Matrox Simple Interface for Windows95

Specification

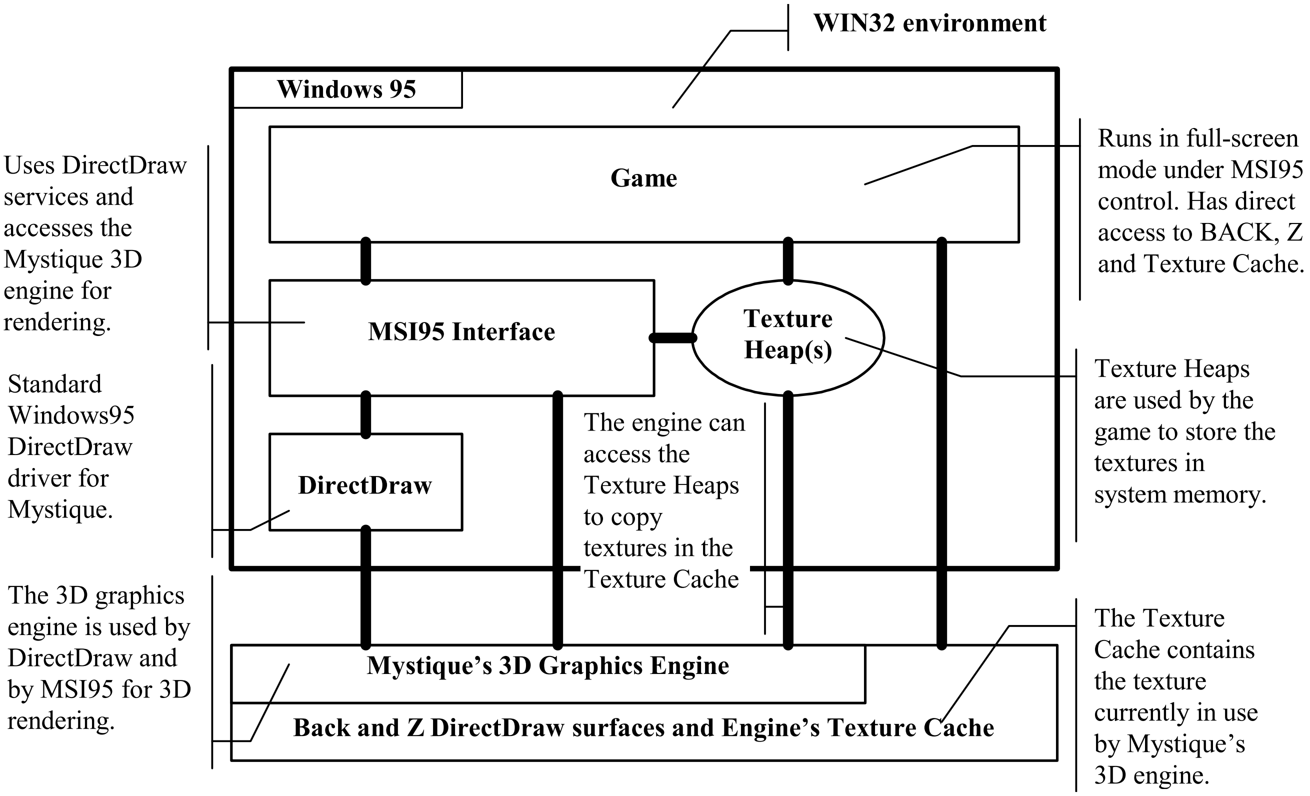
POWERED BY
MGA™
64-BIT GRAPHICS

Version 1.72

Last Updated: September 10, 1997

INDEX

The overall architecture


WIN32 environment
Windows 95
Game
Runs in full-screen mode under MSI95 control. Has direct access to BACK, Z and Texture Cache.
Uses DirectDraw services and accesses the Mystique 3D engine for rendering.
MSI95 Interface
Texture Heap(s)
Texture Heaps are used by the game to store the textures in system memory.
Standard Windows95 DirectDraw driver for Mystique.
DirectDraw
The engine can access the Texture Heaps to copy textures in the Texture Cache
The 3D graphics engine is used by DirectDraw and by MSI95 for 3D rendering.
Mystique's 3D Graphics Engine
Back and Z DirectDraw surfaces and Engine's Texture Cache
The Texture Cache contains the texture currently in use by Mystique's 3D engine.

