Heavy Metal™ User Guide

**System Operation Manual for
Quantum3D Heavy Metal
Visual Computing Systems**

**Release 1.0
January 20, 2000**

Part Number: 700-1000-01

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1. Legal Stuff

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2. Quantum3D Visual Computing Systems

Congratulations on choosing a Quantum3D Heavy Metal Visual Computing Platform from Quantum3D, Inc. From the motherboard to the graphics subsystem, Heavy Metal GX+ and Heavy Metal BX represent the latest in PC technology. Quantum3D Obsidian2, Mercury and AAlchemy graphics systems coupled with Intel's latest L440BX and L440GX+ motherboards, offer unsurpassed graphics bandwidth and performance.

The Heavy Metal product family name is derived from the motherboard and graphics products used at its foundation. Heavy Metal GX+ Mercury and AAlchemy contain Quantum3D hardware for full scene anti-aliasing and utilize the Intel L440GX+ motherboard (GX+). Heavy Metal BX Iron utilizes the Quantum3D Obsidian2 200Sbi (Iron) and the SuperMicro P6DBS motherboard (BX Chipset).

Heavy Metal systems provide scalability, use an open systems architecture, and can be easily upgraded. Heavy Metal systems offer a high degree of reliability through individual, highly integrated performance components designed by the leaders in the PC industry. Quantum3D systems can be configured as multi-channel systems using a **Shared Channel** or **Distributed Channel** architecture.

Quantum3D Heavy Metal BX and GX+ are PC systems specifically designed for deployment into any environment, including the most hostile. Heavy Metal visual computing platforms can be used as stand alone visual computing platforms, or can be configured as a single multi-channel system by adding easily integrated components. Each system can be configured and upgraded with a range of cost effective, high performance RAM, media and 3D graphics options.

Heavy Metal systems provide the following key system benefits.

- Industry-standard open architecture using the best in PC components
- Industry-leading polygon performance that utilizes Intel Pentium III SIMD extensions
- High degree of reliability and ruggedness
- Polygon transform and lighting independent of frame buffer
- Independently upgradeable polygon and fill rate performance
- Varying levels of image quality and fill rate performance
- Additional channels do not decrease geometry or fill rate performance
- Support for low level extreme performance APIs
- Support for general purpose graphics APIs
- Support for high level Scene Manager APIs

3. Unpacking Your Quantum3D System

3.1. Inspect the Shipment

Heavy Metal systems are packaged to withstand the roughest of treatment during shipping. The box, foam core padding and a static sensitive bag should be kept in case you need to ship the system back to Quantum3D for any reason. Also included in the packaging is an accessory box and a 3 ring binder containing all warranty information, hardware documentation, miscellaneous cables, and software drivers for the Heavy Metal computer system. Be sure to place the System Information 3 ring binder in a safe place for future reference.

When you receive the Heavy Metal computer system you should perform a first time inspection to ensure the newly delivered Heavy Metal product is operating at 100%. Monitored shipping tags have been placed on each box to ensure a safe delivery. Tip and Tell and ShockWatch labels should be inspected at the time of delivery before your signature of acceptance has been given to the delivery driver. Any claims for damages made during shipping depend upon these labels, and must be noted in the deliverers shipping bill when you receive it.

You should be able to lift approximately 50 pounds in order to unpack a Heavy Metal system. If you are unable to lift this weight you should obtain assistance with the first few steps of unpacking the system. The following tools are needed.

> A Small Knife to cut packing tape
>
> #2 Phillips Screwdriver

Inspect the cardboard box that the system arrived in. If there is any unusual damage to the box, make note of the damage.

3.2. Check the Tip and Tell

Tip and Tell will inform you if the box has been tipped over or mishandled during shipment. Blue beads in the tip of the arrow means the warning label has been activated. Contact Quantum3D Technical Support for assistance. See chapter 15 Technical Support for information on contacting technical support.

