



Release Notes

3DFX OPENGL DRIVER - BETA 2.1

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1. Introduction

1.1 The Nature of This Release

This beta version is the third public release of 3Dfx OpenGL, a 3-D graphics library based on OpenGL[®] Version 1.1. 3Dfx OpenGL is derived from OpenGL for Windows, source code licensed from Silicon Graphics.

This release is intended to give developers an early opportunity to develop OpenGL applications on 3Dfx Interactive hardware. This release is intended for development use only. This release only supports single-window, full screen applications. Performance optimizations are not complete, though extensive optimization work has been done. This release is conformant; it passes the MUSTPASS test suite for OpenGL 1.1. Future releases will address remaining conformance issues, windowed rendering, and support for multiple windows, processes and threads.

1.2 Acknowledgements

The 3Dfx Interactive logos, Voodoo Graphics, Voodoo Rush, and Voodoo², are registered trademarks of 3Dfx Interactive, Inc. OpenGL is a registered trademark of Silicon Graphics, Inc, Pentium is a registered trademark of Intel Corporation. Windows is a registered trademark of Microsoft Corporation. All other trademarks are the property of their respective owners.



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2. Important Information

2.1 New Features

- Very limited support for windowed rendering on Voodoo Rush
- Optimization of rasterization-only rendering paths.
- The size of the implementation DLL has been significantly reduced

2.2 Accelerated vs. Unaccelerated Rendering

An OpenGL implementation is required to implement all of the functionality defined in the OpenGL specification whether or not the underlying hardware supports that functionality. In order to conform to this requirement OpenGL drivers implement unaccelerated functionality with a software rasterizer that will typically have much lower performance than the accompanying hardware rasterizer.

Below is a table that broadly classifies the primitive rendering modes that will invoke the software rasterization path:

Primitive Type	Software Raster Cases
Points	Stencil is enabled Colormask r, g, and b are not equal
Lines	Stencil is enabled Line stippling is enabled Colormask r, g, and b are not equal
Triangles/Quads/Polys	Stencil is enabled Polygon stippling is enabled Colormask r, g, and b are not equal

2.3 Unsupported Features

This release provides access to most standard OpenGL features, with the exceptions noted below:

- **Color Index Mode:** no pixel formats supporting color index mode are exported. Voodoo Graphics, Voodoo Rush, and Voodoo² hardware only support truecolor pixel formats.



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- **Alpha Planes:** no pixel formats supporting alpha planes are exported in this release.
- **Front & Back Rendering:** specifying **GL_FRONT_AND_BACK** for the color buffer selection is not supported.
- **Logic Operations:** Logic Operations specified via `glLogicOp()` are not implemented. Use of this function will be treated as a no-op.
- **Polygon Offset:** Enabling **GL_POLYGON_FILL_OFFSET**, **GL_POLYGON_LINE_OFFSET**, or **GL_POLYGON_POINT_OFFSET** are no-ops.
- **Texture Formats:** the **GL_INTENSITY*** formats are not supported; using them will be treated as a no-op. The **GL_ABGR_EXT** format is not supported for texture images; calling `glTexImage2D()` with **GL_ABGR_EXT** as the format will create a texture image with undefined contents.
- **glTexImage2D():** the texture image must be tightly packed: the following pixel storage modes must be in effect:

<i>Pixel Storage Mode Parameter</i>	<i>Value</i>
GL_UNPACK_SWAP_BYTES	FALSE
GL_UNPACK_ROW_LENGTH	the width of the texture
GL_UNPACK_SKIP_ROWS	0
GL_UNPACK_SKIP_PIXELS	0
GL_UNPACK_ALIGNMENT	1

Furthermore, when calling `glTexImage2D()`, the image must be in one of the following formats for each corresponding internal format:

