rotary holder returns to the left end. The character scale and colour are unchanged but X and Y coordinates are destroyed.

4.4 Mode Change

Mode is changed by the following conditions:

- i) When reset a return to the text mode is automatic.
- ii) The text mode is changed to the graphic mode by inputting a Device Control code 2 (\$12).
- iii) Graphic mode returns to text mode on the following conditions:
 - When Device Control Code 1 code (\$11) is input.
 - When "A" command is executed.
 - On combination operations. (see section 4.3)

4.5 Mode change timing

Device Control Code 1 and Device Control Code 2 codes work on only those data that are preceded by CR code. Therefore, graphic mode fails to set if Device Control Code 2 is input halfway through the

line in text mode. Also, the manual switches have a specific timing to be read as follows:

i) Under the text mode:

- When no data is input after reset.
- Between CR, LF, LU or BS and the next data entry.
- When the data buffer is empty.

ii) Under the graphic mode:

Between commands (some commands may be executed without CR and the control codes are also accepted without CR).

4.6 Text mode

i) Character set

The table shows the character set in the text mode.

Codes undefined in the table are ignored.

	0	1	2	3	4	5	6	7	8
0			Ø	@	P	¶	P		
1	DC1	¶	1	A	Q	a	q		
2	DC2	"	2	B	R	b	T		
3		#	3	C	S	c	s		
4		\$	4	D	T	d	t		
5		%	5	E	U	e	u		
6		&	6	F	V	f	v		
7		,	7	G	W	g	w		
8	BS	(8	H	X	h	x		
9)	9	I	Y	i	y		
A	LF	*	:	J	Z	J	Z		
B	(VT) LU	+	:	K	[k	{		
C		,	<	L	\	l	:		
D	CR	NC	-	=	M]	m	}	
E			.	>	N	^	n	~	
F		/	?	O	_	o	☒		

(NOTE) BS : Back Space (retreats one character)

LF : Line Feed (paper advances one line)

LU : Line Up (paper goes one line in direction opposite to LF)

CR : Carriage return (pen returns to left edge)

DC1 : Device Control 1 (Text Mode)

DC2 : Device Control 2 (Graphic Mode)

NC : Next Color

ii) Control codes

- Back space (\$08)
Puts back the carriage by one character. Ignored if already at the left end of the printable area.
- Line feed (\$0A)
Feeds print paper forward one line.
- Line up (\$0B)
Puts back print paper one line.
- Carriage return (\$0D)
Moves the carriage to the left end of the printable area. When Pin 34 (Port A1, carriage return mode) is Low, carriage return operates after the line feed operation.
- Device control 1 (\$11)
Sets to the text mode.
- Device control 2 (\$12)
Sets to the graphic mode.
- Next color (\$1D)
Changes to the next color pen.

iii) Character scale

After resetting, the character scale is set by the dip-switch 2 which is maintained until it is changed by the graphic command (S).

iv) Auto-carriage return

In the text mode, if the printer is instructed to print characters exceeding the printable limit of current character scale, CR/LF operates automatically.

v) Text mode program example

*The printing commands to printer/plotter are not the same in all computer systems. The commands used by LASER 200 are demonstrated.

Example 1

```
10 LPRINT"***LASER PP40***"  
20 LPRINT"HELLO"  
30 GOTO20  
40 END
```

Program print out

```
***LASER PP40***  
HELLO  
HELLO
```

-
-
-

Example 2

```
10 FOR I=32 TO 127  
20 LPRINT CHR$(I);  
30 NEXT I  
40 END
```

Program print out

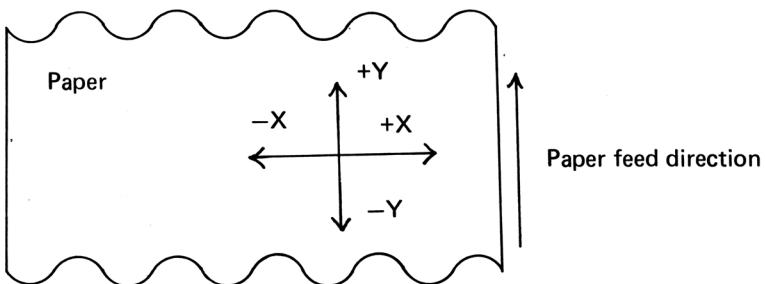
! "#%& ! *+, -./0123456789 : ; <=> ?@ABCDEFGHIJKLMNPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{!}~¤

4.7 Graphic mode

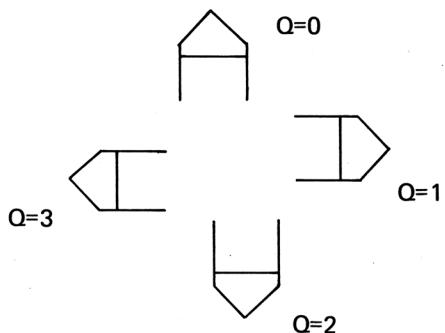
In the graphic mode, the following commands can be used to print various graphic patterns.

COMMAND	FORMAT	FUNCTION
LINE TYP	Lp (p=0 to 15)	Setting of type of line to be drawn. Solid line: p=0. Dotted line: p=1-15. Also indicates pitch.
ALL INITIALIZE	A	Pen moved to left edge in the X direction with no movement in the Y direction. Returns to the text mode with this point as the start point.
HOME	H	Moves to the start point with the PEN-UP.
INITIALIZE	I	Present pen location taken as start point.
DRAW	Dx, Y, .. xn, yn (-999≤x, y≤999)	Draws a line from the present location of the pen to a point located distances x, y from the start point.
RELATIVE DRAW	JΔx, Δy ... Δxn, Δyn (-999≤Δx, Δy≤999)	Draws a line from the present location of the pen to a point located at distances Δx, Δy from this point.
MOVE	Mx, y (-999≤x, y≤999)	Moves, with PEN-UP, from the present location of the pen to a point located distances x, y from the start point.
RELATIVE MOVE	RΔx, Δy (-999≤Δx, Δy≤999)	Moves, with PEN-UP, from the present location of the pen to a point located distances Δx, Δy from this point.
COLOR CHANGE	Cn (n=0 to 3)	Changes to the pen of color number specified by n. 0: Black, 1: Blue, 2: Green, 3: Red
SCALE SET	Sn (n=0 to 63)	Specification of character size.
ALPHA ROTATE	Qn (n=0 to 3)	Specification of character direction. (Only in the GRAPHIC MODE)
PRINT	Pc, c, c, ..., cn (n=∞)	Printing of characters. (c: characters)
AXIS	xp, q, r (p=0 or 1) (q=-999 to 999) (r=1 to 255)	Draws coordinate axis with the present location of the pen as the start point. Y axis p=φ Xaxis: p=1 q=pitch between scales. r=number of repetitions.