Warning Label
Not-Activated

Warning Label
Activated

3.3. Check the ShockWatch

ShockWatch will inform you if the box has had rough handling or has been dropped during shipment. A red mark in between the arrows indicates the warning label has been activated. Contact Quantum3D Technical Support for assistance. See chapter 15 Technical Support for information on contacting technical support.

Warning Label
Not-Activated

Warning Label
Activated

3.4. Open the box

Carefully cut the tape on top of the large cardboard box.

3.5. Remove the Accessory Box

The Accessory Box is a thin box packed on top of the computer system within the large box. Remove this box and set it aside.

3.6. Remove the computer system

Clear a large area on a desk or table on which to place the computer system. You can also place the computer temporarily on the floor. Keeping your back straight, bending at the knees and using your legs as much as possible, place each of your hands directly on the ends of the computer system, pull the system and the blue foam out of the box and place it on the cleared area. Remove each of the foam ends and place back in the box. Remove the plastic static/dust guard from the system and place it back in the box.

3.7. Open the smaller Accessory Box

Carefully cut the tape that holds the Accessory Box closed.

3.8. Locate the packing list and confirm contents

Confirm the contents of the Accessory Box. Ensure that each part is free of damage.

3.9. Heavy Metal GX+ Contents

1 Swap Lock Cable
  2" Internal Swap Lock
  6" Internal Swap Lock

2 Medusa Cable

3 Power Cable

4 Windows NT 4 Pkg.

5 Kingston Carrier
          +Manual

6 Intel L440GX Manual
  Intel L440GX CD

7 Materials Checklist
  QA Confidence Report