<i>Format</i>	<i>Internal Format</i>
GL_LUMINANCE, GL_RGBA	GL_LUMINANCE
GL_LUMINANCE_ALPHA, GL_RGBA	GL_LUMINANCE_ALPHA
GL_RGB, GL_RGBA	GL_RGB
GL_RGBA	GL_RGBA
GL_ALPHA, GL_RGBA	GL_ALPHA
GL_COLOR_INDEX	GL_COLOR_INDEX

- **Texture Environment Modes:** the **GL_BLEND** texture environment mode is only supported on Voodoo². Setting the **GL_BLEND** texture environment mode on Voodoo Graphics or Voodoo Rush results in undefined behavior.
- **Mipmap Modes:** the following minification modes are not supported, and will be handled as follows:



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- ◇ **GL_LINEAR_MIPMAP_LINEAR**: substitute **GL_LINEAR_MIPMAP_NEAREST**.
- ◇ **GL_NEAREST_MIPMAP_LINEAR**: substitute **GL_NEAREST_MIPMAP_NEAREST**.
- **1D Textures**: One-dimensional textures are not supported. Calling `glTexImage1D()` is a no-op.
- **Copy Texture**: The `glCopyTex[Sub]Image*()` routines are not implemented in this release. As a workaround, use `glReadPixels()` to read back the frame buffer contents, followed by `glTexImage*()` to load the texture.
- **glFog**: Fog is not currently hardware accelerated in 3Dfx OpenGL. Currently fog is not correctly implemented when texturing is enabled.

2.4 Known Problems

- **Performance of Software Path**: Primitive rendering through the unaccelerated software path is very, very slow when depth testing is enabled. Any significant rendering through the software path in a double-buffered application may appear to be hung. Unaccelerated features on the software path are to be avoided where high performance is desired.
- **Flat Shading**: The flat shading attribute is ignored under certain circumstances.
- **Window Support**: Only full-screen mode is supported on Voodoo Graphics and Voodoo². A single window is supported in a very limited way on Voodoo Rush. See below for details.
- **Antialiasing**: The Voodoo Graphics and Voodoo Rush hardware do not compute true fragment coverage. As a result, antialiasing is not exact, and shared edges between antialiased triangles will have too much alpha.
- **Texture Sizes**: The maximum texture size is 256x256. However, textures whose aspect ratio is more extreme than 8:1 or 1:8 are not supported. For example, 256x32 and 32x256 are supported, but 256x16 and 16x256 are not.
- **Accumulation Buffer**: As with most hardware accelerators, the accumulation buffer is supported in software only. Its use is not advised where high performance is desired.
- **OpenGL Programming Guide Programs**: These programs are an optional component of the Microsoft Win32 SDK. They are found under the directory named `\MSTOOLS\SAMPLES\OPENGL\BOOK\`. The following problems are known to exist:
 - ◇ **antindx**: color index mode not supported.
 - ◇ **antipoly**: needs a pixel format with both depth and alpha. Voodoo Graphics and Voodoo Rush do not support depth and alpha buffers simultaneously.

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- ◇ **maplight**: color index not supported.
- ◇ **material**: lighting bug.
- ◇ **texgen**: 1D texture not supported.
- **3Dlabs Demo Programs**: 3Dlabs, Inc. have developed a set of publicly available OpenGL demonstration programs for Windows 95 and Windows NT. They may be downloaded from 3Dlabs' web site, <http://www.3dlabs.com>. The following problems are known to exist:
 - ◇ **rc**: fog not drawn properly.
 - ◇ **rctex**: fog not working.
 - ◇ **rg**: fog not drawn properly.
 - ◇ **rgtex**: fog not working.
- **Conform Failures**: There is still a small set of conformance tests that 3Dfx OpenGL does not pass.

