

YET ANOTHER VERSION OF MINI-GD3.

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ABSTRACT

This note describes the implementation of CERN portable graphics package mini GD3 / PIGS on DEC VT125 terminals and the Versatec electrostatic plotter.

INTRODUCTION

Mini-GD3 / PIGS is a portable, general purpose graphics package written entirely in FORTRAN. It has been available in a batch-oriented version on the large IBM mainframe at CERN for several years. Thanks to the earlier effort 1 the MGD3/PIGS package is also available in an interactive version on the LINAC office computer for TEKTRONIX 4105 terminals.

The new implementation is intended to facilitate a large degree of device independence for graphics applications.

The implementation consists of three different device dependent object libraries and one common library;

VD:[7,7]MGD3.OLB for TEKTRONIX 4105 terminals,
LB:[7,11]VT125.OLB for DEC vt125 terminals and
LB:[7,11]VERSATEC.OLB for Versatec plotters.
LB:[7,11]PEP.OLB Common library with user coordinate
 spec. (CPUWIN) and character plotting
 (CPSYM) routines.

USER COORDINATE SYSTEMS.

With the Versatec plotter and mini-GD3 it is now possible to create plots with known size and aspect ratio. This is accomplished through a call to the new subroutine

CPUWIN(XMIN, XMAX, YMIN, YMAX).

XMIN leftmost user coordinate, REAL
XMAX rightmost - " - , REAL
YMIN lowermost - " - , REAL
YMAX uppermost - " - , REAL

The coordinates XMIN, XMAX etc. are all given in centimeters and must lie in the interval [0-26] cm for the X-direction and [0-18] cm for the Y-direction. This creates

SIZ is the size scale factor with size 1.0 corresponding to characters 5.0 mm high and 3.0 mm wide. After a call to CPSYM rotation, scaling and translation are unchanged.

POLYGON FILLING

This feature has been brought over to the versatec from the earlier Tektronix 4105 implementation. For details see 1. To fill a polygon bounded by vertices at (x0,y0) through (xn,yn) use the following call sequence:

```
CALL  CPCOLO(iarg)
CALL  CPPBG2(x0,y0,IBORDR)
CALL  CPDRW2(x1,y1)
CALL  CPDRW2(x2,y2)
      ...
CALL  CPDRW2(xn,yn)
CALL  CPPEND
```

THE CAPTUREFILE.

First a short description of MGD3 capture files. The capturefile consists of a number of 16 bit values called items. The three most significant bits of every item are called the item code and the remaining 13 are the item value. Item code 0 is used to indicate a special control operation. Item codes 2 through 5 are used for draw and move instructions, in this case the item value gives the coordinate (in the range 0 to 8191). Item codes 6 and 7 are unused.

If the item code is zero then the item value indicates what operation to perform:

ITEM VALUE:	OPERATION:
0	No operation (used for padding).
1	Next page (or frame, or picture).
2	Set line width, the next item contains the line width.
3	Set window, followed by 5 values: IXMIN, IXMAX, IYMIN, IYMAX, IWIDITH - Not implemented.

These are additions to the capturefile facility.

10	Specify color, nex item same as argument to CPCOLO.
11	Begin panel, followed by x and y coordinates and border argument; 1 if border of fill area is visible, 0 if it is invisible.
12	End panel.

The capturefile generation is controlled by calls to CPCAP (for details see 2), and a previously written capturefile can be read by CPREP (capturefile REPlay). Capturefiles can be generated with all three versions of

MGD3 for later replaying on any type of device supported. Note however that the panel and area filling features are not available on the VT125 terminal.

Once a capturefile has been created it can immediately be plotted on a terminal or plotter by the use of one of three programs; VTPLOT, DECPlot and TEKPlot. These programs can be found in directory [7,11]. All three programs assume that the capturefile is called PLOTFILE.DAT and is in your current directory. After the file has been plotted it is deleted. If several versions of the file PLOTFILE.DAT exists they will all be plotted and later deleted starting with the most recent.

DESCRIPTION OF CHANGED ROUTINES

The following routines have a different interpretation in this implementation than in the earlier versions of mGD3.

1. CPIN Reads one line of input on the vt125. Null function with Versatec.
2. CPCOLO(I), TVCOLO(I) These routines are used to set background colors (fill patterns) for area filling (panels). They work in a way similar to the same routines in the Tektronix implementation. Only background colours are supported. That is, the high bit of the argument should be one and the three low-order bits designate what fillpattern to use.
3. CPPBG2(X,Y,IB), CPPBG9(IX,IY,IB), TVPBG9(IX,IY,IB) Start area fill mode. the X and Y (or IX and IY) give the first point of the polygon covering the area to be filled. IB is a flag that indicates if the border of the area is visible or not (IB=zero => border invisible). Not available in the vt125 implementation.
4. CPPEND, TVPEND ends area fill mode, plotting now works as usual. Not available in the vt125 implementation.
5. CPLW(I) Sets line width or brightness to I. I is between 1 and 5 on the Versatec plotter and between 0 and 3 on the vt125. Color 0 (black) on the VT125 can be used to selectively erase previously drawn lines.

