



# **PLOTMATE OPERATING INSTRUCTIONS**

## **Sideways ROM Version**

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## **Introduction**

The PLOTMATE sideways ROM is a direct replacement for the PLOTMATE disk based software and is compatible with all BBC microcomputer models.

This manual should be used in conjunction with the PLOTMATE user guide - disk based version. Most of the operating and system setup procedures are the same, any differences are shown.

As the ROM memory requirements are far less than that of the disk based software, any screen graphics mode can be used when plotting.

Extra graphics facilities have been added to this version of the software. These include interception of many of the Acornsoft Graphics Extension ROM (GXR) commands.



## 1 – Getting Started

The PLOTMATE sideways ROM must first be installed into the BBC microcomputer (see installation leaflet). This ROM can be placed in any spare ROM slot in the machine.

When installed, the ROM claims two pages of memory for its routines thus increasing PAGE by &200.

PLOTMATE should be connected to either the user or printer port of the computer by use of the appropriate direct drive interface lead. Once this connection has been made both machines can be powered up ready for use.

The following commands are available for controlling the plotter :-

- \*PLTMATE <size>
- \*PLTMATP <size>
- \*ONMATE <size>
- \*OFFMATE <size>
- \*HOME <size>
- \*PARK <size>
- \*PENUP <size>
- \*PENDOWN <size>
- \*CURSOR <size>

The optional <size> parameter following each command can be used for selecting different PLOTMATE ROMs if they have been installed. e.g. A4, A3.

All of the commands are described below :-

**\*PLTMATE <size>**

Initialises the PLOTMATE when connected to the user port. A pen reset will be performed after which the system will be ready to start plotting by intercepting BBC graphics (VDU) commands.

# PLOTMATE

## \*PLTMATP <size>

Initialises PLOTMATE when connected to the printer port. A pen reset will be performed after which the system will be ready to start plotting by intercepting BBC graphics (VDU) commands.

Note : The following commands will only function if PLOTMATE has been previously initialised :-

## \*ONMATE <size>

Enables PLOTMATE if it has already been disabled. Plotting by interception of BBC graphics commands will be resumed.

## \*OFFMATE <size>

Disables PLOTMATE. All subsequent BBC graphics commands will be routed through the BBC operating system only.

## \*HOME <size>

Moves pen to the home (bottom left) position.

## \*PARK <size>

Moves pen to the park (bottom right) position.



\*PENUP <size>

Lifts pen from the paper.

\*PENDOWN <size>

Lowers pen onto the paper.

\*CURSOR <size>

Pen can be moved around paper by pressing the cursor control keys.  
To escape from this function press the space bar.



## 2 – Programming

All the example programs shown in sections 5 and 6 of the PLOTMATE user guide can be demonstrated using the sideways ROM. Changes only need be made to the commands which enable and disable PLOTMATE. These commands should be replaced by,

\*PLTMATE or \*PLTMATP when enabling PLOTMATE  
and \*OFFMATE when disabling PLOTMATE.

Note: It is not necessary to change the value of HIMEM when programming as no extra memory is required by the ROM. All screen modes can be used when plotting.





### 3. Added Commands

- VDU 1,2 – Disables PLOTMATE. All BBC graphics commands will be routed through the BBC operating system only. (Same as \*OFFMATE).
- VDU 1,5 – Pen can be moved around paper by pressing the cursor control keys. To escape from this function press the space bar. (Same as \*CURSOR).
- VDU 1,6 – Lifts pen from the paper. (Same as \*PENUP).
- VDU 1,7 – Lowers pen onto the paper. (Same as \*PENDOWN).
- VDU 1,11 – Initialises PLOTMATE when connected to the user port. A pen reset will be performed after which the system will be ready to start plotting by intercepting BBC graphics (VDU) commands. (Same as \*PLTMATE).
- VDU1,12 – Initialises PLOTMATE when connected to the printer port. A pen reset will be performed after which the system will be ready to start plotting by intercepting BBC graphics (VDU) commands. (Same as \*PLTMATP).
- VDU 1,16 – Moves pen to the home (bottom left) position. (Same as \*HOME).
- VDU 1,17 – Moves pen to the park (bottom right) position. (Same as \*PARK).



VDU 1.N – Shading and pen response.

- N=32 to 63 – Changes vertical line spacing on GXR shape fills.  
32=Most dense fill.  
63=No fill.
- N=64 to 95 – Changes horizontal line spacing on GXR shape fills.  
64=Most dense fill.  
95=No fill.
- N=128 to 255 – Change pen response time.

