The Oxygen™ RPM Graphics Accelerator User's Guide

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Caution: Changes or modifications to the Oxygen graphics accelerator card not expressly approved by 3Dlabs, Inc. void the user's warranty.

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1. Re-orient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
4. Consult 3Dlabs or an experienced radio/TV technician for assistance.

Compliance with FCC Rules requires that a shielded cable be used to connect to other equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

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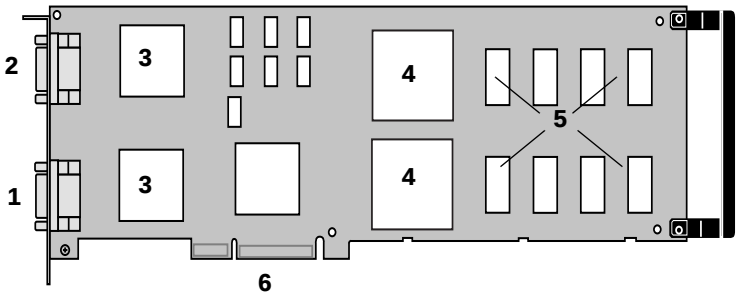
Introduction

Welcome to 3Dlabs!

Thank you for selecting a 3Dlabs® Oxygen™ RPM 3D graphics accelerator card!

Oxygen delivers a high-performance power boost to the complex 3D graphics applications running on Windows NT systems. The huge design files – with millions of triangles – created with these applications can challenge even multiple-processor systems. Oxygen RPM cards merge the power of your system processor with an integrated hardware and software solution to accelerate the geometry-related calculations needed to create these triangles. Optimized software drivers support the OpenGL 1.1 specification in order to accelerate visual computing, MCAD and digital content creation applications based on the OpenGL standard.

Oxygen RPM



1. Primary monitor connector
2. Secondary monitor connector
3. Dual RAMDACs
4. Dual RPM processors
5. Memory
6. AGP connector

The Oxygen RPM card features:

- **Dual RPM Rendering and Texturing processors**

  Multiple processors let you manipulate several 3D primitives in parallel.

- **64 MB memory**

  A unified memory architecture dynamically allocates graphics memory for the features you need for your MCAD or DCC applications.

- **PowerThreads technology**

  PowerThreads significantly boosts 3D graphics performance in multi-processor systems. This 3D software technology is application independent

and ensures seamless acceleration of even single-threaded 3D applications.

- **1,600 x 1,200 true-color maximum resolution**

  RPM supports true color resolutions from 800x600 up to 1,600x1,200 at a variety of refresh rates.

- **Dual monitor support**

  The dual RAMDACs let you drive two monitors from a single Oxygen RPM card, delivering seamless performance across one 2,048 x 768 (maximum resolution) desktop.

System Requirements

Your system must have the following features in order to support your card:

- **Pentium® II (or later) based system**
- **Windows® NT 4.0 (or later) operating system**
- **128 MB RAM (Random Access Memory)**
- **512 K level 2 cache minimum**
- **3 MB minimum available hard drive space**
- **AGP slot**
- **VGA multisync monitor**

Software Partners

Your Oxygen RPM card has been tested with a variety of graphics software packages, several of which are listed below. As testing continues and performance optimizations are made, the results and techniques are posted on the 3Dlabs, as well as the appropriate software partner's, web site.

Software Application	Web Site Address
3D Studio MAX	http://www.ktx.com
Lightscape	http://www.lightscape.com
LightWave 3D	http://www.newtek.com
Maya	http://www.aw.sgi.com
MicroStation	http://www.bentley.com
Pro/ENGINEER	http://www.ptc.com
SDRC I-DEAS	http://www.sdrc.com
Softimage | 3D	http://www.softimage.com
SolidWorks	http://www.solidworks.com
Unigraphics	http://www.ug.eds.com/ug/

Chapter 1 - Installation

Getting Ready

The order in which you install your new card and driver software depends on whether a video card is already present in your system.

If there is a video card in your system: Install the drivers first. Once the drivers are loaded, remove the old card and install the Oxygen RPM card. The driver installation instructions begin on page 6.

If there is not a video card in your system: Install your new Oxygen RPM card as described in the Installing Hardware section, below, then install the drivers.