The game has access to a set of functions to initialize, clean-up, mark the begin and end of a frame, render textured triangles, draw lines, do BitBlts, create and manage textures.

The Matrox Simple Interface for Windows 95 accesses the Mystique 3D engine directly and uses DirectDraw to manage the rendering surfaces. The game relies on MSI95 for surface management and accelerated rendering. The game is provided with direct frame buffer accesses to the BACK, Z and Texture Cache memory to perform dumb frame buffer rendering and texture management. A powerful texture management architecture is provided, giving the flexibility to manage directly the engine's texture cache, to create texture heaps from which the engine updates the texture cache and even to have texture stored anywhere in system memory.

The operating environment

The game must be compiled with Microsoft Visual C 5.0 for the WIN32 environment on the Windows 95 operating system. The game links with the MSI95 import library that loads and links the game with the MSI95 executable DLL.

Updated Mystique Windows95 drivers that implement DirectDraw 2.0 are required to run MSI95. DirectDraw 3.0 and more recent is required on the machine executing the application.

Supported and tested graphic modes:

Screen Resolution	**Other Capabilities**	**Used Video Memory**
512x384x16bits	Z / No Z	~1.2 M / ~0.8 M
640x400x16bits	Z / No Z	~1.5 M / ~1.0 M
640x480x16bits	Z / No Z	~ 1.8 M / ~1.2 M

MSI95 API function list

Initialize and Exit functions

```
T_msiInfo* msiInit  (     LONG Width,
                          LONG Height,
                          LONG Planes,
                          BOOL ZBuffer,
                          BOOL Debug,
                          WNDPROC lpWindowProc  )
```

This entry point will initialize the Matrox Simple Interface library and the Mystique 3D engine to the specified full screen resolution and pixel depth. The allocation of a Z buffer is optional for games that pre-sort the triangles. A BACK buffer is always allocated as the rendering always occurs in the back buffer. Optional debug information may be written to the file msidebug.log in the current directory. The full screen DirectDraw window is allocated by MSI95. The game specifies the window procedure that will process window's messages or set it to NULL if the default window procedure is to be used.

Returns a pointer to a T_msiInfo structure that gives some useful information for the dumb frame buffer renderer (pointers to the back and z buffers and texture cache). The pointers of T_msiInfo are valid for direct accesses only between the calls to msiSetParameters(NULL) and msiSetParameters(-1 or a valid pointer). Initially the pointers are set to NULL. The MSI95 library will update the T_msiInfo structure every time the msiSetParameters(NULL) function is called and reset the pointers to NULL every time the msiSetParameters(-1 or a valid pointer) function is called (**do not cache these pointers)**.

Returns a NULL pointer if an error occurred. Possible causes are: Specified full screen mode not supported by DirectDraw, Not enough memory on display adapter. Check the msidebug.log file for more information about the problems.

Note: The handle of the full screen window is not returned in T_msiInfo. The game will receive the window handle when the window procedure is called.

Returns TRUE if successful.

```
BOOL msiExit()
```

This entry point is used to clean-up and get back to normal GUI mode.

Returns TRUE if successful.

Start and End Frame functions

```
BOOL msiStartFrame  (    BOOL ClearRGB,
                         float r,
                         float g,
                         float b,
                         BOOL ClearZ,
                         float z        )
```

This entry point is used to mark the beginning of a frame. Optional color and depth may be specified to clear the color and Z buffers. If ClearRGB is set to FALSE, no clear is performed on the color buffer. If ClearZ is set to FALSE, no clear is performed on the Z buffer.

Note: Dithering is NOT performed on RGB clear. This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Returns TRUE if successful.

```
  BOOL  msiEndFrame   (   BOOL Dump,
                          LONG Frame,
                          BOOL Wait      )
```

This entry point is used to mark the end of a frame. The BACK buffer is swapped/flipped to the FRONT buffer. Optionally the frame can be written to a file named frameXXX.bmp in the current pixel format (XXX is replaced with the value of the parameter **Frame**).

When this entry point is called, the graphics engine may not be ready to swap/flip the buffers because it is still processing the current frame. If **Wait** is set to TRUE, the game blocks and waits until the processing of the current frame is completed. If **Wait** is set to FALSE and the graphics engine is still processing the current frame, MSI95 will postpone the completion of this command to the next call to msiStartFrame or msiSetParameters(NULL) or msiEndFrame(*, *, TRUE).