## GXR Commands

Some of the Acornsoft Graphics Extension ROM (GXR) command functions have been included. These commands take the form of additional PLOT commands the codes for which are given in groups of eight. The codes within each group have the following effects on PLOTMATE :-

PLOT code	Function
96 - 103	Rectangle fill.
112 - 119	Parallelogram fill.
144 - 151	Circle outline.
152 - 159	Circle fill.
160 - 167	Circular arc.
168 - 175	Circular segment.
176 - 183	Circular sector.

Plot code 96 - 103      Rectangle Fill.

Consider the following solid rectangle :-



This rectangle can be plotted by use of the following commands:-

```
MOVE 100,100      :REM Bottom left corner  
PLOT 101,500,600 :REM Top right corner
```

or:-

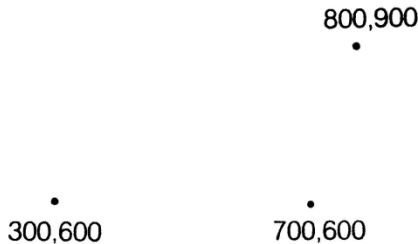
```
          100,600      :REM Top left corner  
PLOT 101,500,100    :REM Bottom right corner
```

# PLOTMATE

Plot Code 112 - 119 Parallelogram Fill.

To plot a parallelogram three corner points must be defined. The order in which these are given affects which way round the parallelogram appears. Points are taken as moving around the edge of the parallelogram in sequence, the final point being opposite the middle one defined.

Consider the three points given below :-

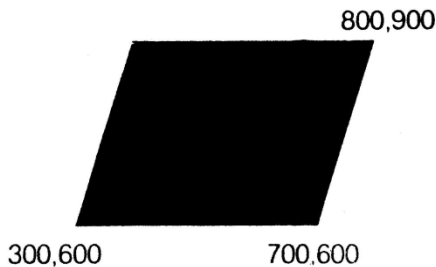


Using the following commands different parallelograms can be drawn :-

- 1) MOVE 300,600 :REM Bottom left corner  
MOVE 700,600 :REM Bottom right corner  
PLOT 117,800,900 :REM Top right corner

or:-

- MOVE 800,900 :REM Top right corner  
MOVE 700,600 :REM Bottom right corner  
PLOT 117,300,600 :REM Bottom left corner

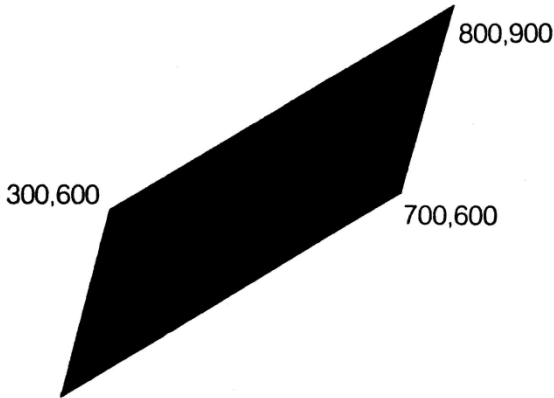


# PLOTMATE

2) MOVE 300,600 :REM Top left corner  
MOVE 800,900 :REM Top right corner  
PLOT 117,700,600 :REM Bottom right

or:-

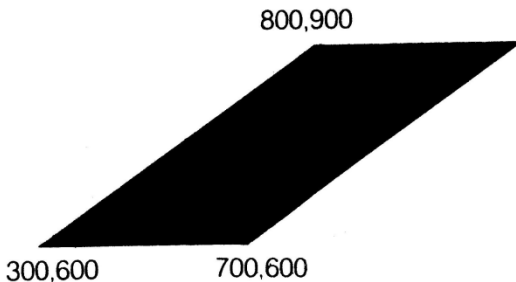
MOVE 700,600 :REM Bottom right corner  
MOVE 800,900 :REM Top right corner  
PLOT 117,300,600 :REM Top left corner



3) MOVE 700,600 :REM Top left corner  
MOVE 300,600 :REM Bottom left corner  
PLOT 117,800,900 :REM Top left corner

or:-

MOVE 800,900 :REM Top left corner  
MOVE 300,600 :REM Bottom left corner  
PLOT 117,700,600 :REM Bottom right corner





Plot Code 144 - 151      Circle Outline.

Circles can be defined by two points, its centre and a point on the X-axis which represents the radius.

To plot a circle centred at point 500,500 with a radius of 100, the following commands can be used :-

```
MOVE 500,500           :REM Circle centre  
PLOT 149,600,500       :REM X-centre + radius, Arbitrary Y co-ord
```

or:-

```
MOVE 500,500           :REM Circle centre  
PLOT 145,100,500       :REM Radius, Arbitrary Y co-ord
```

Plot Code 152 -159      Circle Fill.