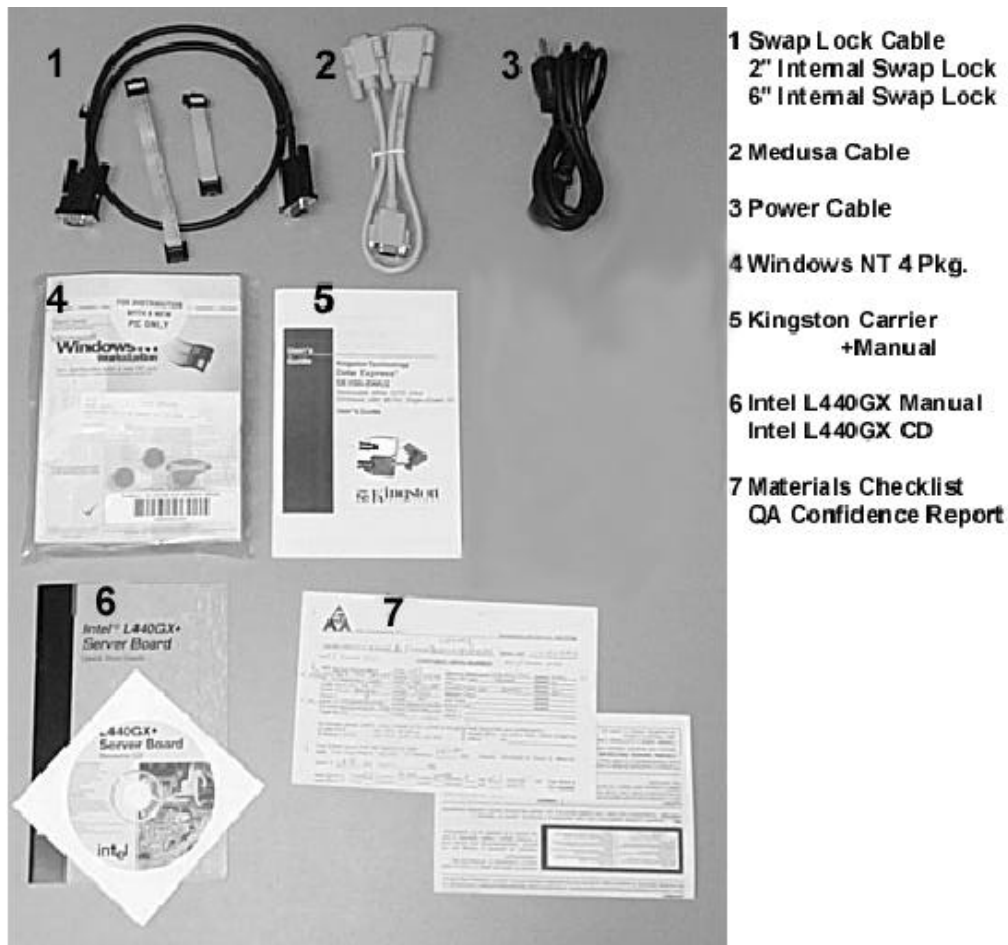
3.10. Heavy Metal BX Contents

1 Medusa Cable
   Swap Lock Cable
   2" Internal Swap Lock
   6" Internal Swap Lock

2 Material Checklist
   QA Confidence Rpt.
   Power Cable

3 Obsidian 2 Manual
   Obsidian CD

4 Windows NT 4 Pkg.

5 Super Micro
       SCSI Manual

6 2D Video Card CD
          + Manual
   Viper 550
      or
   ATI Rage PRO

7 Kingston Carrier
   Manual + Keys

8 Super Micro
       Manual
       CD
       Diskettes

4. First Time Inspection

Ensure the system is on a flat surface. Use a screwdriver to remove the screws that secure the lid to the system chassis. The Motherboard Layout and Lithium Battery Warning Label are located on the underside of the lid.

Figure 4-1 Location of the lid screws on Heavy Metal systems.

4.1. Confirm Components are Seated Properly

Look for loose cables, hardware expansion cards unsecured or loose in their slots and floating nuts and bolts inside the system.

ISA Bus Slot

SCSI Cable   PCI Bus Slots

RAM

CPUs

Drive Bay   Power Supply
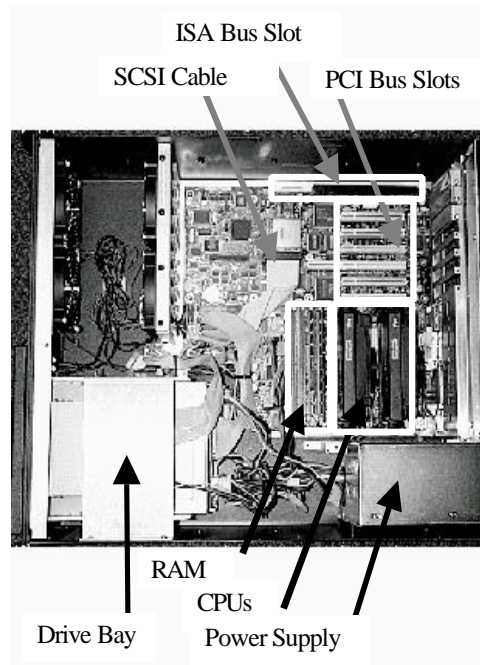
Figure 4-2 The picture above is a Heavy Metal GX+ system without any PCI or ISA cards installed. Heavy Metal BX has a similar layout.

4.2. Confirm Installation of Expansion Cards

Confirm that all PCI, AGP, and ISA cards are properly seated in their slots and are secured to the back face using screws on the top of each bracket. These cards usually include NICs, secondary display adapters, GCI-2, Audio and I/O cards.

Un-Seated in PCI slot
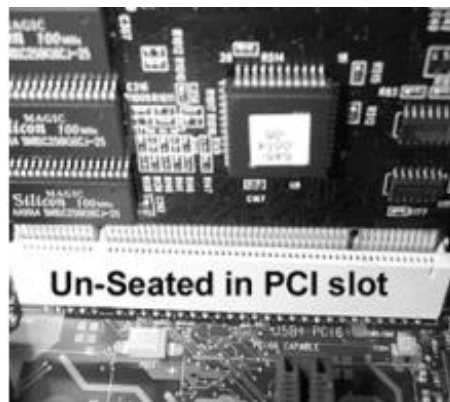
Figure 4-3 The expansion card above is not seated properly in the PCI slot. Note that it is possible to see the pins and the notch more on the right of the card, then on the left.