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Returns TRUE if successful.

Clearing functions

```
BOOL msiClearZ( float z )
```

This entry point clears the Z buffer. Valid values are from 0.0 to 1.0.

Returns TRUE if successful.

```
 BOOL msiClearFront  (  float r,
                        float g,
                        float b   )
```

This entry point clears the Front buffer. Valid rgb values are from 0.0 to 255.0.

Returns TRUE if successful.

```
 BOOL msiClearBack   (  float r,
                        float g,
                        float b   )
```

This entry point clears the Back buffer. Valid rgb values are from 0.0 to 255.0.

Returns TRUE if successful.

Memory related functions

```
LPBYTE msiAllocTextureHeap    (    LONG Pages     )
```

Allocate a texture heap of **Pages** 4K pages. A heap can contain any number of textures and is managed by the game. A heap is specified to MSI95 by its base address.

Note: The heap size is limited to 1008 pages. (almost 4 MB of memory).

Returns Valid texture heap if successful
Returns NULL if an error occurred.

```
  BOOL msiFreeTextureHeap     (    LPBYTE TextureHeap  )
```

Free a previously allocated texture heap. The texture heap content is lost after this operation. The parameter pTextureHeap is the value returned by msiAllocTextureHeap.

Returns TRUE if successful.

```
  BOOL msiIsMemoryBusy   (  T_msiMemoryStatus *pMemStatus  )
```

Note: This is used with functions which have T_msiMemoryStatus as a parameter.

Returns TRUE if memory area has not been processed.

Rendering functions

```
BOOL msiRenderTriangle (      T_msiVertex* pV0,
                              T_msiVertex* pV1,
                              T_msiVertex* pV2,
                              BYTE Opacity       )
```

This entry point is used to render a triangle according to the actual rendering parameters. This function supports gouraud and textured 3D triangles with many texturing options like decal, modulate, transparency, etc ... This function receives 3 pointers to the triangle vertices. All the information required by the actual rendering parameters must be set to appropriate values.

Each vertex contains:

x, y Viewport coordinates. (0,0) is the top-left of the viewport

z Depth coordinate. This value range from 0.0 to 1.0

invW Inverse homogeneous clip coordinate used for perspective correction. Must be > 0 and < 32768. This value should be set to 1.0 for linear interpolation of the texture coordinates.

r, g, b Surface color. These values range from 0.0 to 255.0

mr, mg, mb Texture modulation factor. These values range from 0.0 to 255.0

u, v Texture coordinates. These values should be in the range 0.0 to 1.0 when the clamp_u, clamp_v texturing parameters are set to TRUE. In other cases these values are not restricted to this range and the texture coordinates wrap around based on the fractional part. The restriction on u,v is then -32768 < u/w, v/w < 32768.