Circle fills can be drawn in a similar way to circle outlines. To draw a filled circle centred at 500,500 and with a radius of 100, the following commands can be used :-

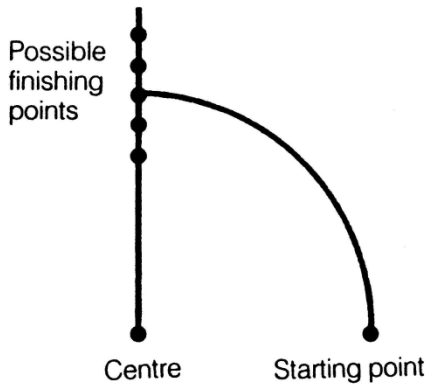
```
MOVE 500,500           :REM Circle centre  
PLOT 157,600,500       :REM X-centre + radius, Arbitrary Y co-ord
```

or:-

```
MOVE 500,500           :REM Circle centre  
PLOT 153,100,500       :REM Radius, Arbitrary Y co-ord
```

Plot Code 160 - 167      Circular Arc.

To draw a circular arc three points need to be defined. These are the centre of the circle and two points indicating the starting and finishing points of the arc. The starting point must be somewhere on the circumference, the finishing point is used just to indicate the angle of the arc.



NOTE: All arcs are drawn in an anti-clockwise direction.

The following commands will draw an arc based on a circle centre which is at 500,500 whose radius is 100. A portion of the arc from 0 to 90 degrees will be drawn :-

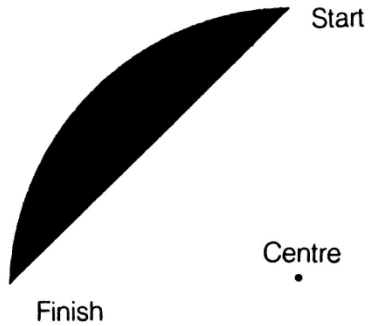
```

MOVE 500,500      :REM Circle centre
MOVE 600,500     :REM Starting point
PLOT 165,500,1000 :REM Finishing point
    
```

# PLOTMATE

Plot Code 168 - 175      Circular Segement.

Segements are defined in the same way as arcs.



The following example will draw a segement centred at 500,500 with a radius of 100 and has an arc portion between 90 to 180 degrees :-

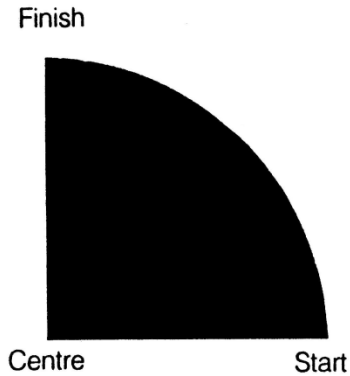
```
MOVE 500,500           :REM Circle centre  
MOVE 500,600           :REM Starting point  
PLOT 173,0,500         :REM Finishing point
```



# PLOTMATE

Plot Code 176 - 183      Circular Sector.

Sectors are defined in the same way as arcs.



The following commands will plot a 90 degree sector centred at 500,500 with a radius of 100 :-

```
MOVE 500,500           :REM Circle centre  
MOVE 600,500           :REM Starting point  
PLOT 181,500,1000      :REM Finishing point
```



## Shading

Shading patterns are made up of two sets of parallel lines that intersect each other. Line spacing can be defined using VDU 1,32+n and VDU 1,64+n commands where n lies in the range 0-31. The table below shows how n changes the spacing :-

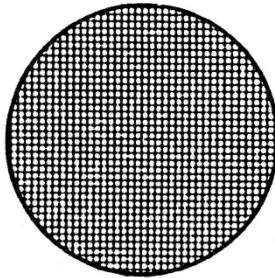
Value of n	Line spacing
0	= Solid fill .3mm spacing.
1	= $.3+(1*.3)\text{mm} = .6\text{mm}$
2	= $.3+(2*.3)\text{mm} = .9\text{mm}$
.	
.	
.	
n	= $.3+(n*.3)\text{mm}$
.	
.	
.	
31	= No fill.

## Circular shading

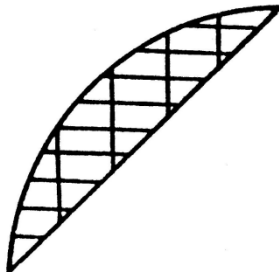
When a circle fill, circular segment or circular sector is plotted, the commands VDU 1,32+n changes the vertical line spacing and VDU 1,64+n the horizontal line spacing.