Before You Start

- **Take every possible precaution against static electricity as you prepare to install the card: static can damage components. We have included an anti-static wrist strap for you to wear while installing the hardware: you should also try to work in a static free area (such as on a tile floor rather than carpet). You might even consider wearing special ESD (electro-static discharge), or at least rubber-soled, shoes.**
- **Save any work in progress and exit any open applications. Always back up your system before you install new hardware or software.**
- **Have your anti-static strap and a Philips-head screwdriver ready.**

Installing Hardware

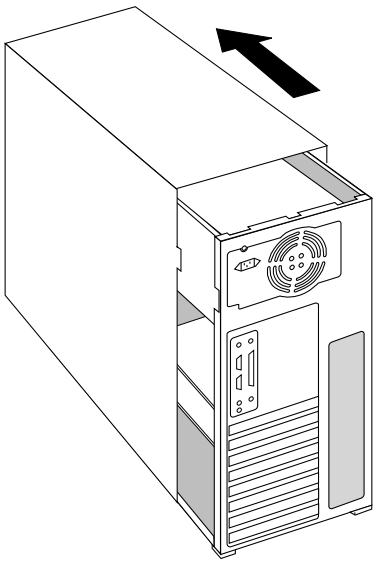
Oxygen RPM cards have AGP connectors and must be installed in your system's AGP slot. Please see your system documentation for the AGP slot location in your machine.

➤ To remove an old card from your system

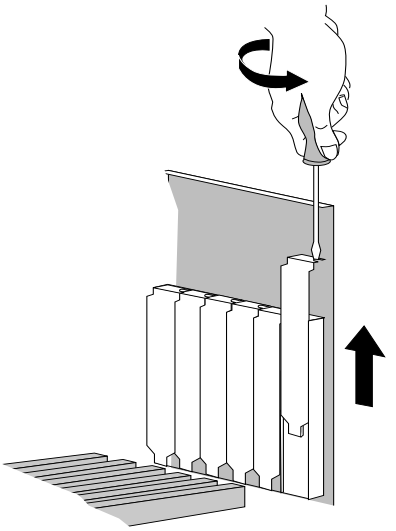
1. Turn off and unplug the power source for your system and each of its peripherals.
2. Unplug the monitor cable from the old card.
3. Remove any screws securing the card to the chassis.
4. Lift the card out of the slot.

➤ To install your Oxygen RPM card

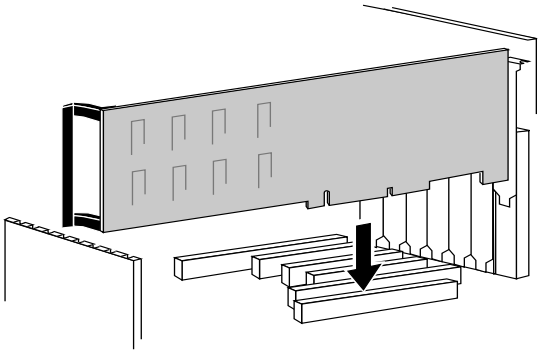
1. Turn off and unplug the power source for your system and each of its peripherals, if you have not already done so.
2. Remove the cover from your system so you can access its AGP expansion slot. (See your system documentation for details.)



3. Determine which slot you are going to use and remove its back panel cover. You must use an AGP slot: AGP cards will not fit in PCI slots.

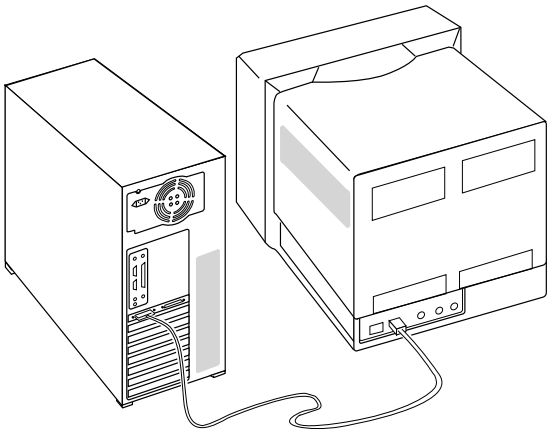


4. Attach the anti-static strap to your wrist, and attach the other end to a conductive metal (not painted or sticker-covered) area of your system's chassis.
5. Remove the card from its anti-static packaging. Write down the serial number for registration and future use.
6. Place the card into the AGP slot, and seat it firmly. See your system documentation for instructions on securing the card to the chassis. Loose cards and connections can cause grounding and operating problems.