The triangle passed to this function must be clipped to the viewport as no 3D clipping will be performed by this function. An opacity factor for the triangle, ranging from 0% to 100%, may be specified on a triangle basis. This factor is used to perform screen door transparency while rendering the triangle. The value 0 means fully transparent, while the value 100 means fully opaque.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL msiRenderZPlane   (    T_msiZPlane*   pZPlane,
                            BYTE           Opacity   )
```

This entry point is used to render a plane of constant Z according to the actual rendering parameters. This function supports flat and textured rendering with many texturing options like decal, modulate, transparency, etc. ... This function receives the Z plane top-left coordinates along with the screen and texture extents. All the information required by the actual rendering parameters must be set to appropriate values.

A Z plane specification contains:

x, y To-Left viewport coordinates; (0,0) is the top-left of the viewport

xWidth, yHeight Viewport extents of the Z plane; x + xWidth and y + yHeight must give valid viewport coordinates.

z Depth coordinate. This value range from 0.0 to 1.0

r, g, b Surface color. These values range from 0.0 to 255.0

mr, mg, mb Texture modulation factor. These values range from 0.0 to 255.0

u, v Top-Left texture coordinates. **As opposed to the msiRenderTriangle,** these values should be in the range [0 to texture width-1] and [0 to texture height-1]; the clamp_u, clamp_v texturing parameters are implicitly considered as being set to TRUE.

uWidth, vHeight Texture extents of the Z plane; u + uWidth and v + vHeight must give valid texture coordinates.

The Z plane passed to this function must be clipped to the viewport as no 3D clipping will be performed by this function. An opacity factor for the Z plane, ranging from 0% to 100%, may be specified. This factor is used to perform screen door transparency while rendering the Z plane. The value 0 means fully transparent, while the value 100 means fully opaque.

This entry point will be highly optimized for this very specific case:

- The texture is in the current frame buffer format (T_msiInfo.msiColor)

    - xWidth **==** uWidth **and** yHeight **==** vHeight

- T_msiParameters.msiTexture.Enable	= TRUE
- T_msiParameters.msiTexture.Modulate	= FALSE
- T_msiParameters.msiTexture.Decal	= FALSE
- T_msiParameters.msiTexture.Clamp_u	= TRUE
- T_msiParameters.msiTexture.Clamp_v	= TRUE
- T_msiParameters.msiDepth.Enable	= FALSE
- T_msiParameters.msiColor.Dither	= FALSE

In this very specific case msiRenderZPlane is equivalent to a simple bitblit with color keying ...

Note: The **x, y, u, v, xWidth, yHeight, uWidth and vHeight** values are INTEGER as opposed to the msiRenderTriangle entry point where only floating point values are used.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL msiBlitRect (    LPBYTE              Pheap,
                      LPBYTE              Pmemory,
                      T_msiMemoryStatus        *pMemStatus,
                      WORD                SourcePitch,
                      WORD                SourcePlanes,
                      WORD                BlitWidth,
                      WORD                BlitHeight,
                      DWORD               DestinationOff,
                      DWORD               KeyingColor,
                      DWORD               KeyingMask      )
```

:: IMPORTANT :: IMPORTANT :: IMPORTANT ::

The blit function only works in 16bits, only supports a destination of pitch 640, and only draws to the drawbuffer at the current time.

This entry point is used to blit a rectangle to any plane using the parameters specified in the function. This function supports transparent blits and blits to the Z, Draw, Display and Offscreen buffers. This function receives a pointer to a heap and a pointer to memory inside the heap. It ***will blit from heap memory only***. You should not reuse this memory until you know that the blit was done. KeyingColor and KeyingMask determine if there is any transparency, if you want no transparency use KeyingColor=0xFFFF and KeyingMask=0x0000. The function returns TRUE if the command is accepted, FALSE otherwise.

The parameters are explained here:

Pheap Pointer to a valid texture heap.

Pmemory Pointer to a valid area inside the texture heap pointed by Pheap.

PMemStatus Pointer to a T_msiMemoryStatus structure that will be filled by msiBlitRect. This is then used internally by msiIsMemoryBusy to check if the blit has been executed.

SourcePitch Pitch of the source rectangle in bytes. **Must be DWORD aligned**.

SourcePlanes Number of planes of source bitmap 4/8/15/16/32

BlitWidth Width of source rectangle

BlitHeight Height of source rectangle

DesitnationOff Offset in **bytes** in the destination window. The **2 MSB**'s decide the destination window in this manner:

00	**Draw Window**
01	**Display Window**
10	**Offscreen Window**
11	**Z Window**

KeyingColor Transparency color key

KeyingMask Transparency color mask

Note: Source rectangle pixels have to be in the format of the destination window’s pixels

Note: For the Offscreen buffer, everything is stored linearly.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL   msiDrawSingleLine (    DWORD color,
                              DWORD XYStart,
                              DWORD XYEnd,
                              DWORD LineStyle  )
```

This entry point is used to draw a single line.

XYStart and XYEnd can be easily programmed by using the following define:

#define PT(x , y)   ((((y) & 0xFFFF) << 16) | ((x) & 0xFFFF))

The parameters are explained here:

color Color to use for the lines. This must be formatted in the current pixel format.

XYStart The x,y value of the first point; using the **#define pt(x,y)** given above.

XYEnd The x,y value of the second point; using the **#define pt(x,y)** given above.

LineStyle Contains a 32 bit pattern to use while drawing the lines.
A ‘0’ means no write, a ‘1’ means write.

A linestyle of 0x00000000 is a solid linestyle as fully transparent lines are not very useful.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

msiSetParameters General State change function

