

3Dlabs[®]

PERMEDIA 2[®]

*Software Release Note for
Windows 95 Display Driver*

Release 4.10.01.2105-0359

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1. Introduction

This document describes the Windows 95 Display Driver for PERMEDIA 2 boards. The driver includes support for Direct3D, DirectDraw, OpenGL and Heidi.

1.1 Release Identity

Once the driver has been installed and the machine rebooted, the display driver release number can be determined by inspecting the Display Control panel. The Driver page of the Device Manager property sheets for the installed board also contains the version.

The Display Control panel and the glint.driv binary in the Device Manager should show version 4.10.01.2105-0359 WHQL.

The 3dogldrv.dll binary in the Device Manager should show 4.10.01.2105-0409.

You can also locate the glint.driv and 3dogldrv.dll in your Windows\system directory. Right-clicking on these files, choosing 'properties', then the Version tab and finally clicking on the Product Version field will also display the version.

1.2 Prerequisites

- Windows 95 (Final Release), OEMSR2 or Windows 98
- Pentium processor or later.
- PERMEDIA 2 board.

1.3 Important Information

This release has been QA'd only for PERMEDIA 2 boards. It may also run on GLINT MX boards, but this is not supported.

It is compatible with DirectX 2, 3 and 5. Subsequent releases of this driver can also be obtained from the 3Dlabs web site:

<http://www.3dlabs.com>

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2. Installation

2.1 Fitting a new card with Windows 95 already installed

Please refer to the original instructions provided with your PC for information on how to replace the graphics board. Remember to use anti-static precautions at all times to protect the hardware from static electricity. If in any doubt about the installation consult a qualified PC engineer.

Once your original graphics board has been removed, replace it with the PERMEDIA 2 card. Ensure that it is firmly seated and secured to the machine using the appropriate fastenings.

Note: The PERMEDIA 2 boards are VGA enabled, and there should be no other VGA in the machine once the card has been fitted. If your PC motherboard has built-in VGA it should be disabled. Again refer to the original equipment manufacturers manuals for details on how to do this.

Fit the PC casing, switch on and boot Windows 95.

After the login procedure, your new card should be detected and Windows will ask for the correct drivers. Insert the floppy disk containing the 3Dlabs drivers and install them. Upon completion, Windows will reboot using the new card. PERMEDIA 2 boards have more than one PCI device on the board, which means there may be some extra reboots as Windows 95 detects the other devices present. You should start in at least a 16Bit mode for Direct3D acceleration.

2.2 Installing Windows 95 with a 3Dlabs board in the PC

Install Windows 95 in the usual way. When installation has completed, Windows 95 should be booted on the VGA. It will not have recognized the PERMEDIA 2 graphics card on installation.

Boot Windows 95 into safe mode. This can be done by pressing “F8” just after the machine has rebooted, when the message “Starting Windows 95...” appears.

Open the device manager. To do this right-click on the “My computer” icon and choose “Properties”. Once the device manager is open, select the “Device Manager” tab at the top of the property sheet.

Look at the list of devices on your machine. If there are any listed under “3D Accelerators”, such as “Delta Geometry Processor” or “GLINT 500 TX”, remove them. Next look at the “Display Adapters” section. All the devices listed in this section should be removed. Finally look in the “Other” section, and remove all the devices in this section. This may cause several devices on your system other than the

graphics card to be redetected at the next reboot, but this will not harm the system and it will give you a chance to reinstall the correct drivers for these devices.

Close the device manager and reboot the machine.

After the login procedure, your new card should be detected and Windows will ask for the correct drivers. Insert the floppy disk containing the 3Dlabs drivers and install them. Upon completion, Windows will reboot using the new card.

PERMEDIA, PERMEDIA NT, PERMEDIA 2, GLINT 500TX and GLINT MX boards have more than one PCI device on the board, which means there may be some extra reboots as Windows 95 detects the other devices present. You should start in at least a 16Bit mode for Direct3D acceleration.

2.3 Updating existing drivers

Whilst running Windows95, open the control panel and choose "Display".

Navigate to the "Settings" tab at the top of the panel, and choose "Change Display Type" or "Advanced Properties". From here you can change the driver. Select "Change" and "Have Disk". Windows will now prompt for the installation floppy. Follow the usual procedure to install the drivers.

Windows will now reboot your machine using the new drivers.