USER ROUTINES FOR COORDINATE SYSTEMS

There has been added some FORTRAN routines for coordinate systems. They may be found in the library LB:[7,11]PEP.OLB . They are

SCAXIS(X,Y,ANGLE,AXLEN,ZMIN,ZMAX,ZSTR,STRLEN)

Draws scaled axis with step in [1,2,4,5,8,10,20]. User window should be saved before the call and restored after the use of the axis.

X, Y Position for axis, REAL
 ANGLE Direction of axis (deg.) (horizontal=0.,
 vertical=90.), REAL
 AXLEN Length of axis (cm), REAL
 ZMIN Min. value for axis, REAL
 ZMAX Max. value for axis, REAL
 ZSTR Units for axis, CHARACTER
 STRLEN Length of ZSTR, > 0 for text above axis
 else < 0., INTEGER

AXIS(X,Y,ANGLE,AXLEN,ZMIN,ZMAX,ZSTR,STRLEN)

Draws scaled axis. User window should be saved before calling and restored when finished. Parameters as before.

HEADNG(STR,LEN)

Draws heading for coordinate system. Should be called before call to AXIS, SCAXIS or FRAME.

STR String, CHARACTER
 LEN Length of STR, INTEGER

FRAME(X,Y,XAXIS,XMIN,XMAX,XSTR,XLEN,
YAXIS,YMIN,YMAX,YSTR,YLEN)

Draws a rectangular coordinate system. User window should be saved before calling and restored when finished.

X,Y Position for coordinate system, REAL
 XAXIS Length of x-axis (cm), REAL
 XMIN Min. value for x-axis, REAL
 XMAX Max. value for x-axis, REAL
 XSTR Units for x-axis, CHARACTER
 XLEN Length of XSTR, INTEGER
 YAXIS Length of y-axis (cm), REAL
 YMIN Min. value for y-axis, REAL
 YMAX Max. value for y-axis, REAL
 YSTR Units for y-axis, CHARACTER
 YLEN Length of YSTR, INTEGER

FRAME1(XMIN,XMAX,XSTR,XLEN,YMIN,YMAX,YSTR,YLEN,HEADNG,LEN)

Draw one frame in one plot. User window should be saved before calling and restored when finished.

XMIN	Min. value for x-axis, REAL
XMAX	Max. value for x-axis, REAL
XSTR	Units for x-axis, CHARACTER
XLEN	Length of XSTR, INTEGER
YMIN	Min. value for y-axis, REAL
YMAX	Max. value for y-axis, REAL
YSTR	Units for y-axis, CHARACTER
YLEN	Length of YSTR, INTEGER
HEADNG	Headng for frame, CHARACTER
LEN	Length of HEADNG, INTEGER

FRAME2(XMIN,XMAX,XSTR,XLEN,
YMIN,YMAX,YSTR,YLEN,HEADNG,LEN,FRAME)

Draw two frames in one plot. User window should be saved before call for first frame and restored when that frame is finished. The second frame may then be used in the same manner.

XMIN	Min. value for x-axis, REAL
XMAX	Max. value for x-axis, REAL
XSTR	Units for x-axis, CHARACTER
XLEN	Length of XSTR, INTEGER
YMIN	Min. value for y-axis, REAL
YMAX	Max. value for y-axis, REAL
YSTR	Units for y-axis, CHARACTER
YLEN	Length of YSTR, INTEGER
HEADNG	Headng for frame, CHARACTER
LEN	Length of HEADNG, INTEGER
FRAME	Frame nb 1 or 2, INTEGER

POST SCRIPTUM

This paragraph describes some incompatibilities with earlier versions of GD3.

The inclusion of area fill in the versatec library made it necessary to add the following common area to that library:

```
COMMON /CPCPF/IFILL,XC(100),YC(100),IBORDR
```

Where IFILL is a counter of vertices in the fill area border encountered (IFILL = 0 means area filling off), XC and YC are arrays holding the coordinates of the polygon bounding the fill area and IBORDR is a flag indicating if the border of the fill area is visible (IBORDR = 0 means the border is invisible).

There is a new subroutine called CPPSTR that is only for internal use by MGD3.

The following routines are not supported in the new implementation.

1. CPVCUR
2. CPSCUR

REFERENCES

1. PS/LI/Note 85-5 U. Raich
2. DD Writeup, MGD3 documentation
3. User Guide VT125, EK-VT125-UG-001

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