7. Remove the anti-static strap and replace the cover on your system.

8. Connect the video cable from your monitor to the primary monitor connector on the card. Oxygen RPM cards have primary and secondary monitor connectors. If you have a second monitor, you can connect its cable to the secondary monitor connector on the card.



9. Plug in and start up your system, including peripherals, and log in to Windows NT.

Installing Software

Your Oxygen RPM card includes driver software, which you must install and configure. This OpenGL driver allows your system to harness the acceleration potential of your Oxygen RPM card, as well as set image quality and performance preferences.

This section describes the installation process for systems running the Windows NT 4.0 (or later) operating system.

➤ To install your Oxygen RPM software

1. Log in to Windows NT using any account that has administrator privileges.
2. Place the Oxygen CD-ROM in your CD-ROM drive. When the installation window opens, choose the Oxygen RPM installation.
3. Follow the instructions that appear on your screen. (Be sure to read the software license agreement.)
4. Restart your system at the prompt. You have installed your Oxygen software successfully!

Registering Oxygen RPM

When you register your Oxygen RPM card you:

- **Activate your warranty**
- **Receive notification of software updates**
- **Qualify for technical support**

You can complete the registration card and return it to us in the mail, or register over the Internet once your hardware and software installations are complete.

➤ To register over the Internet

1. Click the Start button on the taskbar.
2. Point to Programs, Oxygen RPM, Register Online.
3. Follow the instructions that appear on your screen.

Chapter 2 - Software Configuration

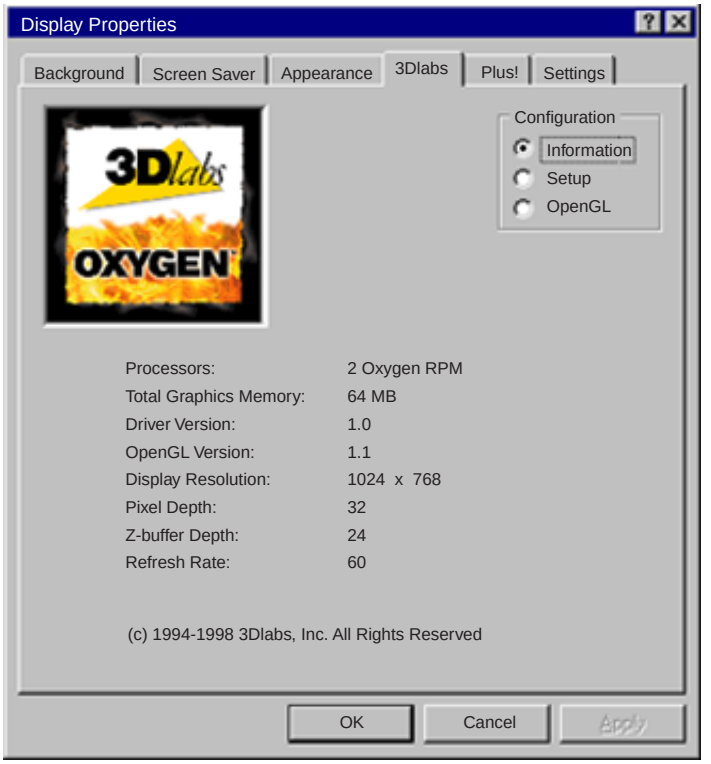
The Oxygen RPM Driver

The Oxygen RPM driver allows you to balance image quality and performance for all your 3D applications, or optimize for a specific application. The Setup and OpenGL screens work together to bring you this flexibility. When you select Custom Settings on the Setup screen, you have control over each option on the OpenGL screen, in addition to the image quality/performance balance. The other Setup selections manage your OpenGL screen options by making certain optimization choices for you.