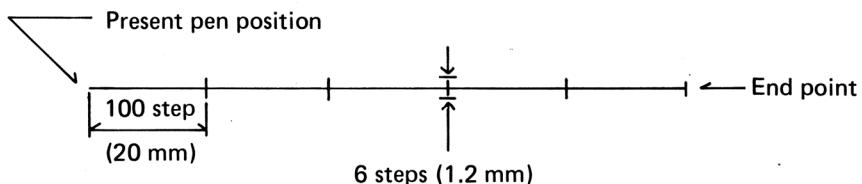
(Note 1) X and Y directions are defined as follows:



(Note 2) Character inclination is defined as follows:



(Note 3) "X" command example
When "X1,100,5" is entered:



ii) Command forms

There are 5 types of command to be classified.

- a) Single character command (no data required)
"A", "H" and "I" commands.
- b) Single data command (one data)
"L", "C", "S" and "Q" commands. One piece of data should follow.
- c) Two data command (two data)
"D", "J", "M" and "R" commands, followed by two data separated by "," CR code must be entered at the end.
- d) "P" command
This command is followed by character codes ending with CR code.
- e) "X" command
This command is followed by 3 data separated by ",".

iii) Rules for data reading

Data are read according to the following procedure:

- a) If the data begins with " " (blank), skip to the first data other than " ".
- b) A negative value is read if "--" (minus) is entered in front of the data.
- c) If there are more than three digits in a piece of data, the first three digits are effective.
- d) All data should end with "," (comma) or CR code. If characters other than numbers appear, data from that character to the next "," or CR code are ignored.

For example: JKKB-135.77,30

 ignored ignored

- e) For the limited number commands (i.e. "L", "S", "C", "Q" commands), the data is used after conversion to binary numbers, and made AND with \$0F or \$03.

iv) Abbreviated form of commands

To make programs shorter, the CR code may be abbreviated by the following data entry procedures:

- a) A single character type command can be followed by any other command except "A" (return to text mode).
For example: "HJ300, - 100 CR" is valid and equivalent to
 "H [CR] J300, -100 [CR]"
- b) For a single data command, other commands may be continued by inserting "," after the command:
For example: "L2, C3, Q3, S0, M150, -200 [CR]" is valid.
- c) A 2-data command should end with CR code.

v) Data destruction by changing mode

In mode changing, the following data in graphic mode will be destroyed.

- X and Y coordinates

(Y is set to 0 and the home position comes to the left end.)

- Character direction

Q is set to 0.

- Data set with "L", "C" or "S" remains unchanged.

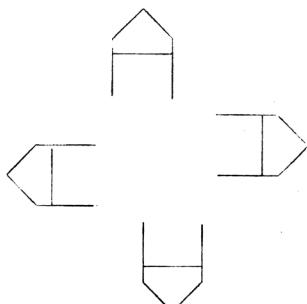
vi) Graphic mode program example

Example 1

Program print out

```
10 REM***CHANGE DIRECTION***
20 LPRINT:LPRINT:LPRINT
30 LPRINT"**CHANGE DIRECTION**"
40 LPRINTCHR$(18); "S9":REM ENTER GRAPHIC
    MODE&SELECT CHAR.SIZE 9
50 LPRINT"C3,M80,-100":REM SELECT RED CO
LOUR&MOVE TO (80,-100)
60 FOR I=0TO3
70 LPRINT"Q";I:LPRINT"PA":REM PRINT CHAR
ACTER A IN QI DIRECTION
80 NEXT I
90 LPRINT"M0,-230":LPRINT"S1,C0":REM RES
UME BLACK,CHAR.SIZE=1
100 LPRINTCHR$(17):REM RETURN TEXT MODE
110 LPRINT:LPRINT
120 LPRINT"4 DIRECTION"
130 END
```

CHANGE DIRECTION



4 DIRECTION

Example 2

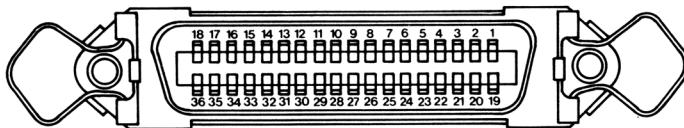
Program print out

```
110 REM**16 LINE TYPES**
120 LPRINT:LPRINT
130 LPRINT"*16 LINE TYPES*"
140 LPRINT:LPRINTCHR$(18); "C1":REM ENTER
GRAPHIC MODE&CHOOSE BLUE
150 FOR I=0 TO 15
160 LPRINT "L"; I; "M0,-20":REM CHOOSE LINE
TYPE&SET START POINT
170 LPRINT "J480,0":REM DRAW LINE TO(480,
0)FROM PRESENT LOCATION
180 LPRINT "R-480,-25":REM MOVE TO START
NEXT LINE
190 NEXT I
200 LPRINT "C0,A":REM RETURN BLACK AND IN
ITIALIZE TO TEXT MODE
*16 LINE TYPES*
```

5) PARALLEL INTERFACE

5.1 Input/Output Connector

A AMP CHAPM 36 BALL LOCK TYPE connector is used to input data into the Printer Plotter Pin configuration. Signals to the receptacle at the back of the Printer Plotter are described below.



PIN	SIGNAL	PIN	SIGNAL
1	STROBE	19	TWISTED PAIR GND (PAIR WITH 1 PIN)
2	DATA 1	20	TWISTED PAIR GND (PAIR WITH 2 PIN)
3	DATA 2	21	TWISTED PAIR GND (PAIR WITH 3 PIN)
4	DATA 3	22	TWISTED PAIR GND (PAIR WITH 4 PIN)
5	DATA 4	23	TWISTED PAIR GND (PAIR WITH 5 PIN)
6	DATA 5	24	TWISTED PAIR GND (PAIR WITH 6 PIN)
7	DATA 6	25	TWISTED PAIR GND (PAIR WITH 7 PIN)
8	DATA 7	26	TWISTED PAIR GND (PAIR WITH 8 PIN)
9	DATA 8	27	TWISTED PAIR GND (PAIR WITH 9 PIN)
10	ACK	28	TWISTED PAIR GND (PAIR WITH 10 PIN)
11	BUSY	29	TWISTED PAIR GND (PAIR WITH 11 PIN)
12	GND	30	GND
13	NC	31	NC
14	GND	32	NC
15	GND	33	GND
16	GND	34	NC
17	GND	35	NC
18	NC	36	NC

NOTES: NC stands for No Connection.

