Interrupts used by Intel GEM

GEM consists of two modules which provide services:

- The VDI loads first. It handles the loading of drivers and provides device independence. Immediately it is loaded, it runs a program (usually GEM.EXE, the AES) and its functions remain available only as long as the program it has loaded is running.
- The AES can only be loaded if the VDI is present, and is normally loaded directly by the VDI. It handles higher "windowing" functions.

It is entirely possible to have the VDI loaded without the AES (for example, by typing `GEMVDI /COMMAND.COM`). This is not possible in ViewMAX.

GEM/1 and GEM/2 hook three interrupts. GEM/3 and ViewMAX hook two...

INT 24h
> The critical error handler. This is hooked by the AES, which offers the choices "Retry" or "Cancel". "Retry" returns as normal, while "Cancel" pops the stack and returns to the application which made the INT 21h call with the Carry flag set and AX=40h+critical error code (see the Interrupt List, table 1798). GEM/2 only supports the DOS 2.x critical error numbers.

INT E0h
> Calls with CL=73h are intercepted by the GEM/1 and GEM/2 VDIs, emulating the [GSX-86](#) graphics system.
>
> If CH is not 4, the call returns immediately. Otherwise, the call goes to the VDI with DS:DX pointing to the parameter block.
>
> The ViewMAX and GEM/3 VDIs do not hook this interrupt.

INT EFh

```
    For calls to the AES:
        DX=0;
        ES:BX -> AES parameter block;
        CX=00C8h or 00C9h.
    For calls to the VDI:
        DS:DX -> VDI parameter block;
        CX=0473h (ignored by the VDI, but used to get the call past the
AES).
```

> If the AES is not loaded, all calls go to the VDI, which ignores CX. The installation check below should be used to find whether the AES or VDI are present.

Formats of the parameter blocks

AES parameter block

```
    DD      control ;Control array. 5 words.
    DD      global  ;Global variables. 15 words.
    DD      int_in  ;Integer parameters
    DD      int_out ;Integer results
```

```
        DD      addr_in ;Address (DWORD) parameters
        DD      addr_out;Address (DWORD) results
```

control is five words in size:

```
        DW      function        ;AES function number, 10-132
        DW      no. of words in int_in
        DW      no. of words available in int_out
        DW      no. of words in addr_in
        DW      no. of words available in addr_out
```

VDI parameter block

```
        DD      contrl  ;Control array. 11 words.
        DD      intin   ;Integer parameters
        DD      ptsin   ;(x,y) pair parameters
        DD      intout  ;Integer results
        DD      ptsout  ;(x,y) pair results
```

contrl is 11 words:

```
        DW      function        ;VDI function number, 1-132
        DW      [in]  no. of words in ptsin
        DW      [out] no. of words in ptsout
        DW      [in]  no. of words in intin
        DW      [out] no. of words in intout
        DW      subfunction
        DW      graphics handle
        DD      [in]  pointer parameter
        DD      [out] pointer return
```

Installation check

Two bytes after the INT EFh entry point, one of the following ASCII sequences should appear:

"GEMVDI"
    The GEM VDI (only) is present.
"GEMAES"
    The GEM AES and VDI, or the ViewMAX AES and VDI, are present.
"ViewMAX"
    The ViewMAX VDI (only) is present.

Either sequence is followed by a zero-terminated ASCII number. Known combinations are:

"GEMAES10"
    GEM/1 AES
"GEMAES20"
    GEM/2, GEM/3, ViewMAX AES; GROWBOX.ACC
"GEMAES400"
    GEM/4 AES
"GEMVDI10"
    GEM/1 VDI
"GEMVDI20"
    GEM/2 VDI
"GEMVDI23"
    GEM/3 VDI

"GEMVDI32 31-Mar-89"
     GEM/4 VDI
"ViewMAX1"
     ViewMAX/1 and ViewMAX/2 VDIs

This text was originally created by John Elliott, and was located on his website www.seasip.info. This version of the document was packaged by Shane M. Coughlan for the OpenGEM SDK.