Information Screen

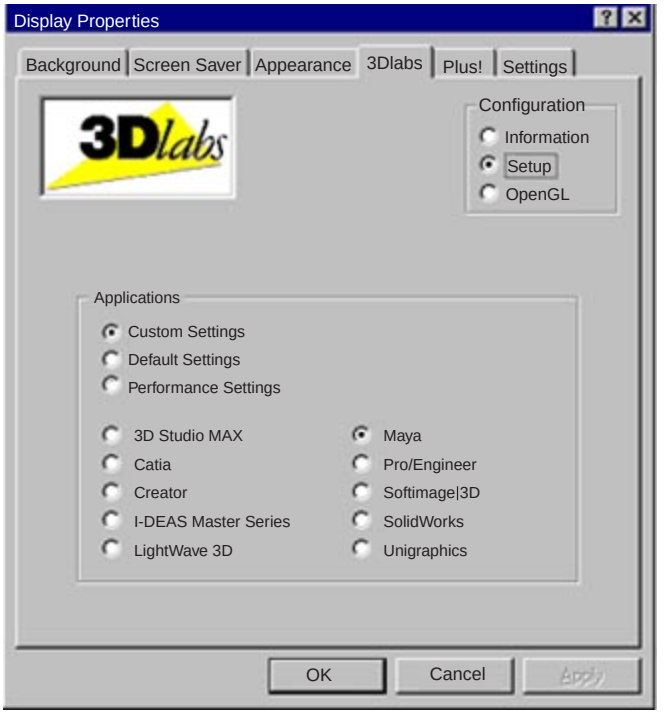
The Information screen appears first when you choose the 3Dlabs page in the Display Properties control panel, and provides useful information if you should need to communicate with 3Dlabs technical support. To open the control panel:

1. Close all open applications.
2. From your desktop, click the right mouse button.
3. Choose Properties.
4. Select the 3Dlabs page.



Setup Screen

When you select one of the first three Applications options on the Setup screen, your choice affects any 3D application you run.



- Select **Custom Settings** when you know exactly what performance results you want from the Oxygen RPM card and know how to set preferences in order to achieve them.
- Select **Default Settings** when you want Oxygen RPM to return to initial factory settings. Default is especially useful if your 3D application does not appear on the Setup screen.
- Select **Performance Settings** when you want Oxygen RPM to prioritize acceleration over image quality.
- Pick **an application from the list** when you want Oxygen RPM to perform optimally with that application. Remember to change this setting when you use another 3D application.

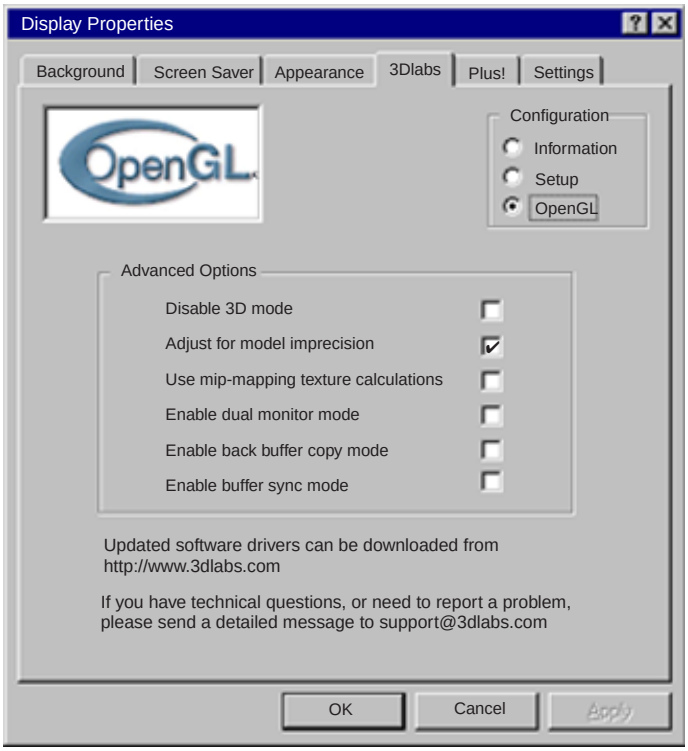
If you selected Custom Settings, click OpenGL in the Configuration box and set the options described in the following section.

If you selected any other option *and have one monitor connected to your card*, click OK to close Display Properties and use your new settings.

If you selected an option other than Custom *and have two monitors connected to your card*, click OpenGL in the Configuration box and select “Enable dual-monitor mode.” Click Apply to preview the setting, or OK to close Display Properties and use your new settings.