*The connector should be connected with a male connector (e.g. 57-30360) from an external system.

*A twisted pair cable should be used to reduce electrical noise.

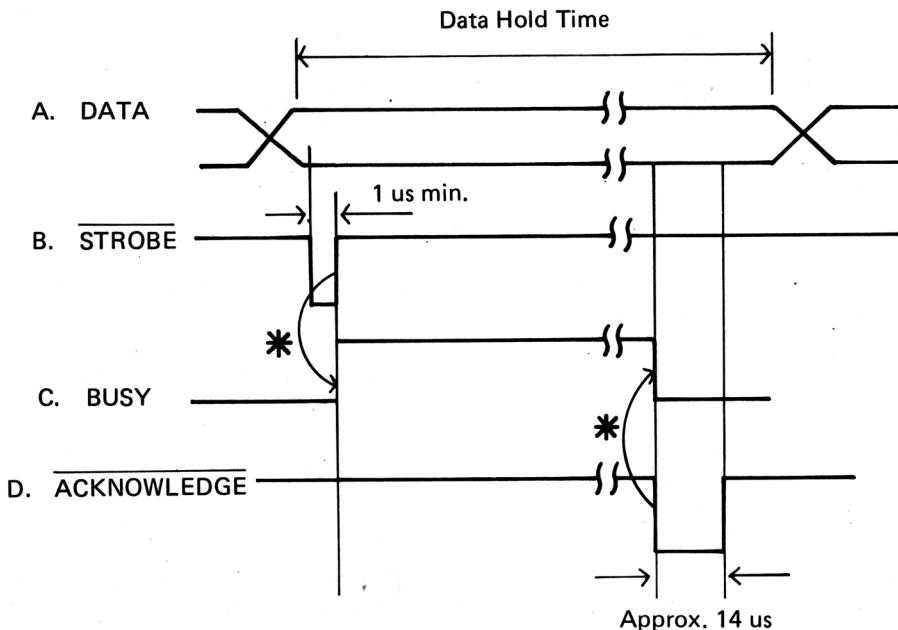
5.2 Interface levels

TTL level

LOW: 0-0.8V

HIGH: 2.4-5.0V

5.3 Timing chart



*Propagation Delay Time less than 200 ns

5.4 Input/Output signal

- DATA (D0-D7) –
8 bit data input signals, 'High' represents logic '1'.
- STROBE –
The strobe input signal is used to read in 8 bits of data. Data is read in when the signal goes 'LOW'.
- BUSY –
This output signal indicates that the printer-plotter is busy and it will not accept data when it goes 'High'.
- ACKNOWLEDGE –
This output 'low' signal indicates the printer-plotter can accept next data input.

6) MAINTENANCE

Clean the printer after use. Dust, etc, on the printer mechanism should be removed with a soft brush.

If you have problems try these solutions.

<u>Problems</u>	<u>Cause/Solution</u>
1. LED LAMP OFF	Check all the power connections. Remove the power cord and reconnect.
2. Wrong character printing	Remove the interface plug and connect it again. Make sure to fix the lock-lever.
3. Printed patterns are too light	Replace the ball pen.
4. Printer o.k., but the paper does not advance	Paper jam/Reload the paper.

7) SPECIFICATION

7.1 Ball pen specification

- Colors — black, blue, green, red.
- Ink — water or oil based.
- Pen life — Approx. 100,000 characters at (S=0)
- Dimensions — 5mm (dia) X 23.3mm (length)

* Cap should be placed on the water based pen when printer plotter is to be unused for a long period.

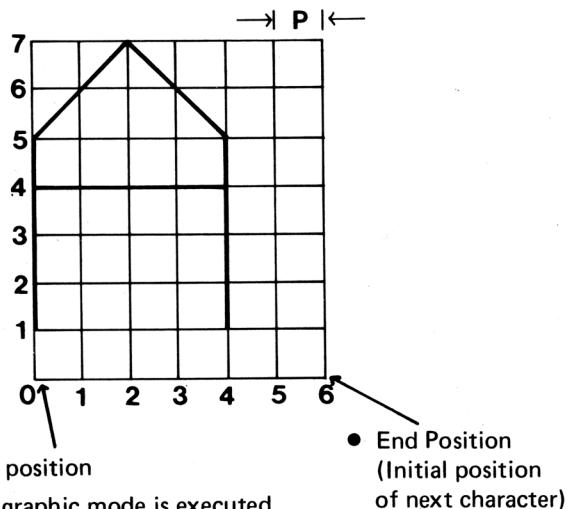
7.2 Roll paper specifications:

- Paper width — 114.5 ± 0.2 mm
- Roll dia. — 70mm max.
- Paper thickness — 0.07 ± 0.005 mm

7.3 Printer-plotter specifications:

- Power consumption — about 6W (average) during continuous printing, 0.7W during standby.
- Input voltage — DC 9V
- Printing method — Ball pen printing and plotting.
- Printing speed — 10 char/sec. (smallest scale S=0)
- Software mode switching — graphic mode and text mode.
- Column capacity — 40/80 column per line.
- Data transfer — 8 bit parallel.
- Interface — Parallel Centronics Bus standard.
- Character set — 96 ASCII character set.
- Step size — 0.2mm/step (X and Y axes)
- Resolution — 0.2mm
- Paper width — 114mm
- Colour — 4 colour (Black, blue, green, red)
- Printable area — 96mm in X axis (480 steps), ± 6.55 m in Y axis (± 32768 steps) (may be modified by programming the start position)
- Scissoring — When 96mm is exceeded on the X-axis, the pen is up and scissoring function operates.
- Error — No error except in case of data entry in excess of ± 32768 or plots exceeding ± 6.55 m from the start position, when an error exists, unit returns to the power-ON reset status.
- Line drawing speed — 52mm/sec (max) along X and Y axes.
73mm (max) in 45° plotting.
- Paper feed — Friction feed.