Examples :-

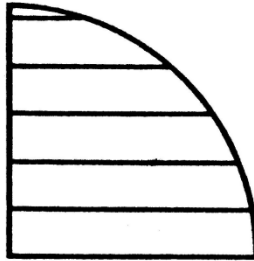
- 1) VDU 1,35 :REM Vertical line spacing = 1.2mm  
 VDU 1,67 :REM Horizontal line spacing = 1.2mm  
 MOVE 500,500 :REM Circle centre  
 PLOT 157,600,500 :REM X-centre + radius, Arbitrary Y co-ord



- 2) VDU 1,52 :REM Vertical line spacing = 6.3mm  
 VDU 1,74 :REM Horizontal line spacing = 3.3mm  
 MOVE 500,500 :REM Centre  
 MOVE 500,650 :REM Starting point  
 PLOT 173,0,500 :REM Finishing point of segment



- 3) VDU 1,63 :REM No vertical fill  
 VDU 1,82 :REM Horizontal spacing = 5.7mm  
 MOVE 500,500 :REM Centre  
 MOVE 650,500 :REM Starting point  
 PLOT 181,500,1000 :REM Finishing point of sector

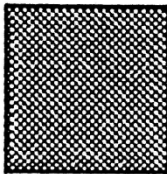


## Rectangle shading

Rectangles are filled by parallel 45 degree lines. VDU 1,32+n defines the vertical line spacing of lines sloping upwards to the right. VDU 1,64+n defines spacing of lines sloping upwards to the left.

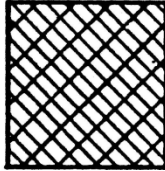
Examples :-

- 1) VDU 1,35 :REM Line spacing = 1.2mm  
 VDU 1,67 :REM Line spacing = 1.2mm  
 MOVE 500,500 :REM Bottom left corner  
 PLOT 101,600,600 :REM Top right corner of rectangle

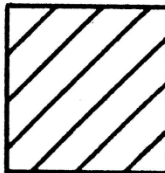


# PLOTMATE

- 2) VDU 1,46 :REM Line spacing = 4.5mm  
VDU 1,71 :REM Line spacing = 2.4mm  
MOVE 500,500 :REM Bottom left corner  
PLOT 101,600,600 :REM Top right corner of rectangle



- 3) VDU 1,50 :REM Line spacing = 5.7mm  
VDU 1,95 :REM No fill  
MOVE 500,500 :REM Bottom left corner  
PLOT 101,600,600 :REM Top right corner of rectangle

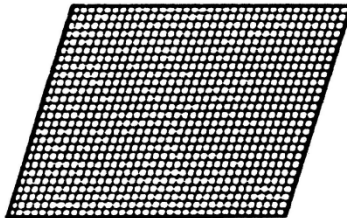


## Parallelogram shading

Parallelograms are filled by lines running parallel to the edges. The type of shading pattern depends on the way in which the parallelogram and the line spacing parameters are used. VDU 1,32+n sets the vertical spacing for lines running parallel with the edge that is defined first. VDU 1,64+n defines the vertical spacing for lines running parallel with the other edge.

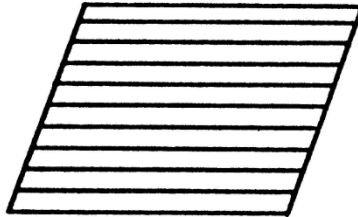
Examples :-

- |    |                  |  |
|----|------------------|--|
| 1) | VDU 1,35         | :REM Line spacing = 1.2mm              |
|    | VDU 1,67         | :REM Line spacing = 1.2mm              |
|    | MOVE 300,600     | :REM Bottom left corner                |
|    | MOVE 700,600     | :REM Bottom right corner               |
|    | PLOT 117,800,900 | :REM Top right corner of parallelogram |



# PLOTMATE

- 2) VDU 1,40 :REM Line spacing = 2.7mm  
VDU 1,95 :REM No fill  
MOVE 300,600 :REM Bottom left corner  
MOVE 700,600 :REM Bottom right corner  
PLOT 117,800,900 :REM Top right corner of parallelogram



- 3) VDU 1,40 :REM Line spacing = 2.7mm  
VDU 1,95 :REM No fill  
MOVE 800,900 :REM Top right corner  
MOVE 700,600 :REM Bottom right corner  
PLOT 117,300,600 :REM Bottom left corner of parallelogram