Conform Path	Failures	Percentage Passed
Conform -D 1 Conform -D 2 Conform -D 3 Conform -D 1 -p 2 Conform -D 2 -p 2 Conform -D 3 -p 2 Conform -D 1 -p 3 Conform -D 2 -p 3 Conform -D 3 -p 3	Texture Border Mipmaps Interpolation Anti-aliased line Horizontal and Vertical Line	94%
Conform -D 1 -p 1 Conform -D 2 -p 1 Conform -D 3 -p 1	Texture Border Mipmaps Interpolation	97%

2.5 Bugs Fixed in this release

- Hardware texturing was not always properly disabled
- Divide by Q for texture coordinates was not correct
- Software rendering was always directed to the front buffer
- User clip planes were broken
- Color Material was broken
- VGA pass-through was not always correctly switching on Voodoo Graphics/ Voodoo²



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- glPopAttrib was broken
- glColorMask was broken
- Non-boundary edges of complex primitives were being antialiased
- GL_TEXTURE_ENV_COLOR was not correctly scaled
- Default alpha blending state was not correct

2.6 Voodoo Rush Windowing Support

In an effort to provide a feature set similar to that of the glQuake mini-driver, limited support for rendering in a window on Voodoo Rush has been added. This feature is enabled through an environment variable.

```
C:>SET OGL_ENABLE_RUSH_WINDOWING=1
```

This feature is disabled by clearing the environment variable

```
C:>SET OGL_ENABLE_RUSH_WINDOWING=
```

Voodoo Rush Glide rendering in a window is subject to the following restrictions:

- Front buffer rendering is broken
- Alt-tab may crash/hang
- Minimize may crash/hang
- Resize may crash/hang
- Software rendering may result in incorrect results or crash

3. System Requirements

- Pentium® Class PC or higher
- Windows® 95 or Windows NT 4.0 Operating System



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- 3Dfx Interactive Voodoo Graphics™ based 3D Accelerator or
- 3Dfx Interactive Voodoo Rush™ based 2D/3D Accelerator or
- 3Dfx Interactive Voodoo² Graphics™ based 3D Accelerator
- 3Dfx Interactive Glide Version 2.43 or later
- Microsoft OpenGL development kit must be installed to supply the needed library file.

4. Installation Procedures

The OpenGL installer is named `OPENGL.EXE`. Before running the installer, please exit all running applications, and be sure to read any **README.TXT** files. Next, run the installer (either by typing its name in a DOS shell or double-clicking the icon through the Explorer). The installer will create a new directory and install the development kit in that directory. The kit consists of a header file and a DLL.

5. Using the Driver

5.1 Different Flavors of OpenGL

3Dfx OpenGL is one of several OpenGL libraries available on the PC platform. It is useful to understand what the others are.

5.1.1 3Dfx OpenGL

3Dfx OpenGL is designed to take advantage of Voodoo accelerator chips. It is derived from code licensed from Silicon Graphics. 3Dfx OpenGL implements Version 1.1 of the OpenGL specification, and uses Glide for rasterization. In general, 3Dfx OpenGL will offer the greatest performance for those features that are directly supported in hardware. 3Dfx OpenGL is contained in a file named `3DFXOPENGL.DLL` that is installed in a directory selected by the developer at installation time.

5.1.2 Microsoft OpenGL

Microsoft OpenGL is a software implementation based on Version 1.1 of the OpenGL specification. It is also the front end for the Installable Client Driver architecture described in §5.2. Microsoft OpenGL serves as a reference for correct drawing behavior. Because it exports pixel formats not supported by Voodoo hardware (e.g. color index mode), it can run a wider variety of programs. However, because it is unable to take advantage secondary display devices which provide hardware acceleration, Microsoft OpenGL runs in software and has



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much lower performance than Voodoo graphics, especially when CPU-intensive operations such as Z-buffering, alpha-blending, or texture mapping are used.

Microsoft OpenGL is bundled with Windows NT (all versions) and Windows 95 (OSR2 only). For earlier versions of Windows 95, OpenGL may be obtained from the Microsoft web site. See Technical article Q124556 or Knowledge Base article Q155003 for further information: these may be accessed either via MSDN or the Microsoft web site at <http://www.microsoft.com/>. Microsoft OpenGL is contained in a file named `OPENGL32.DLL` that is installed in the system directory.