- Character composition – Characters are composed on the line matrix as shown with matrix pitch (P) = $(S+1) \times 0.2\text{mm}$
 $S=\text{character scale } (0-63)$



(When Q command in graphic mode is executed.
the character will rotate about this point)

- Character size – 64 different character sizes
- Plotted line type – Besides plotting solid lines, 15 different types of dotted lines can be plotted.
- Operating Environment – $5^\circ\text{C} - 40^\circ\text{C}$
 $20\% - 80\%$ in humidity (No condensation)
- Weight – approximate 700 gm.
- Dimension – 24.5cm X 14.5cm X 5.75cm

8) DEMONSTRATION PROGRAMS

Demonstration programs designed to run on the Laser 200/VZ200, Apple II and Dragon Computer systems are shown separately in this chapter.

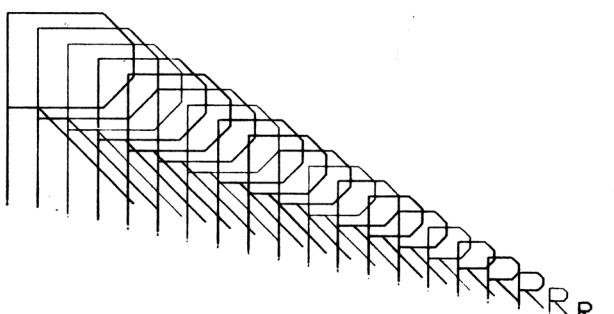
8.1 Demonstration Programs for Laser 200/VZ200 Computer System.

****CHARACTER SET****

```
! "#$%&,[ ]*+, -./0123456789
: ; <=> ?@ABCDEFGHIJKLMNPQRS
TUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~¤
```

```
10 REM ***CHARACTER SET***
20 LPRINT :LPRINT
30 LPRINT"***CHARACTER SET***"
40 LPRINTCHR$(18);"S2":LPRINTCHR$(17)
50 FORI=32TO127
60 LPRINTCHR$(I);
70 NEXTI
80 LPRINT :LPRINTCHR$(18); "S1,C0, A"
```

****DIFFERENT CHARACTER SIZE****

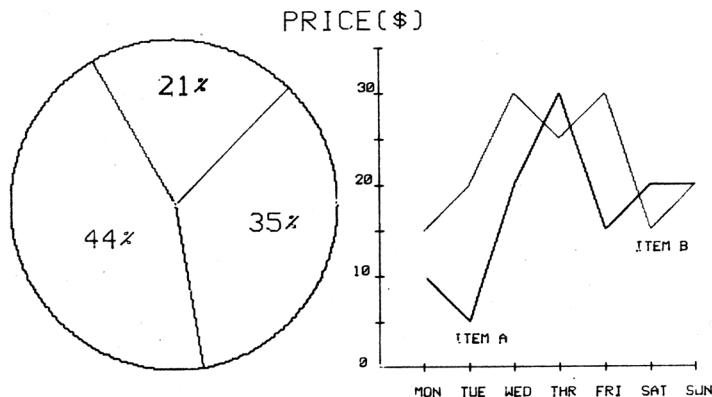


```

200 REM***DIFFERENT CHARACTER SIZE***
210 LPRINT"**DIFFERENT CHARACTER SIZE**"
220 LPRINTCHR$(18);"R0,-200"
230 LPRINT"1"
240 FORI=0TO20:LPRINT"HR20,-3"
250 LPRINT"IC";I;";S";20-I;";PR"
260 NEXTI
270 LPRINT"S1,C0,M0,-20":LPRINT"A"

```

DRAWING CHART



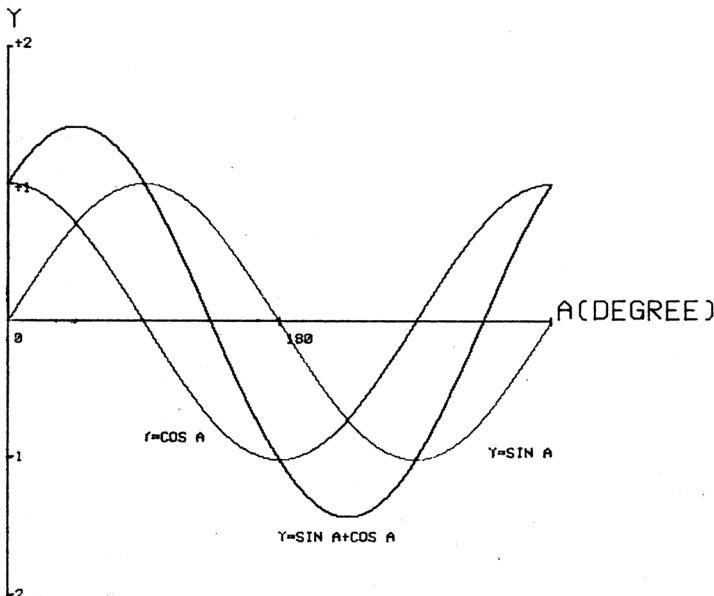
```

300 REM DRAWING CHART
310 LPRINT"**DRAWING CHART**"
320 LPRINTCHR$(18); "R108,-200":LPRINT"1"
330 R=108:FORI=0TO360:GOSUB400
340 IFI>0,GOTO360
350 LPRINT"X;Y;X;Y"
360 LPRINT"D;X;Y:NEXTI"
370 FORJ=1TO3:READI:GOSUB400:GOSUB420:NE
XTJ
380 DATA45,120,280
390 GOTO430
400 X=INT(R*COS(3.14159*I/180)):Y=INT(R*
SIN(3.14159*I/180))

```

```
410 RETURN
420 LPRINT"HC";J;";D0,0,";X;";";Y:RETURN
430 LPRINT"HC1,M50,-20":LPRINT"P35x"
440 LPRINT"HC2,M-60,-30":LPRINT"P44x"
450 LPRINT"HC3,M-10,70":LPRINT"P21x"
460 LPRINT"HC0,M135,-108":LPRINT"IX0,30,
7":LPRINT"HX1,30,7"
470 LPRINT"M-13,0":LPRINT"S0,P0":LPRINT"
R-10,60":LPRINT"P10"
480 LPRINT"R-10,60":LPRINT"P20"
490 LPRINT"R-10,60":LPRINT"P30"
500 LPRINT"R-60,40":LPRINT"S1,PPRICE($)"
510 LPRINT"HM0,-20":LPRINT"S0,P      MON
TUE   WED   THR   FRI";
520 LPRINT"  SAT   SUN"
530 LPRINT"HC1,M30,90":LPRINT"D60,120,90
,180,120,150,150,180"
540 LPRINT"D180,90,210,120"
550 LPRINT"HC3,M30,60":LPRINT"D60,30,90,
120,120,180,150,90"
560 LPRINT"D180,120,210,120"
570 LPRINT"C2,M50,15":LPRINT"PITEM A":LP
RINT"M170,75" .
580 LPRINT"PITEM B"
590 LPRINT"M0,-50":LPRINT"C0,S1,A"
```