2.4 Updating your monitor type

The 3Dlabs drivers will try to use the optimal refresh rate that the monitor can handle. For this reason it is important to correctly set up the monitor type to match your display. If the monitor is over-specified in the Windows95 control panel settings, it is possible that the drivers will attempt to use a refresh rate that is beyond the capabilities of your monitor. To correct this, please ensure that you have correctly specified your monitor type. The monitor settings can be found in the "Display" settings in the control panel.

2.5 Further troubleshooting

The above procedures should work correctly for the 3Dlabs reference boards. If you experience problems with installing the drivers, and you have previously installed 3Dlabs drivers on the machine, there may be a conflict with older drivers. Follow the steps below to resolve it:

Boot Windows 95 into safe mode. This can be done by pressing "F8" just after the machine has rebooted, when the message "Starting Windows 95..." appears.

Open the device manager. To do this right-click on the “My computer” icon and choose “Properties”. Once the device manager is open, select the “Device Manager” tab at the top of the property sheet.

Look at the list of devices on your machine. If there are any listed under “3D Accelerators”, such as “Delta Geometry Processor” or “GLINT 500TX”, remove them. Next look at the “Display Adapters” section. If any 3Dlabs devices, e.g. PERMEDIA” or “GLINT Compatible VGA”, are listed remove them. Finally look in the “Other” section, and remove all the devices in this section. This may cause several devices on your system other than the graphics card to be redetected at the next reboot, but this will not harm the system and it will give you a chance to reinstall the correct drivers for these devices.

Close the device manager.

Open explorer and navigate to the “Windows” directory. In here you will find a hidden directory called “Inf”. Some releases of Windows 95 use a different structure to others inside this directory, so some of the following files may not be present on your release. Find any file names in this directory that begin with “Examine each of the OEM files, if you have them, in turn by double clicking to load them into Notepad. If any of the files contain references to 3Dlabs, PERMEDIA, or GLINT, delete them. You also need to delete the file called 3dlabs.inf from this directory. Look in the “Other” directory, if you have one, and delete any files whose name starts with 3Dlabs.

Windows is now clean of all references to 3Dlabs hardware. Reboot the machine normally and auto-detection of the hardware will begin again. Remember to supply the correct driver disk when it is requested.

3. Resolutions and Color Depths

The following modes are supported by this display driver release. This driver does not accelerate Direct3D in 256 color modes, although it does accelerate DirectDraw in these modes. For hardware acceleration, please ensure you are running in a High Color or True Color display mode. If a Direct3D sample application is started in 256 color mode, it may attempt to change color depth to High Color to work with the card.

The resolutions supported for Windows display are shown below.

Note: DirectDraw driver will support additional resolutions to the Windows desktop (i.e 512 x 384, 320 x 240, 320 x 200 on the PERMEDIA 2). The memory requirements will differ depending upon the applications you run. If the Direct3D/DirectDraw applications complain that there is not enough memory, try reducing screen resolution.

For most modes, all refresh rates between 60Hz and 100Hz are supported by the driver, although the actual maximum resolution and refresh rate that you can achieve will depend on your monitor setting. The following tables show what resolutions are available and the Maximum refresh rate achievable in each mode.

Resolution	256	High Color (32768 colors)	True Color
640x400	100Hz	100Hz	100Hz
640x480	100Hz	100Hz	100Hz
800x600	100Hz	100Hz	100Hz
1024x768	100Hz	100Hz	100Hz
1152x864	100Hz	100Hz	87Hz
1280x1024	100Hz	100Hz	69Hz
1600x1200	100Hz	85Hz	60Hz *

Table 3.1 **PERMEDIA 2 Refresh Rates**

* Some PERMEDIA 2 boards may not support the 1600x1200x32bpp resolution.

4. DirectX Support

The driver contains support for hardware optimized DirectDraw and Direct3D functionality. The driver is compatible with DirectX 2, 3 and 5. Please obtain a release of this software if you require DirectDraw / Direct3D acceleration (you are advised to choose latest release – DirectX5). This release of the DirectX drivers supports PERMEDIA 2.

4.1 Driver changes

Global changes in this release include:

Performance enhancements – Significant gains in performance can be seen in this release – these are particularly apparent on 3D Winbench but benefits are seen in almost all Direct3D applications.