5.1.3 GLquake Mini-driver

The GLquake mini-driver was developed to accelerate Id Software's game Quake. It implements only those OpenGL functions required by Quake, and was never intended as a general-purpose programming API. Over time, 3Dfx OpenGL will replace the mini-driver: our estimates show that the current release has performance within 10% of the mini-driver for most applications.

5.2 Using the Development Kit

Since the ICD mechanism doesn't currently support secondary display devices such as Voodoo Graphics and Voodoo², this kit can't be used as a standard installable driver. For purposes of development this driver can be used to replace the ICD front end, `OPENGL32.DLL`. The procedure is as follows:

1. Include `GL.H` in C files that call the OpenGL API. `GL.H` should be in the standard set of include files that ships with most popular compilers. It is typically in a subdirectory called `GL` so the actual include directive will look like `#INCLUDE <gl/gl.h>`. Alternatively, you can use the `GL.H` that is included in the 3Dfx OpenGL BETA development SDK. This include file is convenient in that it includes tokens for all vendor specific and multi-vendor extensions supported by 3Dfx.
2. Link the application against `OPENGL32.LIB` (or obtain an application that has been linked this way). `OPENGL32.LIB` is a standard component of the Windows Development SDK shipped with most popular compilers. Alternatively you can download an OpenGL development kit from Microsoft.
3. Copy `C:\3dfx\opengl\3DFXOPENGL.DLL` to `OPENGL32.DLL` in the application directory (this assumes that the `%PATH%` environment variable has been set up so that the application home directory is searched before any system directories).
4. *Under no circumstances* should `OPENGL32.DLL` or other files in Microsoft system directories be modified or replaced. This file is a component of your operating system and tampering with it may imperil your right to technical support from Microsoft.

6. OpenGL Extensions

3Dfx OpenGL supports a number of extensions to Version 1.1. The extension mechanism permits low-level access to 3Dfx hardware, as well as features that have not been included



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in standard GL by the Architecture Review Board (the ARB is the governing body of OpenGL).

6.1 Paletted Textures

This extension allows texels to contain an 8-bit index instead of an RGBA value. The index is used to look up an RGBA value in a palette. The extension implemented in this release is similar to the EXT_paletted_texture proposed by Silicon Graphics, with the restriction that only a global (as opposed to per texture object) palette is currently supported.

6.2 Multitexture Extension

This extension allows 2 or more textures to contribute to primitive rasterization. 3Dfx OpenGL currently exports a subset of an early prototype version of this extension which was proposed by Silicon Graphics. IHVs are currently working towards ratifying a similar extension and promoting it as an industry standard. 3Dfx OpenGL will export that extension on multitexture-capable hardware as soon as this extension is ratified by the ARB.



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7. Customer Support

7.1 Discussion Groups

3Dfx encourages developers to express their opinions, wish lists, and comments. Please join in an open discussion of issues pertaining to OpenGL at:

<news://news.3dfx.com/3dfx.opengl>

Another good source of information is the OpenGL Game Development mailing list. To subscribe, send a mail message to ListGuru@fatcity.com. In the message body (not the subject line), enter the following

SUBSCRIBE OPENGL-GAMEDEV-L <My Name>

where <My Name> is your real name, not your e-mail address.

For more information on OpenGL, please visit the OpenGL WWW Center at:

<http://www.opengl.org/>

7.2 Bugs

Please send bug reports to:

opengl-bugs@3dfx.com



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8. Manifest of 3Dfx OpenGL Installation

The following files are installed:

- <INSTALLDIR>\3DFXOPENGL.DLL
- <INSTALLDIR>\GL.H
- <INSTALLDIR>\RELNOTES.PDF