OpenGL Screen

When you select Custom Settings on the Setup screen, you unlock the OpenGL Advanced Options. Turn these options on or off to achieve the Oxygen RPM performance and image quality you need for your applications.



- **Disable 3D mode** is a troubleshooting aid. If you should experience problems when working with a 3D application, close the application, open the Display Properties control panel, check this box and click OK. You are now working in 2D mode. At this time, please contact 3Dlabs technical support.

- **Adjust for model imprecision** eliminates distortion in your images by processing them at sub-pixel levels. Sub-pixel precision “catches” the pixels that may fall out between triangles, smoothing the jagged edges that distort a shape, but prioritizes image quality over acceleration.
- **Use mip-mapping texture calculations** allows texture calculation when requested by an OpenGL application. If disabled, only the largest map will be used and texture calculations will be done with bi-linear sampling. Mip-mapping is disabled by default for maximum OpenGL application performance.
- **Enable dual monitor mode** enables the use of dual displays, and lets the cursor track from one screen to the next. Disabling this option turns off dual display, even if two monitors are present. The option is dimmed and unavailable if only one monitor is connected to your Oxygen RPM card.
- **Enable back buffer copy mode** optimizes the performance of Kinetix 3D Studio MAX R2. Used in conjunction with settings in 3D Studio MAX R2, the contents of the back buffer are copied into the front buffer, while the contents of the back buffer remain unchanged. If disabled, front and back buffer contents are actually swapped, which is faster for most applications.
- **Enable buffer sync mode** swaps the front and back buffers during your monitor’s vertical blank period. Although there is a potential performance loss, this feature improves image quality by eliminating tearing.

Chapter 3 - Troubleshooting & Technical Support

Troubleshooting

If you have trouble using your Oxygen RPM card or a 3D application, you may find the answer to your problem in the following sections. Always start your problem solving efforts with the simplest solution and work up to the more complex ones.

Monitors and Display Resolutions

Question: My monitor is either blank, or the displayed image is distorted, scrambled or smaller than I expected.

Solution: If the monitor is blank, be sure that your system and monitor are plugged in and turned on. Is the monitor's power cord attached securely? Check each component's documentation for the location and use of power connectors and switches.

Solution: Make sure that your video cable is connected securely to the monitor *and* to the monitor connector on your Oxygen RPM card. See your monitor documentation and Chapter 1 - Installation, in this document.

Solution: Your card might not be seated properly in the AGP slot. Remove and reinstall your card as described in Chapter 1 - Installation. Remember to use the anti-static wrist strap when opening your system and handling the card.

Question: The performance of and/or the available resolutions for my Oxygen RPM card are not what I expected.

Solution: The Oxygen driver may not have installed fully, or a file may have been corrupted. Try installing the driver again.

Solution: You may have selected a display setting that is incompatible with accelerated 3D graphics applications. See *Appendix A - Oxygen RPM Specifications*, for a list of compatible resolutions.

Question: When I restart my system, an “Invalid Display Settings” message appears on-screen, followed by “The default display resolution has been temporarily used by the system.”

Solution: Within a few seconds, the error messages should be replaced by a window that allows you to set a display resolution. Pick your preferred resolution from the list and you should get the sharp results you expected.

Systems and Networks

Question: Since installing the Oxygen RPM card, my system either hangs or crashes to a blue screen when I try to start up, or the system starts up but VGA graphics don’t display.

Solution: Make sure that you are not using an old graphics board driver, and that you have uninstalled any graphics drivers other than Oxygen RPM — particularly those drivers provided by other companies using 3Dlabs chipsets.

Solution: Please see the System Integration Guide in the FAQ section at http://www.3dlabs.com/tech/index.html.

Solution: You may need to update your BIOS. See your system documentation for BIOS upgrade information.

Question: I’m experiencing network problems since I installed my Oxygen RPM card.

Solution: If your Ethernet adapter is ISA-based, there may be a conflict between it and your Oxygen card. To resolve a conflict:

1. Go to Start/Programs/Administrative Tools and open Windows NT Diagnostics.
2. Click the Resources tab and select the IRQ button at the bottom of the panel.
3. If the same IRQ address (found in the IRQ column) is assigned to the Ethernet adapter and the Oxygen card, go on to step 4. If they are different, see the next solution.
4. Open the Network control panel and click the Adapters tab.
5. Select your network adapter and click the Properties button. A setup box appears.