Registry location change – All DirectX registry keys now reside in:
[\\HKEY_LOCAL_MACHINE\\software\\3Dlabs\\DirectX](#)

Features added in this release include:

IDirectDrawColorControl – The driver now supports the DirectDraw protocol for changing the display color properties. Please note that DirectX 5 Release 1 has a bug which means that this feature is unavailable. Use a recent version of Memphis or DirectX 5.2 to fix this.

TriLinear MipMapping – The drivers now support trilinear mipmapping.

AntiAliasing – The drivers now support full-scene AntiAliasing on PERMEDIA 2 boards.

Overlay Emulation – To support DirectShow the drivers now emulate overlays. Clipped and ChromaKeyed overlays are fully supported. Overlays without a window are not allowed by the driver.

MultiMonitor – The drivers now fully support Multi-Monitor operation on Windows 98 with PERMEDIA 2 operating as a primary or secondary card. Ensure you are using a Windows 98 build later than 4.10.1687 to get correct operation.

DrawPrimitive – The PERMEDIA 2 drivers fully accelerate DrawPrimitive.

Src X Dest Blend Mode – The drivers now support the Src X Dest blend mode when a monochromatic light map is used.

Miscellaneous improvements – Many of the changes to the driver rely on facilities available only in DirectX 5, for this reason it is strongly recommended that users install DirectX 5 in preference to earlier versions. Because of Microsoft's

policy of full backward compatibility between DirectX versions it is recommended that users install the most recent version of DirectX at all times.

4.2 Major bug fixes

Bugs fixed in this release:

Various ChromaKeying issues – The drivers did not correctly ChromaKey in some circumstances. This is now fixed.

Alpha Test Emulation – Due to many applications assuming Alpha Testing is available, the driver now emulates Alpha Tests if they are turned on. Note that this cannot work in all circumstances so the Alpha Test caps bits are not set.

DrawPrimitive – There were several initial DrawPrimitive bugs. These have now been fixed.

Line renderers – 3D Studio MAX exposed some bugs in the line drawing code. These are now fixed.

GetAvailableVidMem – The previous release of the driver had a broken implementation of GetAvailableVidMem which always returned 0 memory free. This is now fixed.

4.3 Additional Useful Information

Some registry keys are not exposed through the control panels but are useful for developers to know. All DirectX Registry keys live in [\\HKEY_LOCAL_MACHINE\\SOFTWARE\\3Dlabs\\DirectX](reg://HKEY_LOCAL_MACHINE/SOFTWARE/3Dlabs/DirectX).

The following values can be set. They are all stored in the registry as 'String' Values. Some keys will require a reboot to take effect. Another option is to run a task viewer and kill the task 'DDHELP.EXE'.

Direct3DHAL.AppStats = 0 or 1 – Enables debug output of driver statistics such as state changes/frame, etc. This is intended for use only by developers and requires a special build from 3Dlabs

Direct3DHAL.DisableAlphaTextures = 0 or 1 – Disables reporting of Alpha based texture formats.

Direct3DHAL.NoVBlankWait = 0 or 1 – Disables waiting for the Video Blanking interval before a page flip. Useful to measure the real speed of rendering when the application is not quantized to VBLANK.

Direct3DHAL.NoFlip = 0 or 1 – Causes the driver to ignore page flipping requests. Useful to enable scrolling down in video memory with the DbgTrace tool while page flipping.

Direct3DHAL.FilterVideo = 0 or 1 – Enables video filtering during video playback.

DirectX Support

Direct3DHAL.PatchMode = 0 (selective), 1 (always), 2 (never) – Alters the texture patching behavior of the driver.

Direct3DHAL.EnableTrueColorTextures = 0 or 1 – Allows the driver to report true color textures (this will be expensive in memory terms if an application chooses it).

5. Video For Windows Capture Driver

New for this release of the driver is a Video For Windows Capture Driver. When used in conjunction with a 3Dlabs Video daughter card (featuring the Bt827 & Bt868 devices), this driver can grab frames of video for storage as AVI movies or bitmaps. Many software packages will detect the driver and use it if it is available, including NetMeeting. DirectShow will also use the capture driver as a fallback if there are no WDM capture drivers in the system.

5.1 Installation

Installation and detection of the Video For Windows driver are automatic. If a 3Dlabs video daughter card is added to a PERMEDIA 2 board, the drivers will startup whenever an application wants to use them.