PLOTTING GRAPH



```

1000 REM***PLOTTING GRAPH***
1010 LPRINT"**PLOTTING GRAPH**"
1020 LPRINTCHR$(18),"C0,M0,-200":LPRINT"
IX1,180,2"
1030 LPRINT"S0,M5,-15":LPRINT"P0":LPRINT
"M185,-15"
1040 LPRINT"P180":LPRINT"S1,M365,0":LPRINT
"PA(DEGREE)"
1050 LPRINT"HX0,90,2"
1060 LPRINT"M0,190":LPRINT"PY":LPRINT"M5
,178":LPRINT"S0,P+2"
1070 LPRINT"M5,83"
1080 LPRINT"P+1":LPRINT"HX0,-90,2"
1090 LPRINT"HM0,-93"
1100 LPRINT"P-1":LPRINT"M0,-183":LPRINT
"P-2":LPRINT"HC3"
1110 FORI=0TO360:S=I/180*3.14159:Y=INT(9
0.5*(SIN(S)+COS(S)))

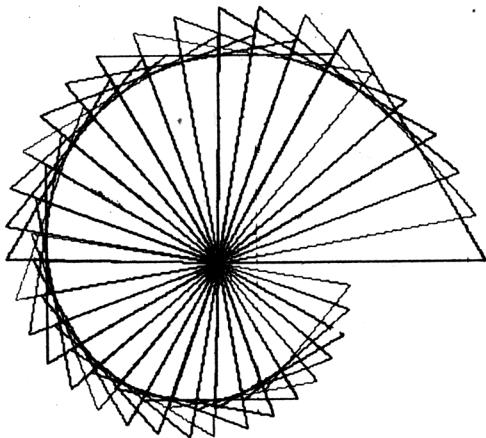
```

```

1120 LPRINT"D";I;";";Y
1130 NEXTI:LPRINT"HC1"
1140 FORI=0TO360:S=I/180*3.14159:Y=INT(9
0.5*SIN(S))
1150 LPRINT"D";I;";";Y:NEXTI:LPRINT"HC2"
1160 FORI=0TO360:S=I/180*3.14159:Y=INT(9
0.5*COS(S))
1170 LPRINT"D";I;";";Y:NEXTI
1180 LPRINT"HM90,-80":LPRINT"C0,PY=COS A
"
1190 LPRINT"M320,-90":LPRINT"PY=SIN A"
1200 LPRINT"M180,-145":LPRINT"PY=SIN A+C
OS A"
1210 LPRINT"M0,-200":LPRINT"S1,A"

```

GRAPHIC DRAWING



```

1300 REM***GRAPHIC DRAWING***
1310 LPRINT"**GRAPHIC DRAWING**"
1320 LPRINTCHR$(18);"M220,-200":LPRINT" I
"
1330 D=-10:R=180:F=3.14159/3:LPRINT"C0"

```

```
1340 FORJ=1 TO 30 :L=L+1  
1350 IFL>=4,L=L-4  
1360 D=D+10  
1370 R=R-3 :K=D*3. 14159/180 :Y1=R*SIN(K) :X  
1=R*COS(K)  
1380 Y2=R*SIN(K+F) :X2=R*COS(K+F)  
1390 LPRINT "C";L;" ";D";X1;" ";Y1;" ";X  
2;" ";Y2;" ",0,0"  
1400 NEXTJ  
1410 LPRINT "HM-300,-150" :LPRINT "C0,A"
```

PP40 FROM VIDEO TECHNOLOGY

```
1450 REM***GRAPHIC CHARACTER***  
1460 LPRINT CHR$(18);"I":FORJ=0 TO 1:LPRINT  
"HM";J*3;" ";J*3  
1470 LPRINT "C";J+2;";S5,PPP40":LPRINT "C0  
,P FROM"  
1480 LPRINT "R-320,-60":LPRINT "C";J+1;";S  
4,VIDEO TECHNOLOGY"  
1490 NEXTJ:LPRINT "C0,S1,A"
```

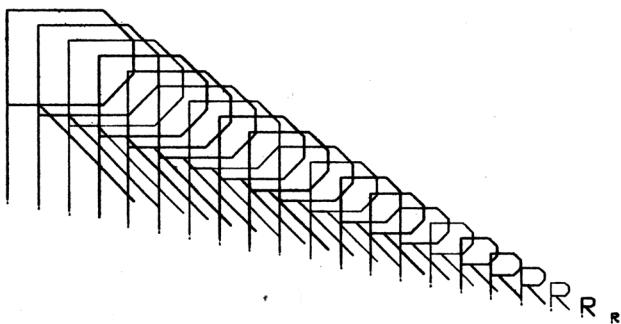
8.2 Demonstration Program for Apple II Computer System.

CHARACTER SET

! " # \$ % & ' () * + , - . / 0 1 2 3 4 5 6 7 8 9
: ; < = > ? @ A B C D E F G H I J K L M N O P Q R S
T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m
n o p q r s t u v w x y z { | } ~ ☒

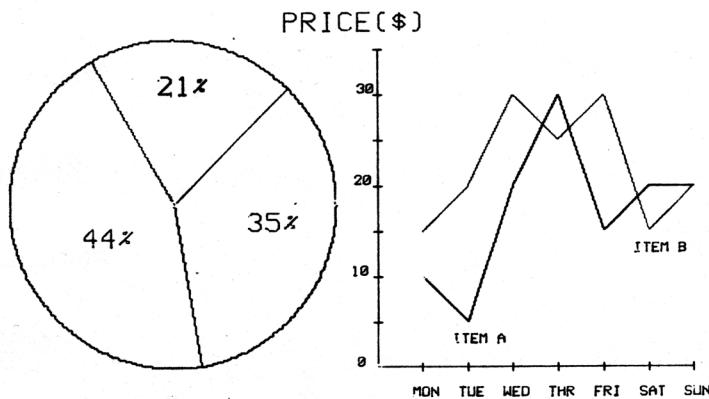
```
10 REM ***CHARACTER SET***  
20 PR# 2  
30 PRINT : PRINT  
40 PRINT "***CHARACTER SET***"  
50 PRINT CHR$ (18); "S2,A"  
60 FOR I = 32 TO 127  
70 PRINT CHR$ (I);  
80 NEXT I  
90 PRINT : PRINT CHR$ (18); "S1,"  
    "C0,A"
```