6. Enter an unused address in the setup box (check your system documentation for a list of valid IRQ addresses) and click OK twice. The control panel will close and a restart prompt appears.
7. Click Yes to restart your system.

Solution: You may need to reinstall or update your Ethernet driver. See your system or Ethernet adapter documentation for more information.

Question: I am experiencing intermittent system hangs, even though my system and Oxygen RPM card are new.

Solution: Certain motherboard/BIOS combinations have demonstrated a predisposition to the intermittent system hangs described. Systems using Intel BX and GX motherboards seem particularly susceptible. The issue is resolved by installing Windows NT Service Pack 4, which is available from Microsoft.

Reaching Technical Support

If you cannot find the problem you are experiencing, or the solution to a problem, listed in this chapter, check the 3Dlabs web site for additional help. To contact 3Dlabs Technical Support, send an e-mail to:

support@3dlabs.com

Be sure to include a description of your system and the exact steps required to recreate the problem.

Chapter 4 - Glossary

Terms and Definitions

AGP: Accelerated Graphics Port.

AGP Sideband Addressing: A method of data transfer where the graphics controller can issue new addresses and requests simultaneously as data continues to move from previous requests on the main data/address wires.

Alpha Blending: This means to create transparent objects by allowing for the blending of pixels to simulate the transparency characteristics of an object. With alpha information, an object can be designed from being totally transparent to opaque.

Alpha Buffer: A portion of the frame buffer used to define the transparency value of a pixel in the frame buffer. This data can be used to blend the frame buffer pixel with the pixel to be drawn to create a composite pixel.

Anti-Aliasing: A technique employed to remove any jagged edges from an object to appear smooth. This is accomplished by gradually modifying the hue and saturation of pixels.

API: Application Programming Interface. The API translates the instructions from the application program into device commands that are specific to the screen's display controller, the graphics board.

Atmospheric Effects: Effects that mimic fog, rain, snow and smoke by using a blend function that varies with depth in the scene. Also referred to as Depth Cueing.

BIOS: Basic Input/Output System. A program code in computer memory that performs the self-test, etc. during system startup.

Bilinear Sampling: A process whereby texture mapping is done through filtering a group of texels sampled from the texel buffer in 2 dimensions.

Clipping: Removal of elements or sections not contained within the active viewing volume.

DAC: Digital to Analog Converter. The DAC converts the digital signals representing the color values of each pixel to analog voltages suitable for driving the CRT display.

Depth Cueing: A technique used to give the illusion of depth. With depth cueing, the part of an object that is farther away is displayed with a lower intensity to give the effect of depth.

Dithering: The process of converting an image with a certain bit depth to one with a lower bit depth. Dithering enables the application to convert an image's colors that it cannot display into two or more colors that closely resemble the original. Dithering works because the mind is tricked by the pattern of colors into thinking it's a different color.

DMA Sub Buffers: Direct **M**emory **A**ccess Sub Buffers partition the data sent to the graphics card from the host processor in order to optimize performance**.**

Double Buffering: With double buffering, images are rendered in the back buffer and then displayed on the screen once the drawing is completed. This results in the smooth, flicker-free rotation and animation of 3D models and scenes.

Driver: A driver is a special interface program that is developed to perform the communication between the application program, the device (i.e., graphics peripheral) and the operating system.

ESD: Electro**S**tatic **D**ischarge. Sparks that move from an electrically-charged object to an approaching conductive object.

EVGA: Extended **V**ideo **G**raphics **A**rray. EVGA runs at a screen resolution of 1024 x 768.

Flat Shading: The simplest method of shading. Each triangle is assigned one single color, resulting in a faceted appearance of the surface.

Floating Point: Refers to the data type that allows numbers to be represented in Scientific Notation for greater range. Floating point operations can be implemented in hardware or software.

Floating Point Processor: An arithmetic unit designed to execute floating point operations. It may be implemented in a variety of ways such as a co-processor chip or a CPU with built-in floating point capabilities.