```
BOOL msiSetParameters    ( T_msiParameters* pParameters )
```

This entry point is used to set the rendering parameters for texturing, z and color processing.

Note: Before doing any dumb frame buffer rendering, call this entry point with a NULL pointer. This way the MSI library can setup the device for direct frame buffer accesses. To quit the direct access mode, this entry point must be called with -1 or a valid pointer.

Note: When requesting the direct access mode, the game blocks waiting for the graphics engine to finish pending rendering. ***This may slow down the game if not used properly***.

Note: This function **must** be called inside a Start/End Frame pair when doing anything else than dumb frame buffer rendering.

TEXTURE PARAMETERS

Enable Enable texturing. If this value is set to TRUE then the invW, u and v values of the vertex must be valid, otherwise they are ignored.

Width, Height Dimensions of the texture. These values must be power of 2 values. The Width also specifies the pixel pitch of the texture image.

Planes Specifies the bit per texel. For PseudoColor textures this value can be 4 or 8; for TrueColor textures it can be 15 or 16. PseudoColor textures contain an index to a true color palette in 5:6:5 RGB format.TrueColor textures of 15 bit contains colors in the 1:5:5:5 ARGB format and textures of 16 bits contain colors in the 5:6:5 RGB format.

pMem This value is a pointer to the texture image formatted according to the previous Width, Height and Planes values. The texture image can be located in a texture heap or in normal system memory. If the texture is already in the texture cache, this parameter must be set to NULL and CacheOffset is used to reference the texture.

pHeap This value is a pointer to a previously allocated texture heap where the texture referenced by pMem can be found. The value NULL means that the texture is not allocated in a texture heap.

CacheOffset This value is an offset in the texture cache memory where the texture can be found or where the texture referenced by pMem must be copied.
The 5 LSB’s must be 0

Clamp_u
Clamp_v Indicates that the u and v texel coordinates must be clamped to the texture dimensions. Otherwise they wrap around on the texture boundaries.

Modulate Indicates that the texel color must be modulated with the surface modulation factors. The mr, mg and mb values of the vertex must be valid.

Decal Indicates that the texel color must be blended with the surface color. The blending is implemented as a transparency test. For PseudoColor textures the color keying gives the blending info. For TrueColor textures in the 1555 ARGB format, the alpha keying is used. For TrueColor textures in the 565 RGB format, the color keying is used. The r, g and b values of the vertex must be valid.

Note: If both Decal and Modulation are set to TRUE, then the rendering is performed in two passes. (**This is a slow process)**

Transparency Indicates that texture transparency is to be performed. Texture transparency is controlled by the color keying. Pixels covered by transparent texture areas are not written to the frame buffer.

KeyingColor Specifies the color key and the associated mask. The
KeyingColorMask texture is defined as transparent if the following equation is TRUE

texel & KeyingColorMask == KeyingColor

Note: The color key is specified in the texture format (4, 8 15 or 16 bit planes).

KeyingAlpha Specifies the alpha key and the associated mask. The
KeyingAlphaMask texture is defined as transparent if the following equation is TRUE

texel bit 15 & KeyingAlphaMask == KeyingAlpha

Note: The alpha key is 1 bit and is used for 15 bit TrueColor textures only.

TEXTURE LUT PARAMETERS

pMem For PseudoColor textures, this value references the lookup table for texel indices. The lookup table contains 16 bit colors in the 5:6:5 RGB format. For 4 bit PseudoColor textures, this pointer references an array of 16 colors; for 8 bit PseudoColor textures, the array is of 256 colors. The LUT can be located in a texture heap or in normal system memory. If the LUT is in the texture cache, this parameter must be set to NULL and CacheOffset is used to reference the LUT.

pHeap This value is a pointer to a previously allocated texture heap where the LUT referenced by pMem can be found. The value NULL means that the LUT is not allocated in a texture heap.

CacheOffset This value is an offset in the texture cache memory where the LUT can be found or where the LUT referenced by pMem must be copied.
The 5 LSB's must be 0

DEPTH PARAMETERS

Enable Enable the depth processing (compare and update)

Compare Define the z compare to use. msiCMP_*

Protect Specifies that Z buffer update must not be performed.

COLOR PARAMETERS

Dither Indicate that dithering must be performed.

Protect Specifies that color buffer update must not be performed.

Note: msiSetParameters has been optimized so that if you reload a CLUT with the same CacheOffset, it will not reload the CLUT. Furthermore, if you alternate between the same CLUT4 and CLUT8, only the first 16 entries of the CLUT will be reloaded.

Returns TRUE if successful.

Texture State change functions

