Screen driver documentation

Internals of the screendrivers

This informations shown here i have found threw looking into the GEM/3 screen driver sources and GDOS sources and looking into the binaries of the drivers. So i take no responsiblity that the informations i show here are right.

In GEM 1.2 the screendrivers was named in the following method

```
IBMCHMP3
|     |
|     +-----Version number (P3)
+-----------Name of driver
```

In GEM 2.2 the started a simple system for the names of the drivers.

Extension	Driver type
SD	Screen Driver
PD	Printer Driver
MD	Metafile Driver
UD	Screen Driver (Viewmax)
CD	Camera Driver
ID	Scanner Driver
VD	Plotter Driver

Drivers which are not from DRI don't take care of this nameing convention.
After SD there comes the name of the driver which is 3 chars long
which is followed by a number that seems to be a version number
For example

```
SDPSC8.VGA
| |  |
| |  +-----Version number
| +--------Name of driver (3 chars long)
+----------Extension (SD for screen driver)
```

System	Version number
GEM 1.2	P3
GEM 2.2	7
GEM/3	8 and 9
GEM/4	10
GEM/5	11
Viewmax I	9
Viewmax II	9

The extension EGA,VGA or CGA which was used in GEM/3,GEM/4 seems to be used to identify which fonts to load.The fonts which have the same extension as the driver are used. The GEM/5 screen driver has .BS as extension. In GEM/5 there are also fonts which have this extension. I am not sure if they are used.

The GEM/3 drivers with version number 9 are not the same as the Viewmax drivers.
Drivers with version number 10,11 have bezier support integrated.

In all drivers from GEM 1.2,GEM 2.2,GEM/3,GEM/4,GEM/5,Viewmax you find a patch area

```
db      "zyxg"          ; Patch string
db      0FFh            ; 0FF = No Port
                                        ; 0 = Com1 (3F8h)
                                        ; 1 = Com2
db      2             ;   0 = None (Keyboard)
                                        ;   1 = Mouse systems
                                        ;   2 = Microsoft bus mouse (Mouse.com)
                                        ;   3 = Microsoft RS232 Mouse
                                        ;   4 = MM1201 SummaSketch Stylus
                                        ;   5 = MM1201 SummaSketch Cursor
                                        ;   6 = MM961  SummaSketch Stylus
                                        ;   7 = MM961  SummaSketch Cursor
                                        ;   8 = MM1812 SummaSketch Stylus
                                        ;   9 = MM1812 SummaSketch Cursor
                                        ;  10 = PS/2 Mouse
```

The following info strings exists only in drivers with a version number 8 and up

```
db      ???           ; Short name of driver ( 13 Bytes )
db      ???           ; Long description ( 81 Bytes )
```

**The position of the patch area in in every driver at a other position to find
it it is the easiest way to search the file for the zyxg string.**

The informations string you find in the source of the drivers in files called names.??? the extension is always different and is when compiling renamed to .inc.
The patch area you find in the file zyxg.a86 which includes the file names.inc when compiling.

Port 0FFh and Mousetype 2 are the defaults when compiling a screendriver.

Changing the resoultion of a screen driver

If you want to change the resoultion of a screen driver always remeber that
if you not want to make big changes (reprogramming big parts) the following things must be made.

The size of the Bitmap can't be bigger than 65535 (64Kb) Max. Res:(800x600)
You can only use Monochrom or a maximum of 16 Colors

If you want to use a other mode you have to change the init routine.
Which you find in the main file. After this you have to set the new Sizes in the Externs.a86 file. There you have to change the following lines

```
xresmx         equ     639
yresmx         equ     479
plane_size      equ     38400
bytes_line      equ     80
```

xresmx is the maximum x resolution - 1
yresmx is the maximum y resolution - 1
bytes per line is the maximum x resolution div 8 (640/8=80)

plane_size is the size of a single graphics plane which you can calculate
with this formula.
Size=(MX/8)*MY
Size is the size of a plane
MX is the Maximum X resolution (example 640)
MY is the Maximum Y resolution (example 480)
For example: 38400=(640/8)*480

This table is only correct when using with the original GEM/3 screendriver sources.