Frame Buffer: An area of memory used to hold a frame of data containing the displayable color buffers (front, back, left, right, overlay, underlay), their (optional) associated alpha components, and any associated (optional) window control information. This memory is typically separate from the local buffer.

Geometry: The intermediate stage of the 3D pipeline, geometry determines the location of the object and the frame of reference of the viewer in relation to the object.

Geometry accelerator: A high performance graphics engine that performs geometry calculations.

Gouraud Shading: This method of shading, more complex than flat shading, shows subtle color changes across an object. Gouraud Shading is accomplished by incrementally changing pixel color values smoothly from one vertex to another across the polygon.

Graphics Accelerator Card: A graphics accelerator performs 3D functions in the hardware, thereby relieving the CPU of repetitive, complex and intensive calls. This results in enhanced performance and speed.

IRQ: **I**nterrupt **R**e**Q**uest lines are hardware connections that can transmit interrupt signals from hardware subsystems to the CPU to trigger certain procedures.

MCAD: **M**echanical **C**omputer **A**ided **D**esign.

MIP-Mapping (for texture processing): MIP-mapping (*multim in parvo* – many things in a small place) is a method of texture mapping where multiple texture maps are used to more accurately map the texture onto objects or surfaces of objects of different distances from the view point. Each MIP-map is a lower (approximately half) resolution version of another MIP-map.

MMX: **M**ulti **M**edia e**X**tension, a set of 57 instructions, to be added to the x86 processor, to accelerate signal processing operations for multimedia.

Multiple Resolution Support: The ability to support multiple resolutions on the screen.

OpenGL: The industry standard library of advanced 3D graphics functions developed by Silicon Graphics, Inc.

PCI: **P**eripheral **C**omponent Interconnect.

Perspective Correction: A function that allows an object to maintain its 3D textural features as it moves away from the viewer, into the background.

Pipelining: A basic hardware tool for accelerating processes by performing multiple operations in a multi-stage pipeline simultaneously.

Pixel: The smallest addressable element of a cathode ray tube display. More simply put, the individual dots that make up the screen image.

Pixel Depth: The total number of bits per pixel (in all buffers combined), which is 112 bits per pixel for the Oxygen GMX.

Point Sampling: The basic method of adding texture to an object. Point sampling does not include any filtering of textures.

RAMDAC: The last component in the graphics subsystem pipeline that translates a digital image into an analog representation. This component contains a color table RAM and the DAC that converts digital signals to analog signals (see *DAC*).

Rasterizer: A chip that controls the rasterization process.

Rasterization: A method to fill in colors for all pixels bound by vertices.

Refresh Frequency: The rate at which the monitor refreshes the screen. Generally quoted in Hz.

Rendering: The final and most rigorous stage in the 3D pipeline where an object undergoes shading, texturing, etc.

RGB: **R**ed, **G**reen, **B**lue. Color information that is saved using the Red/Green/Blue color format.

RISC: **R**educed **I**nstruction **S**et **C**omputing.

SDRAM: **S**ynchronous **DRAM** is a cost-effective solution to improve bandwidth to and from memory, resulting in increased graphics performance.

SDTP: **S**uper **D**esk**T**op **P**ublishing. SDTP runs at a resolution of 1,600 x 1,200.

Stencil Buffer: The stencil buffer assists with the creation of effects such as decals on the surface of an object.

Stipple masking: A technique that spatially creates transparent effects by rendering an object through various patterns.

SVGA: **S**uper **V**ideo **G**raphics **A**rray. SVGA runs at a resolution of 800 x 600.

Tessellation: The process of breaking parametric surfaces in the model geometry into component polygons that can be processed by the rest of the 3D pipeline. Although additional computation is required, rendering is more realistic when a higher number of polygons are used to represent a surface.

Texels: **Tex**ture **El**ements, the name used for the smallest addressable element of a texture map.

Texture Mapping: A technique that enables 2D graphic images to be “wrapped” around or “pasted” on to a 3D primitive. Perspective correction and lighting calculations allow for added realism.

Transformation: The change in rotation, size and perspective of an object in 3D space as part of the geometry operations.

Transparency: A function that refers to the rendering of transparent (non-opaque) objects. Transparency is generally accomplished on a polygon rendering system using either screen-door transparency (stipple masking) or alpha blending.