Securly Seated in PCI slot

Figure 4-4 The expansion card above is
seated properly in the PCI slot. Note that it is
difficult to see the pins in the slot as well as
the notch. The card is level in the slot.

4.3. Confirm that the CPU and RAM is properly seated
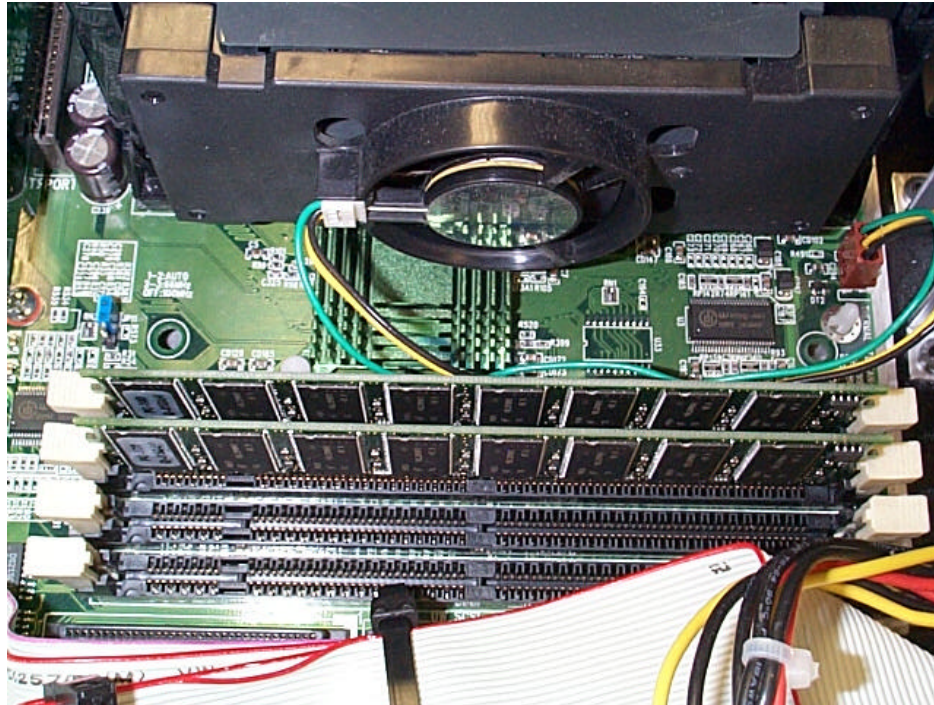
Figure 4-5 Above is a picture of a properly seated CPU and memory modules. RAM clips are properly holding the DIMMS in place.

4.4. Confirm that the cables are attached properly to the floppy, CDROM, and hard disk.
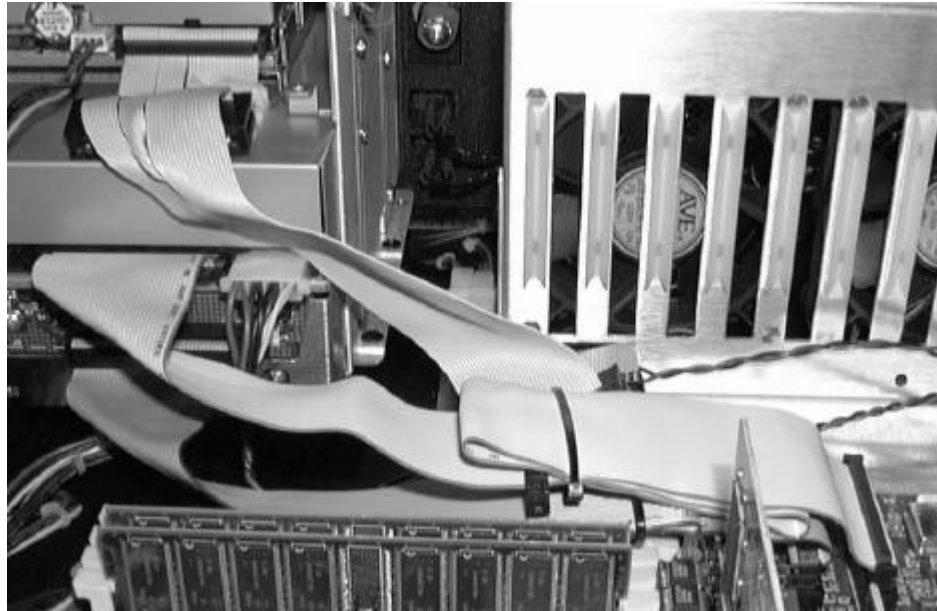
Figure 4-6 Above is a picture of properly connected Floppy, CDROM and Disk Drive cables.