5.2 Software features

The capture driver currently captures in one color format – 16 Bit 555 RGB. During operation of standard Video For Windows applications, two dialog boxes will be available to configure the driver. The available options are:

- Video Format
This dialog box alters the dimensions and quality of the captured video.
 1. The list box allows the user to change the dimensions of the captured video
 2. The 'bob' check box allows the user to turn video bobbing on or off.
 3. The 'Filter Video' check box allows the user to turn video filtering on or off.
- Video Source
This dialog box alters the source and color of the incoming video
 1. The sliders allow the user to change the contrast, brightness and saturation of the image.
 2. The Video Format options offer PAL or NTSC operation – the drivers can also be told to 'auto detect' the video standard by clicking on the detection check box.
 3. Incoming video can be input from the S-Video connector or the Composite video connector. The input connector box offers this choice.

6. OpenGL

The driver provides support for OpenGL version 1.1. This graphics API library is a part of the OEM SR2 Windows95/Windows98 release. (There is a self-extracting executable `opengl95.exe` available from Microsoft and included with the 3Dlabs drivers, which provides all the required libraries for those using the original retail release of Windows95). This enables hardware acceleration of OpenGL applications and requires installation of DirectX 3 (or later) on which it depends for pixel buffer allocation (back buffer, z-buffer, texture storage etc).

The last two digits of the OpenGL version number returned by a call to `glGetString(GL_VERSION)` (i.e 1.1xx) are updated with every major release of the ICD. The version for this release is 1.1.23.

All OpenGL version 1.1 API calls are now implemented in release 1.1.22 and later.

6.1 OpenGL Games

The following web page URL provides a useful FAQ for users of iD Software's Quake, Quake 2 and Hexen titles.

<http://www.3dlabs.com/enduser/quake.html>

7. OpenGL Known Anomalies and Restrictions

- The DirectX surfaces upon which OpenGL applications depend will be lost during a display resolution mode change, disabling rendering but allowing the application to be safely shutdown.
- The standard maze screen saver does not get hardware accelerated. This is due to a bug in the Microsoft screen saver library. A customized accelerated 3Dlabs version that also supports linear filtering in the settings option has been provided with this release.
- Support for texture memory caching is available for the PERMEDIA family only in this release (NOT for GLINT chips).
- Support for the Overlay planes extension is not provided in this release.
- Support for hardware OpenGL acceleration on a 256 color desktop is no longer supported in this release.

Important note for Windows98 beta users

OpenGL acceleration is automatically disabled by Microsoft OpenGL dll in multi-monitor mode under Windows98 beta, even for the primary display.

A partial workaround is to disable the non-primary displays in the display properties settings page, launch the OpenGL application and finally re-enable the secondary displays. However any subsequent applications will revert to software OpenGL.

If the hardware accelerated window is then dragged across to a secondary display, no output will appear in the application window (due to clipping of all rendering beyond the primary display). Dragging the window back to the primary display will restore accelerated rendering.

8. OpenGL Texturing & Extensions

8.1 Efficient use of multiple textures

OpenGL applications that wish to render primitives with multiple texture maps will achieve much higher performance by avoiding the invoking of the different textures in immediate mode. There are two alternative options for efficient switching between multiple textures.

The first and much preferred option is to use the OpenGL texture object functionality. This is available with 3Dlabs Installable Client Driver as part of the standard API for OpenGL version 1.1 on Windows 95. Texture objects are fully editable and may have their images and parameters altered at any time (unlike the use of textures in display lists). Details on texture object functionality is available in the OpenGL 1.1 specification (Appendix E) and also in Appendix F of the 3Dlabs OpenGL Extensions document. The performance gain using this approach will benefit performance for PERMEDIA 2.

The second option is to define each texture (or array of mip map resolutions) within a display list - *with the limitation that only one texture is allowed per display list*. Switching between different textures is then achieved by referencing the appropriate display list. Since display lists are not editable in OpenGL, the OpenGL implementation is able to cache texture data defined within a display list. In effect the display list identifier acts as a texture handle. This caching cannot be performed when a texture is invoked in immediate mode since the application in this case is at liberty to have changed the texture data since any previous reference.

From release 1.1.20 onwards this non-standard behaviour can be disabled with the registry variable `OpenGL.DisableDisplayListTextureSwitch` - this will prevent conflicts with texture object routines in display lists (e.g. `glBindTexture` etc) and also prevent `glTexImage` calls from downloading texel data in compile only display lists (hence overwriting any existing immediate mode texture).