DIFFERENT CHARACTER SIZE



```
200 REM ***DIFFERENT CHARACTER S  
    IZE***  
210 PR# 2  
220 PRINT "***DIFFERENT CHARACTER  
    SIZE***"  
230 PRINT CHR$ (18); "R0,-200"  
240 PRINT "I"  
250 FOR I = 0 TO 20: PRINT "HR20  
    ,-3"  
260 PRINT "IC"; I; ",S"; 20 - I; ",P  
    R"  
270 NEXT I  
280 PRINT "S1,C0,M0,-20": PRINT  
    "A"
```

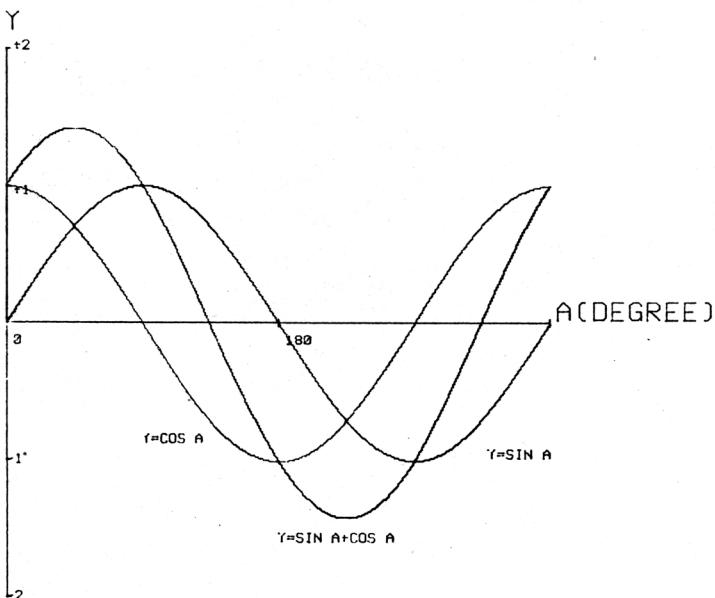
DRAWING CHART



```
300 REM **DRAWING CHART**
310 PR# 2
320 PRINT "**DRAWING CHART**"
330 PRINT CHR$(18); "R108,-200"
: PRINT "I"
340 R = 108: FOR I = 0 TO 360: GOSUB
410
350 IF I > 0 THEN 370
360 PRINT "M"; X; ", "; Y
370 PRINT "D"; X; ", "; Y: NEXT I
380 FOR J = 1 TO 3: READ I: GOSUB
410: GOSUB 430: NEXT J
390 DATA 45,120,280
400 GOTO 440
410 X = INT (R * COS (3.14159 *
I / 180)): Y = INT (R * SIN
(3.14159 * I / 180))
420 RETURN
430 PRINT "HC"; J; ", D0,0,"; X; ", "
Y: RETURN
```

```
440 PRINT "HC1,M50,-20": PRINT "P35z"
450 PRINT "HC2,M-60,-30": PRINT "P44z"
460 PRINT "HC3,M-10,70": PRINT "P21z"
470 PRINT "HC0,M135,-108": PRINT "IX0,30,7": PRINT "HX1,30,7"
480 PRINT "M-13,0": PRINT "S0,P0": PRINT "R-10,60": PRINT "P10"
490 PRINT "R-10,60": PRINT "P20"
500 PRINT "R-10,60": PRINT "P30"
510 PRINT "R-60,40": PRINT "S1,P PRICE($)"
520 PRINT "HM0,-20": PRINT "S0,P MON TUE WED THR FRI"
530 PRINT " SAT SUN"
540 PRINT "HC1,M30,90": PRINT "D60,120,90,180,120,150,150,180"
550 PRINT "D180,90,210,120"
560 PRINT "HC3,M30,60": PRINT "D60,30,90,120,180,150,90"
570 PRINT "D180,120,210,120"
580 PRINT "C2,M50,15": PRINT "PI TEM A": PRINT "M170,75"
590 PRINT "ITEM B"
600 PRINT "M0,-50": PRINT "C0,S1,A"
```

PLOTTING GRAPH



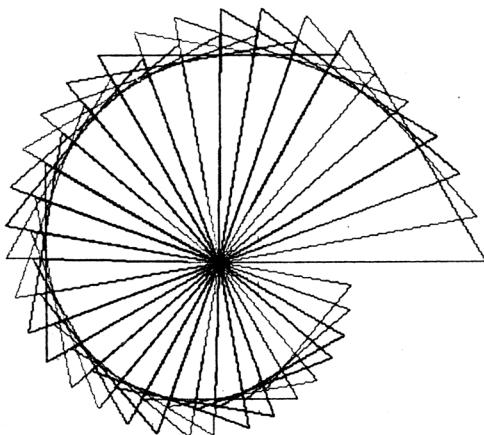
```

1000 REM ***PLOTTING GRAPH***
1010 PR# 2
1020 PRINT "**PLOTTING GRAPH**"
1030 PRINT CHR$ (18), "C0,M0,-20
      0": PRINT "IX1,180,2"
1040 PRINT "S0,M5,-15": PRINT "P
      0": PRINT "M185,-15"
1050 PRINT "P180": PRINT "S1,M36
      5,0": PRINT "PA(DEGREE)"
1060 PRINT "HXX0,90,2"
1070 PRINT "M0,190": PRINT "PY":
      PRINT "M5,178": PRINT "S0,P
      +2"
1080 PRINT "M5,83"
1090 PRINT "P+1": PRINT "HX0,-90
      ,2"
1100 PRINT "HM0,-93"

```

```
1110 PRINT "P-1": PRINT "M0,-183"
      ": PRINT "P-2": PRINT "HC3"
1120 FOR I = 0 TO 360:S = I / 18
      0 * 3.14159:Y = INT (90.5 *
      ( SIN (S) + COS (S)))
1130 PRINT "D";I;",";Y
1140 NEXT I: PRINT "HC1"
1150 FOR I = 0 TO 360:S = I / 18
      0 * 3.14159:Y = INT (90.5 *
      SIN (S))
1160 PRINT "D";I;",";Y: NEXT I: PRINT
      "HC2"
1170 FOR I = 0 TO 360:S = I / 18
      0 * 3.14159:Y = INT (90.5 *
      COS (S))
1180 PRINT "D";I;",";Y: NEXT I
1190 PRINT "HM90,-80": PRINT "C0
      ,PY=COS A"
1200 PRINT "M320,-90": PRINT "PY
      =SIN A"
1210 PRINT "M180,-145": PRINT "P
      Y=SIN A+COS A"
1220 PRINT "M0,-200": PRINT "S1,
      A"
```