4.5. Confirm the Bill of Materials

The BOM controls the configuration of your system. It is the specification of individual components in the system. To ensure that your system is configured properly, you need to compare the BOM with your system. While the system is still open, confirm the following components match the BOM.

- PCI, AGP and ISA cards

- CPU Type and Clock Speed

- Amount and Type of RAM

- Hard Disk Size and Type

5. Installation

5.1. Installation of a single channel stand-alone system

5.1.1. You will need the following items, not supplied with the system.

1-Multisync monitor capable of at least 1024x768@60 Hz operation for the 3D Display. Projection systems, HMDs, and large screen monitors are also commonly used as 3D display devices. If you have specific questions about compatibility, please contact Quantum3D Technical Support.

(1) Multisync monitor capable of at least 1024x768@60 Hz operation for the primary Windows Display. You may wish to have a high resolution display if you are using any software that utilizes a GUI for its operation.

(2) 15 Pin Video/Monitor Cables (Transducers are highly recommended).

(1) CAT5 Network Cable and Operating network connection.

5.1.2. You will need the following from your Accessory Box

25 Pin to 15 Pin Medusa Cable (T-style monitor adapter)

18" Black External SwapLock™ Cable

Keyboard (Optional)

Mouse (Optional)

Power Cord

5.1.3. Power Requirements

The systems are equipped with auto sensing power supplies that handle electricity in the ranges 120-240VAC 50-60Hz. We recommend that rack mount systems have a dedicated 20amp circuit with a clean current for proper operation.

5.1.4. Keyboard, Mouse, Monitor and Network Connectors

The Keyboard and Mouse connections are PS2 and are well marked towards the left of the PC rear I/O panel. A diagram for your exact PC is on the back face of the system.

Heavy Metal BX Primary Display Adapter and NIC are located to the right of the keyboard mouse connectors in and are typically located vertically in AGP and PCI slots respectively. Gently place the network cable in the RJ45 connector until you hear a slight click.

A. Mouse connector
B. Keyboard connector
C. Parallel port connector
D. Serial port connectors
E. Network connector
F. Green NIC LED
G. Orange NIC LED
H. USB connectors
I. Video connector
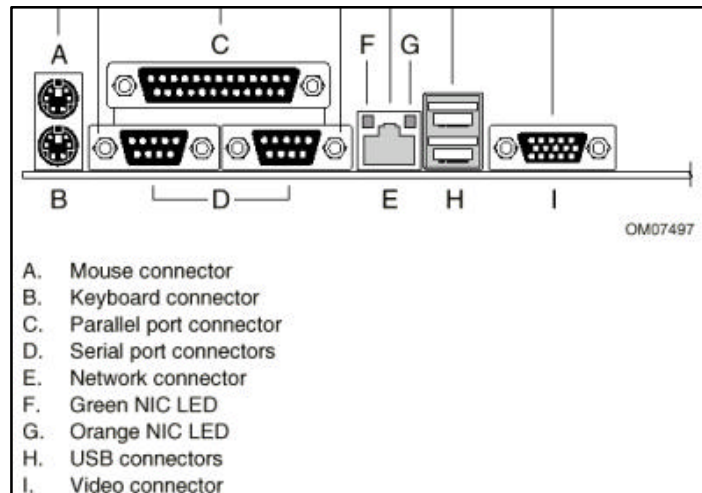
Figure 5-1 The GX+ motherboard. GX+ systems have the Primary Display Adapter and NIC built as an integral piece of the L440GX+ motherboard. Items labeled I and E are in different locations on Heavy Metal BX