8.2 Texture Memory Cache Management

For the PERMEDIA 2, texture data is stored in the off screen memory on the graphics card. The memory available for textures is therefore constrained by the off screen memory available. It is also constrained by the amount of memory already consumed for the depth buffer, stencil buffer, and the display, which varies according to the current display resolution in use. I.e. there is more memory available for textures when the display resolution (and therefore the size of the display, depth buffer, stencil buffer memory requirements) is lowered.

On 3Dlabs OpenGL releases prior to version 1.1.22, if the condition is reached where there is insufficient off screen memory to load a new texture then the OpenGL texture download will not succeed and will set the error code `GL_OUT_OF_MEMORY`. Textured primitives that expected to use this texture will not be rendered correctly.

To improve on this behavior a scheme for swapping textures to/from system host memory has been implemented for the PERMEDIA chip family. By setting aside a portion of texture memory on the graphics card for use as a texture cache and tracking when a texture switch takes place, textures can be reloaded to the cache as needed from a copy kept in host memory when the texture was first downloaded. If the requested texture is already present in the cache, then no reload is performed.

Ideally for the greatest flexibility and most efficient use of available texture memory, all textures should be cacheable. However for a software texture cache manager there is a small performance overhead to be paid for this tracking plus any delay in reloading a swapped out texture (as a texture could be swapped out at any time by another OpenGL process). By allowing the user to specify the size of the texture cache through the use of the registry variable `OpenGL.MaxTextureSize`, an approximate balance between non-swappable and swappable textures can be made (and hence performance). Thus an application should load any real-time critical textures first as the texture manager will only place textures in cache and/or host memory if a space of sufficient size is not available in the non-swappable area of texture memory.

In order to guarantee all texture requests no matter how large, any texture whose size in texels is greater than the cache size will be silently filtered down to fit in the cache (while preserving aspect ratio).

As noted under the description for `OpenGL.MaxTextureSize`, the texture cache manager can be disabled by setting this registry variable to zero so that all textures are non-swappable as in previous releases.

8.3 Texture Filter Modes

The default texture minification filtering for OpenGL involves mip-map filtering. This gives good textured rendering quality but at the cost of low performance. Much higher performance can be obtained by changing the default texture filtering such that the minification and magnification filtering modes are the SAME. Setting them to `GL_LINEAR` gives good quality bilinear filtering and improved performance. Setting both modes to `GL_NEAREST` will give nearest neighbour filtering and the fastest possible performance.

Only linear and nearest neighbour texture filtering modes are supported on PERMEDIA 2 (mip-map filtering is not supported).

8.4 BGRA Extension

This extension provides an additional pixel color format for compatibility with the blue, green, red component ordering of Microsoft Windows DIB's (device independent bitmaps). Refer to Appendix E in the 3Dlabs OpenGL Extensions document for further details.

8.5 Palette Texture Extension

The PERMEDIA 2 provides direct support for palette textures, where each texel represents an index into an on-chip RGBA (8-bits per component) lookup-table. An OpenGL palette texture extension has been defined by Microsoft which is supported by 3Dlabs OpenGL ICD from release 1.0.11. The supported texel depths depend on the chip. They are as follows:

PERMEDIA supports 4 bit texel depths.

PERMEDIA 2 supports 4 bit and 8 bit texel depths.

Besides improving texture performance and reducing the memory requirements for storing textures in the local buffer, by repeatedly updating the texture LUT, animation effects such as real-time color cycling are also possible. Refer to Appendices C and D for further details.

If many textures share the same look-up table (LUT), performance gains can be obtained with paletted texture objects by forcing the textures to share the same palette (particularly for 8-bit palette textures on the GLINT MX and PERMEDIA 2). The default behaviour when texture switching through calls to `glBindTexture` is to send down the LUT on every switch. This can be disabled by the `EXT_shared_texture_palette` extension described in Appendix H of the OpenGL Extensions document.

8.6 3Dlabs Driver Extension

In addition to the extensions mentioned above, the `3Dlabs_DriverState` extension has been added and is detailed at Appendix H in the OpenGL Extensions document. This extension is simply a mechanism for adding extra state to the Client Driver and provides extra control to the currently selected context.

8.7 Swap Hint Extension

The Microsoft defined extension `GL_WIN_swap_hint` is supported. This extension allows the area of a window swapped by the `SwapBuffers` call to be restricted. This can give performance benefits when only a small area of the display is being updated at a time. For more information please contact Microsoft directly or search in the latest Win32 help files for `glAddSwapHintRectWIN`.