GRAPHIC DRAWING



```
1300 REM ***GRAPHIC DRAWING***  
1310 PR# 2  
1320 PRINT "**GRAPHIC DRAWING**"  
  
1330 PRINT CHR$ (18);"M220,-200  
": PRINT "I"  
1340 D = - 10:R = 180:F = 3.1415  
9 / 3: PRINT "C0"  
1350 FOR J = 1 TO 30:L = L + 1  
1360 IF L > 4 THEN L = L - 4  
1370 D = D + 10  
1380 R = R - 3:K = D * 3.14159 /  
180:Y1 = R * SIN (K):X1 = R  
* COS (K)  
1390 Y2 = R * SIN (K + F):X2 = R  
* COS (K + F)  
1400 PRINT "C";L;" ";"D";X1;" ";"  
Y1;" ";"X2;" ";"Y2;" ;0,0"  
1410 NEXT J  
1420 PRINT "HM-300,-150": PRINT  
"C0,A"
```

PP40 FROM VIDEO TECHNOLOGY

```
1450 REM ***GRAPHIC CHARACTER***  
  
1460 PR# 2  
1470 PRINT CHR$ (18);"I": FOR J  
= 0 TO 1: PRINT "HM";J * 3;  
";";J * 3  
1480 PRINT "C";J + 2;,S5,PPP40"  
: PRINT "C0,P FROM"  
1490 PRINT "R-320,-60": PRINT "C  
";J + 1;,S4,PVIDEO TECHNOLO  
GY"  
1500 NEXT J: PRINT "C0,S1,A"
```

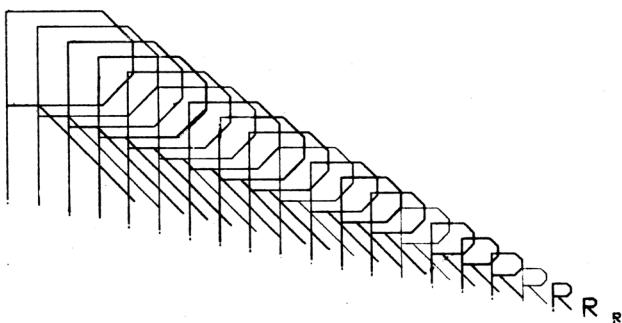
8.3 Demonstration Program for Dragon Computer System.

CHARACTER SET

~ " # \$ % & , [] * + , - . / 0 1 2 3 4 5 6 7 8 9
: ; < = > ? @ A B C D E F G H I J K L M N O P Q R S
T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m
n o p q r s t u v w x y z { | } ~ ☒

```
10 REM***CHARACTERSET***  
20 PRINT#-2:PRINT#-2  
30 PRINT#-2,"**CHARACTER SET**"  
40 PRINT#-2,CHR$(18);"S2":PRINT#-2,CHR$(  
17)  
50 FORI=32TO127  
60 PRINT#-2,CHR$(I);  
70 NEXTI  
80 PRINT#-2:PRINT#-2,CHR$(18);"S1,C0,A"
```

DIFFERENT CHARACTER SIZE

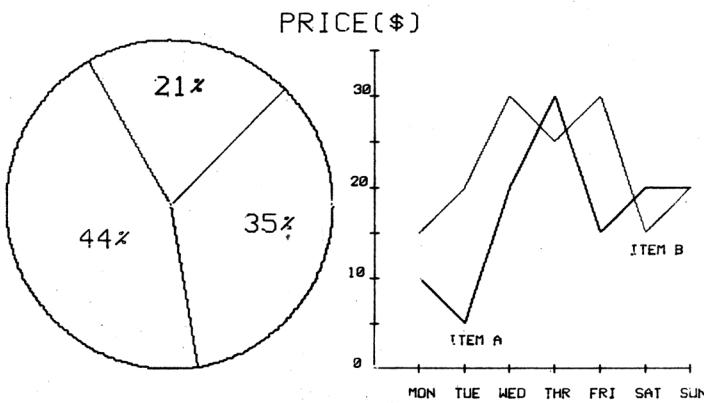


```

200 REM***DIFFERENT CHARACTER SIZE***
210 PRINT#-2,"**DIFFERENT CHARACTER SIZE
**"
220 PRINT#-2,CHR$(18); "R0,-200"
230 PRINT#-2, "I"
240 FOR I=0 TO 20:PRINT#-2, "HR20,-3"
250 PRINT#-2, "IC"; I; ",S"; 20-I; ",PR"
260 NEXT I
270 PRINT#-2, "S1,C0,M0,-20":PRINT#-2, "A"

```

DRAWING CHART



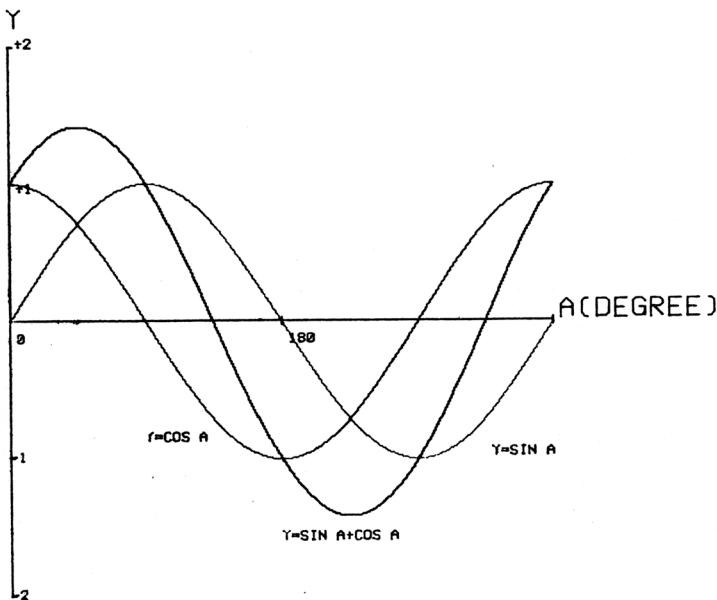
```

300 REM*** DRAWING CHART
310 PRINT#-2,"**DRAWING CHART**"
320 PRINT#-2,CHR$(18); "R108,-200":PRINT#
-2, "I"
330 R=108:FOR I=0 TO 360:GOSUB 400
340 IF I>0 THEN 360
350 PRINT#-2, "M"; X; ", "; Y
360 PRINT#-2, "D"; X; ", "; Y:NEXT I