Driver	Main File	Externs.a86	Names.Inc
VGA 16 Colors	VERTICMF.A86	EXTERNS.VRF	NAMES.VRF
VGA 2 Colors	VERTICOM.A86	EXTERNS.VRT	NAMES.VRT
ATT	DEVDEB.DEB	EXTERNS.DEB	NAMES.DEB
EGA HiRes 16 colors	IBMEGAHC.A86	EXTERNS.EHC	NAMES.EHC
EGA LoRes 16 colors	IBMEGALC.A86	EXTERNS.ELF	NAMES.ELF
EGA 2 colors	IBMEGAHM.A86	EXTERNS.EH1	NAMES.EH1
EGA Monochrom	EGAMONHI.A86	EXTERNS.EGA	NAMES.EGA
GENIUS	GENIUS.A86	EXTERNS.GEN	NAMES.GEN
HERCULES	HERCSPPC.A86	EXTERNS.HRC	NAMES.HRC
CGA	IBMBLMPC.A86	EXTERNS.IBM	NAMES.IBM

Advanced programming infos

The routine to calculate the memory adress of a X,Y position you find in the
main file it is called CONCAT.
In file IBMMDVSP.A86 you find the routine to clear the screen.
In file MONOBJ.C and MONOUT.C you find the C routines which call the ASM drawing
routines.(MONOBJ.C and MONOUT.C are used in every driver!)
Monodrivers use the drawing routines in the files
MONMMRE1.A86,MONMMRE2.A86,OPTDRAW.A86,OPTTXT1.A86,OPTTXT2.A86
Colordrivers use the drawing routines in the files
EGAMMRE1.A86,EGAMMRE2.A86,EOPTDRAW.A86,EOPTTXT1.A86,EOPTTXT2.A86

Mousedrivers inside the screen drivers

The mouse drivers you find in file IMOUSE.A86 which is when compiling the screendrivers
included into every driver.

The screendriver needs 3 functions for every mouse or sketch tablett.
Initialize mouse
Deinitialize mouse
Return mouse status/coordinates
There are three tables which are used to call for every mouse type the right routine

For initialize mouse
tab_init

For tabdeinitialie mouse
tab_deinit

For mouse status
tab_status

If you want to write a new Mouse driver you simple must add your functions in this tables
or overwrite one of the old ones. There seems to be no limitation to the number of drivers.

Bezier Curves

Function calls for Bezier Curves

WORD v_bez_on(handle);
Turns Bezier curves On
Calls Function 11 (GDP) with ID=13

WORD v_bez_off(handle);
Turns Bezier curves Off
Calls Function 11 (GDP) with ID=13

WORD v_bez_qual(handle, prcnt);
Calls Function 5 Escape Code 99 subopcode 32

MLOCAL VOID v_bezier_all(opcode, handle, count, xyarr, bezarr, minmax, npts, nmove);
Is called from v_bez and v_bezfill
Calls function (opcode) with contl[5]=13

VOID v_bez(handle, count, xyarr, bezarr, minmax, npts, nmove);
Calls v_bezier_all with opcode 6 (v_pline)

VOID v_bezfill(handle, count, xyarr, bezarr, minmax, npts, nmove);
Calls v_bezier_all with opcode 9 (v_fillarea)

Function 11 with ID=12 means non filled bezier

Function 11 with ID=11 (This call is not documented in the documentation i have)
is called from this function
VOID v_etext(handle, x, y, string, offsets)

Description strings inside of the screendrivers

You can read out this strings with the call
VOID v_get_driver_info(device_id, info_select, info_string)
info_select = *1 : get full driver filename*
2 : get short device name
3 : get long device name
4 : get font path string
5 : get driver patch byte(s)

This call is existing in my GEM PTK 3.1 Turbo C bindings but is missing
in the version of Pacific C bindings i own.
In the Drivers with version 10 there are in the description strings spaces before
the text instead of this spaces i have made _ in this info.

Also the description strings inside the Viewmax I and II drivers are different
and sometimes wrong.
The Hercules driver UDHRC9.EGA from ViewMax II shows VGA 16 HIRES as description.

Filename	Short description	Long description
SDCJB25.VGA	CJB vga 16c	Christopher John Barnes s 1999 16 Colour Adaptor
SDPSC8.VGA	SVGA 16 CLR	SVGA 16 Color 800x600
SDPSC8.VGA	VERT 16 CLR	Verticom 16 Color Adaptor
SDPSC8.VGA	VGA colour	

This text was originally created by Heinz Rath, and was located on his website http://www.geocities.com/heinz_rath. This version of the document was packaged by Shane M. Coughlan for the OpenGEM SDK.