9. 3D Studio MAX

This release supports hardware acceleration of both 3D Studio MAX 1 and 2. 3D Studio MAX 1 is accelerated through the Autodesk propriety API, Heidi. 3D Studio MAX 2 is accelerated through OpenGL or Direct3D.

9.1 3D Studio MAX 1.x

The 3Dlabs Heidi driver has the same system requirements as OpenGL. These are that the 1.1 versions of Microsoft's OpenGL binaries be installed and that Direct X3 (or later) is installed. The 1.1 OpenGL binaries are provided as standard on the OEM SR2 release of Windows 95 and are also provided in the self-extracting archive `opengl95.exe`. This archive can be downloaded from the Microsoft website and is also provided with 3Dlabs drivers.

If PERMEDIA hardware is already in use for 3D Studio Max 1 then simply copy the `wglint.hdi` file to your `3dsmax/drivers` directory to upgrade to this driver. If 3D Studio is not currently using PERMEDIA hardware then first copy the `wglint.hdi` file to your `3dsmax/drivers` directory and then start up 3D Studio Max. Under the File menu choose Preferences and in the resulting dialog click on the Viewports tab. Click on the button labelled Choose Driver and then select GLINT Hardware. You will then need to restart Max to enable GLINT hardware acceleration.

On PERMEDIA based boards best performance will be obtained when running with 32k colors. On GLINT based boards best performance will be provided when running in TrueColor display modes.

Please note that only version 1.2 of 3D Studio MAX 1 is recommended by Kinetix for use under Windows 95. For information on how to upgrade to version 1.2 please contact Kinetix.

9.2 3D Studio MAX 2

When you first run 3D Studio MAX 2 you will be given the option of which graphics driver to use. You should select the either OpenGL, Heidi or Direct3D to get hardware acceleration with this driver release. If you wish to change which driver 3D Studio Max 2 uses at a later date then this can be done by selecting Preferences from the File menu. Click on the Viewports tab and then press the Choose Driver button.

When running with OpenGL you can confirm that you getting hardware acceleration by viewing the About from the Help menu. The driver box in the top right hand corner of the resulting dialog should read 'OpenGL (3Dlabs v1.1.xx)'. If it reads 'OpenGL (Microsoft Corporation v.1.1.0)' then you are running through

Microsoft's software OpenGL and should consult the OpenGL section of this document for more information on enabling OpenGL acceleration.

When running through OpenGL 3D Studio MAX 2 defaults to not backface culling wireframe objects. This means that wireframe objects typically use twice as many lines as they do through a Heidi or Direct3D driver. This can result in poor performance in comparison to a Heidi or Direct3D driver. This behaviour can be changed from within the application. Go to the 'File/Preferences' dialog box. Click on the 'Viewports' tab and then select 'Configure Driver'. Enable the option 'Display Wireframe Objects Using Triangle Strips'. This causes wireframe objects to be backfaced culled and can drastically improve performance. The setting also causes shared edges within polygons to be drawn, which may not appear as desired.

For the latest information for using 3D Studio MAX on GLINT & PERMEDIA boards please see the 3D Studio MAX FAQ at <http://www.3Dlabs.com>.

9.3 Known Anomalies with 3D Studio MAX

- When running 3D Studio MAX 2 with OpenGL acceleration you may sometimes experience a crash on exit from the application. This problem also affects Microsoft's software OpenGL implementation and is under investigation.
- When running 3D Studio MAX 2 with OpenGL acceleration you may sometimes notice that textures do not appear in some of the viewports. This problem also affects the Microsoft software OpenGL implementation. It will be fixed in a future release of 3D Studio MAX 2.
- When running 3D Studio MAX 2 with Direct3D acceleration may find that you are unable to select vertices individually in the edit mesh or mesh select modifiers. This is a problem within the application that affects all Direct3D drivers. It will be fixed in the next release of 3D Studio MAX 2.

10. Known Anomalies and Restrictions

The following errors have been noted during testing of this software release:

- Remote control applications may not function correctly on this driver due to application bugs. For example, Laplink does not work correctly when using the remote control option. Old versions of the application will not run remotely at all, where newer versions run with many black icons and bitmaps.
- The Video-For-Windows capture driver may not install successfully after the first boot of the drivers. If this occurs reboot a second time to cure the problem.