```
BOOL msiSetTextureCLUT4(      DWORD Offset,
                              DWORD Index   )
```

This entry point is used to change the CLUT4 index and/or load the CLUT4 in this index. You can call this function to change a CLUT4 without calling msiSetParameters.

The Mystique Graphics Engine can have up to 16 cached CLUT4 entries.

Passing a value higher than 0x80000000 as the Offset will tell the Graphics Engine that it must now use the cached CLUT at index: Index.

The parameters are explained here:

Offset Offset inside the Mystique's texture memory to the CLUT4 to load.
The 5 LSB's must be 0

Index 0-15 indicate which cached entry is being used in the 16 CLUT4 spaces.

Examples:

msiSetCLUT4(512, 0) will load the CLUT4 at offset 512 in the Mystique's memory
into CLUT4 index 0. And set the used CLUT4 to index 0.

msiSetCLUT4(1024, 1)will load the CLUT4 at offset 1024 in the Mystique's memory
into CLUT4 index 1. And set the used CLUT4 to index 0.

msiSetCLUT4(0xFFFFFFFF, 0)will set the used CLUT4 to be the one at index 0

msiSetCLUT4(0xFFFFFFFF, 1)will set the used CLUT4 to be the one at index 1

Note: **msiSetParameters has been optimized so that if you reload a CLUT with the same CacheOffset, it will not reload the CLUT. msiSetTextureCLUT4 is not optimized in this way. However when you load a CLUT to position 0, this new CLUT4's offset will be cached for msiSetParameters.**

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL msiSetTextureCLUT8 ( DWORD Offset )
```

This entry point is used to change the CLUT8. You can call this function to change a CLUT8 without calling msiSetParameters.

The Mystique Graphics Engine can have 1 cached CLUT8 entry.

The parameters are explained here:

Offset Offset inside the Mystique's texture memory to the CLUT8 to load.
The 5 LSB's must be 0

Note: msiSetParameters has been optimized so that if you reload a CLUT with the same CacheOffset, it will not reload the CLUT. MsiSetTextureCLUT8 is not optimized in this way. However when you load a CLUT8 in this way, we keep this offset for the next msiSetParameters.

Note: If you are currently set to CLUT4 (with msiSetParameters) and do a CLUT8 load with this function, only the first 16 entries of the CLUT8 will be loaded to index 0 of the Cached CLUT4 entries.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL msiSetTextureTransparency ( DWORD MaskKey )
```

This entry point is used to change the Transparency mask and key without calling msiSetParameters. This can be used to set transparency between triangles if you have selected transparency=True in a previous call to msiSetParameters.

The parameters are explained here:

MaskKey Contains the mask and key of the color being used for transparency.
MaskKey = (Key & 0x0000FFFF) | (Mask & 0x0000FFFF)<<16
a MaskKey of 0x0000FFFF is always non transparent.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

BOOL **msiSetTextureOffset** (DWORD Offset)

This entry point is used to change the Offset to the current used texture without calling msiSetParameters. This can be used to change the used texture between triangles. Make sure that these different triangles are of the same type (same width, height, color planes...)

The parameters are explained here:

Offset Offset inside the Mystique's texture memory to the texture to use.
The 5 LSB's must be 0

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

BOOL **msiSetTexturePlanes**(LONG Planes)

This entry point is used to change the number of planes of the current used texture without calling msiSetParameters. This can be used to adjust the number of planes when changing the texture between triangles using msiSetTexOffset.

The Parameters are explained here:

Planes The number of planes in bits per pixel used by the current texture pointed to inside the Mystique's texture memory.
The valid numbers of planes are 4, 8, 15, and 16 bits per pixel

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL msiSetTextureSize( LONG Width, LONG Height )
```

This entry point is used to change the texture width and height parameters of the current used texture without calling msiSetParameters. This can be used to adjust the texture size and width when changing the texture between triangles using msiSetTexOffset.

The Parameters are explained here:

Width The Width of the texture in pixels.
Height The Height of the texture in pixels.