Trilinear Sampling: A process whereby texture mapping is done through filtering a group of texels sampled from the texel buffer in 3 dimensions. This technique is commonly used to sample texels from MIP-maps.

True Color: Graphics mode with approximately 16.8 million colors (24 or 32 bits per pixel) where full color information is saved for each pixel.

Vblank: The interval during which the screen is blanked so as to conceal the retrace line as the CRT guns reset from the lower right corner of the screen to the upper left corner. Since the CRT is blank during this interval, the front and back buffers are swapped at this time.

Vectors/second: Lines drawn per second.

VGA: **V**ideo **G**raphics **A**rray. VGA runs at resolutions up to and including 640 x 480.

VHR: **V**ery **H**igh **R**esolution. VHR runs at a resolution of 1,280 x 1,024.

VRAM: **V**ideo **R**andom **A**ccess **M**emory is an expensive, fast type of RAM that is used as display memory on high-end graphics boards.

VRML: **V**irtual **R**eality **M**odeling **L**anguage.

Z-Buffer: The z-buffer is the part of the frame buffer that stores the depth value (z-axis) for each pixel. It facilitates hidden-surface removal by comparing the z value of the pixel to be written to that of the existing pixel, and allowing or not allowing the pixel to be overwritten depending upon this comparison.

Appendix A - Oxygen RPM Specifications

General Specifications

Feature / Function	Implementation
Card size	Full-length AGP
Power requirement	0.25W @ 12V, 10W@ 5V, 15W @ 3.3V
Geometry processing	Software: Power Threads technology for multithreaded OpenGL
Rasterizer	2 Oxygen RPM rasterization engines
RAMDAC chip Pixel frequency	2 TI TVP 3026 250 MHz
Memory	64 MB 128 MB with expansion module

Supported Resolutions

Display Resolution	Color Depth	Vertical Refresh
800 x 600	True Color	75
1,024 x 768	True Color	60, 70, 75, 85, 100
1,152 x 900	True Color	66, 76
1,280 x 1,024	True Color	60, 66, 85
1,600 x 1,200	True Color	60

Appendix B - Warranty and Licenses

Three (3) Year Parts and Labor Limited Warranty

3Dlabs warrants that the Product will be free from defects in materials and/or workmanship for a period of three (3) years from the date of purchase. During the warranty period, 3Dlabs will correct any defects in material or workmanship, or any failure of the product to conform to hardware specifications, at no-charge for in-house labor and materials. Shipping costs must be pre-paid by Buyer. Any replacements parts/products will be new or serviceably used, and are warranted for the remainder of the original warranty or thirty (30) days from the date of shipment of the parts/products, whichever is longer. The warranty period is not extended as a result of purchasing any additional parts/products from 3Dlabs. Buyer must notify 3Dlabs in writing if there is a defect in material or workmanship. Written notice in all events must be received by 3Dlabs before expiration of the warranty period. This warranty is non-transferable. A purchase receipt or other proof of date of original purchase will be required before warranty is rendered. This warranty only covers failures due to defects in materials or workmanship that occur during normal use. It does not cover damage that occurs in shipment or failures that are result from, but are not limited to, accident, misuse, abuse, neglect, mishandling, misapplication, alteration, modification, fire, flood, earthquake, explosion, lightning, line power surge, introduction of sand, dust, humidity and liquids, or service by anyone other than 3Dlabs or an authorized 3Dlabs service center, or damage that is attributable to acts of God.

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Appendix C - Declaration of Conformity

We, 3Dlabs, Incorporated,
480 Potrero Avenue
Sunnyvale, CA 94086
Phone 408-530-4700
Fax 408-530-4701
United States of America

declare under our sole responsibility that the product

3Dlabs® Oxygen™ RPM

to which this declaration relates are in conformance with the following standards:

EN55022:1987
EN50082-1:1992
IEC801-2:1984
IEC801-3:1984
IEC801-4:1987

following the provisions of the 89/336/EEC Directive.
San Jose, California, September 30, 1998
3Dlabs, Inc.

We, 3Dlabs, Incorporated,
480 Potrero Avenue
Sunnyvale, CA 94086
Phone 408-530-4700
Fax 408-530-4701
United States of America

declare under our sole responsibility that the product

3Dlabs® Oxygen™ RPM

comply with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interferences that may cause undesired operation.

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