```

```
370 FORJ=1 TO3 :READI :GOSUB400 :GOSUB420 :NEXTJ
380 DATA45, 120, 280,
390 GOT0430
400 X=INT(R*COS(3.14159*I/180)) :Y=INT(R*SIN(3.14159*I/180))
410 RETURN
420 PRINT#-2, "HC"; J; ",D0,0,";X;",";Y:RETUR
N
430 PRINT#-2, "HCI,M50,-20":PRINT#-2, "P35
z"
440 PRINT#-2, "HC2,M-60,-30":PRINT#-2, "P4
4z"
450 PRINT#-2, "HC3,M-10,70":PRINT#-2, "P21
z"
460 PRINT#-2, "HC0,M135,-108":PRINT#-2, "I
X0,30,7":PRINT#-2, "HX1,30,7"
470 PRINT#-2, "M-13,0":PRINT#-2, "S0,P0":P
RINT#-2, "R-10,60":PRINT#-2, "P10"
480 PRINT#-2, "R-10,60":PRINT#-2, "P20"
490 PRINT#-2, "R-10,60":PRINT#-2, "P30"
500 PRINT#-2, "R-60,40":PRINT#-2, "S1,PPRI
CE($)"
510 PRINT#-2, "HM0,-20":PRINT#-2, "S0,P
MON TUE WED THR FRI ";
520 PRINT#-2, "SAT SUN"
530 PRINT#-2, "HC1,M30,90":PRINT#-2, "D60,
120,90,180,120,150,150,180"
540 PRINT#-2, "D180,90,210,120"
550 PRINT#-2, "HC3,M30,60":PRINT#-2, "D60,
30,90,120,120,180,150,90 "
560 PRINT#-2, "D180,120,210,120"
570 PRINT#-2, "C2,M50,15":PRINT#-2, "PITEM
A":PRINT#-2, "M170,75"
580 PRINT#-2, "PITEM B"
590 PRINT#-2, "M0,-50":PRINT#-2, "C0,S1,A"
```

PLOTTING GRAPH



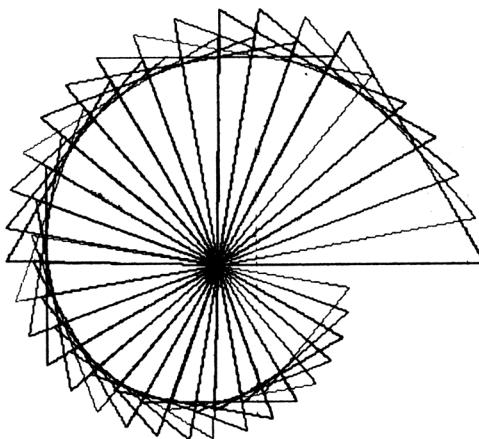
```

1000 REM***PLOTTING GRAPH***
1010 PRINT#-2, "**PLOTTING GRAPH**"
1020 PRINT#-2, CHR$(18), "C0,M0,-200":PRINT#-2, "IX1,180,2"
1030 PRINT#-2, "S0,M5,-15":PRINT#-2, "P0":PRINT#-2, "M185,-15"
1040 PRINT#-2, "P180":PRINT#-2, "S1,M365,0":PRINT#-2, "PA(DEGREE)"
1050 PRINT#-2, "HX0,90,2"
1060 PRINT#-2, "M0,190":PRINT#-2, "PY":PRINT#-2, "M5,178":PRINT#-2, "S0,P+2"
1070 PRINT#-2, "M5,83"
1080 PRINT#-2, "P+1":PRINT#-2, "HX0,-90,2"
1090 PRINT#-2, "HM0,-93"
1100 PRINT#-2, "P-1":PRINT#-2, "M0,-183":PRINT#-2, "P-2":PRINT#-2, "HC3"
1110 FOR I=0 TO 360:S=I/180*3.14159:Y=INT(9
0.5*(SIN(S)+COS(S)))

```

```
1120 PRINT#-2,"D";I;",";Y  
1130 NEXTI:PRINT#-2,"HC1"  
1140 FORI=0TO360:S=I/180*3.14159:Y=INT(9  
0.5*SIN(S))  
1150 PRINT#-2,"D";I;",";Y:NEXTI:PRINT#-2  
,"HC2"  
1160 FORI=0TO360:S=I/180*3.14159:Y=INT(9  
0.5*COS(S))  
1170 PRINT#-2,"D";I;",";Y:NEXTI  
1180 PRINT#-2,"HM90,-80":PRINT#-2,"C0,PY  
=COS A"  
1190 PRINT#-2,"M320,-90":PRINT#-2,"PY=SI  
N A"  
1200 PRINT#-2,"M180,-145":PRINT#-2,"PY=S  
IN A+COS A"  
1210 PRINT#-2,"M0,-200":PRINT#-2,"S1,A"
```

GRAPHIC DRAWING



```
1300 REM***GRAPHIC DRAWING***  
1310 PRINT#-2,"**GRAPHIC DRAWING**"
```

```
1320 PRINT#-2,CHR$(18);"M220,-200":PRINT  
#-2,"I"  
1330 D=-10:R=180:F=3.14159/3:PRINT#-2,"C  
0"  
1340 FORJ=1TO30:L=L+1  
1350 IFL>=4THENL=L-4  
1360 D=D+10  
1370 R=R-3:K=D*3.14159/180:Y1=R*SIN(K):X  
1=R*COS(K)  
1380 Y2=R*SIN(K+F):X2=R*COS(K+F)  
1390 PRINT#-2,"C";L;", ";"D";X1;", ";"Y1;",  
";X2;", ";"Y2;", 0,0"  
1400 NEXTJ  
1410 PRINT#-2,"HM-300,-150":PRINT#-2,"C0  
,A"
```

PP40 FROM VIDEO TECHNOLOGY

```
1450 REM***GRAPHIC CHARACTER***  
1460 PRINT#-2,CHR$(18); "I":FORJ=0TO1:PRI  
NT#-2,"HM";J*3;";";J*3  
1470 PRINT#-2,"C";J+2;";S5,PPP40":PRINT#  
-2,"C0,P FROM"  
1480 PRINT#-2,"R-320,-60":PRINT#-2,"C";J  
+1;";S4,PUVIDEO TECHNOLOGY"  
1490 NEXTJ:PRINT#-2,"C0,S1,A"
```


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91-0160-02