Note: The Parameters MUST be valid powers of 2 and must lie in the range 8 to 1024.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL msiSetTextureWrap( BOOL ClampU, BOOL ClampV )
```

This Entry point is used to set up the wrapping attributes without calling msiSetParameters.

The Parameters are explained here:

ClampU Indicates that the u and v texel coordinates must be clamped to the texture dimensions.
ClampV Otherwise they wrap around on the texture boundaries.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL msiSetTextureBlend( ULONG msiTexBlend )
```

This entry point is used to set the Decal and Modulate Parameters without calling msiSetParameters. Valid parameters are DECAL, MODULATE, and DECAL | MODULATE.

The Parameters are explained here:

DECAL	Sets Decal Blending.. (See TEXTURE PARAMETERS above.)
MODULATE	Sets Modulate Blending.. (See TEXTURE PARAMETERS above.)

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL msiSetTextureEnable  ( BOOL Enable )
```

This entry point is used to select between Textured Triangles and Gouraud Shaded Triangles.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

General State change functions

```
BOOL msiSetDepthCompare( DWORD Cmp )
```

This entry point is used to change how Z-Buffer comparison (Depth Processing) without calling msiSetParameters.

The Parameters are explained here:

Cmp The new Depth Compare parameter to be used for depth processing.

The valid compare parameters are:

msiCMP_NEVER
msiCMP_LESS
msiCMP_EQUAL
msiCMP_LEQUAL
msiCMP_GREATER
msiCMP_NOTEQUAL
msiCMP_GEQUAL
msiCMP_ALWAYS

Note: If depth protection is on and the user calls this routine with a valid depth parameter, depth protection is automatically switched off and the depth processing set to the depth parameter.

Note: An invalid parameter will turn depth processing off.
e.g. msiSetTextureDepth(0).

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

```
BOOL msiSetDitherEnable( BOOL Dither )
```

This entry point is used to turn color dithering on/off without calling msiSetParameters. Sending TRUE will turn color dithering on, and FALSE will turn it off.

Note: This function will return an error if MSI95 is in direct access mode; msiSetParameters (-1 or a valid pointer) must be called before calling this entry point.

Note: This function will return an error if it is not called between msiStartFrame and msiEndFrame.

Returns TRUE if successful.

Special functions

```
BOOL msiQueryInfo(LONG StructSize, LPBYTE StructPointer)
```

This entry point will return information about the card.

The Parameters are explained here:

StructSize: Size of Pointed structure

Note: minimum size is 8 bytes.

StructPointer: Points to a QueryInfoStruct.

```
typedef struct QueryInfoStruct
  {
  DWORD ErrorStatus;
  DWORD MemorySize;
  } QueryInfoStruct;
```

When the function is succesfull (returned TRUE) ErrorStatus will be 0

Otherwise ErrorStatus will contain the error type.

ErrorStatus Values:

```
#define ESCAPECALLNOTSUPPORTED      1
```

this indicates that the driver running does not support the Escape call which you tried to use. Possible reasons: Wrong driver, Wrong Graphic Card.

```
#define DRIVERNOTSUPPORTED          2
```

this indicates that you are using an old driver and should update.

```
#define BOARDNOTSUPPORTED           4
```

this indicates that the board is not a Mystique

Note: There is one exception to this: If StructSize is less than the minimum size (8 bytes) the Structure will not be touched. I.e. the values contained in QueryInfostruct will be whatever they were before calling us.

Returns TRUE if successful.

```
BOOL msiSplashScreen( void )
```

This entry point will display a Matrox Splash Screen.

Game Developers should display this in their games. It should be used right after a call to msiInit or at the very end of a game; right before a call to msiExit.

Note: This function will overwrite the Texture Cache. Hence, don't load textures into the Texture Cache before calling this.

Note: This function will return an error if MSI95 is in direct access mode.

Note: This function will return an error if it is called inside an msiStartFrame - msiEndFrame pair.

Returns TRUE if successful.

```
BOOL msiSleep( void )
```

This entry point stops msi95 - without changing the resolution - allowing programs to use Direct X. Use only if msi is awake, maximized and not inside a frame. (See msiAwake)

Returns TRUE if successful.

```
BOOL msiAwake( void )
```

This entry point restores msi95. Use only when msi is asleep, maximized and not inside a frame.

Note: Exclusive Mode users should make sure to set the cooperative level to *DDSCL_NORMAL* on MINIMIZE and to set it to *DDSCL_EXCLUSIVE/DDSCL_FULLSCREEN* on MAXIMIZE. They should also make sure to set the correct Display Mode on every MAXIMIZE.

Note: When finished, users should confirm that the Cooperative Level is set to *DDSCL_NORMAL*.

Note: All objects must be destroyed before msiAwake.

Returns TRUE if successful.

Textures and LUT management

MSI95 supports a very flexible texture management scheme. The game has full control over texture management and uses the many MSI95 mechanisms to handle texture trashing, allocation, copy, etc … MSI95 allows the game to store the texture anywhere: system memory, MSI95 texture heaps or engine texture cache. There are performance issues related to the mechanism used to update the engine texture cache.

Note: The texture cache, texture heaps and the texture image are linear memory spaces.

The 3D graphics engine can only use textures present in the offscreen texture cache to perform texture mapped rendering. The game has a direct access to the texture cache to load textures. The game manages the texture cache sub-allocation.

As offscreen memory is a limited resource, there may not be enough texture cache memory to contain all the textures required for a frame. In this situation MSI95 offers two mechanisms to update the texture cache with a new texture, trashing one or more textures in the texture cache.

MSI95 implements texture heaps. A texture heap resides in system memory and is known by the 3D graphics engine so it can, in an autonomous way, access it to update the texture cache. The game uses the texture heap memory as any other system memory to store textures. A game can allocate many texture heaps as required and store many textures in a single heap.

If for some reasons it is not possible to have a texture in the texture cache or in a texture heap, MSI95 allows textures to be located anywhere in system memory. There is a performance hit to have a texture outside a texture heap or the texture cache, as the 3D graphics engine cannot access directly the texture in such situation.

The following table shows how to use the possible mechanisms based on the msiTexture parameters specified in the T_msiParameters structure.

pHeap	pMem	CacheOffset	Action
NULL	NULL	within texture cache	setup for actual cached texture
NULL	within system memory	within texture cache	copy from system memory to cache
VALID	within texture heap	within texture cache	copy from texture heap to cache

a) If the texture is already in the texture cache, the game calls msiSetParameters with CacheOffset pointing to the texture in the texture cache. This is the fastest situation as no texture copy is required. In this situation the value of pHeap and pMem must be NULL.

b) If the texture is in a texture heap, the game calls msiSetParameters with pMem pointing to the texture in the texture heap, pHeap indicating the heap to use and CacheOffset indicating where to copy the texture in the texture cache.

c) If the texture is not in the texture cache nor in a texture heap, the game calls msiSetParameters with pMem pointing to the texture in system memory, pHeap must be NULL and CacheOffset indicating where to copy the texture in the texture cache.

Pseudo-color textures are associated with a LUT. As for the textures, the LUT can be located in different memory spaces.

The following table shows how to use the possible mechanisms based on the msiLUT parameters specified in the T_msiParameters structure.

pHeap	**pMem**	**CacheOffset**	**Action**
NULL	NULL	within texture cache	setup for actual cached LUT
NULL	within system memory	within texture cache	copy from system memory to cache
VALID	within texture heap	within texture cache	copy from texture heap to cache

Task switch (pressing Alt-TAB or Alt-ESC)

A game running with MSI95 can be switched from fullscreen to minimized when the player press the Alt-TAB or Alt-ESC key sequence. In such situation, MSI95 looses all the surfaces (FRONT, BACK and Texture Cache), enters a state similar to msiSetParameters(-1), disables most if its entry points and returns an error if these entry points are called. The game must detect that it has been minimized and stop any rendering, waiting to be switched back to fullscreen. While switching back to fullscreen, MSI95 will restore the display mode, restore all the surfaces and re-enable all its entry points. The game is responsible for restoring the texture cache content and must restart rendering at the beginning of a new frame (the Texture Cache and the BACK buffer content were destroyed when MSI95 lost the surfaces).

System considerations

a) Between msiSetParameters(NULL) and msiSetParameters(-1 or a valid pointer), MSI95 holds the Win16 lock that serializes the access to GDI and USER, shutting down Windows during the direct access mode. The game should limit its activity during the direct access mode and call msiSetParameters(-1 or a valid pointer) as soon as possible.

b) Between msiStartFrame and msiEndFrame, MSI95 holds the Mystique device lock that prevents any other driver from accessing the graphics engine and the Win16Lock for windows 95.

c) Someone using MSI95 should make sure that any cursors that are used, are either the 32x32 monochrome or the basic hardware pointer.