5.1.5. Secondary Display Device and Medusa Adapter Cable

The picture below is a Quantum3D monitor adapter cable. This is called a Medusa Adapter Cable. The cable is used for single monitor operation and enables the Secondary Display Adapter to pass through the signal of the Primary Display Adapter when 3D is not being used. In a dual monitor configuration the long end for the Primary Display Adapter is not used. See Figure 5-3 and Figure 5-4 for proper installation of the monitor connections.
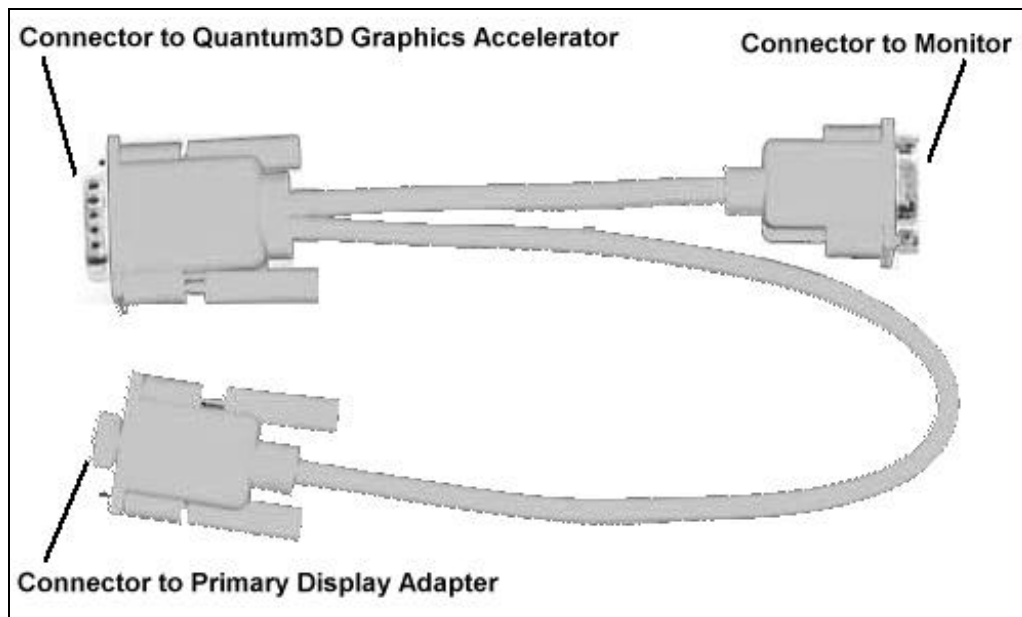
Figure 5-2 Quantum3D Medusa Monitor Cable Adapter
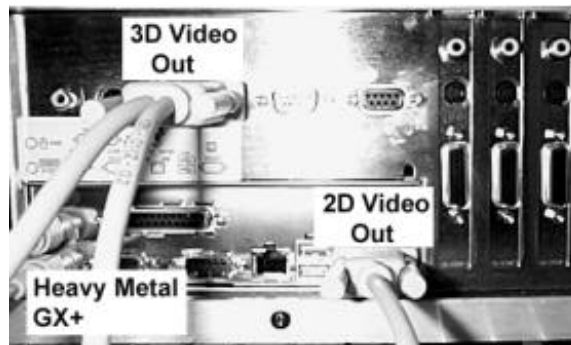
Figure 5-3 Video Output connections for Heavy Metal GX+ with a Mercury Graphics Subsystem. The medusa cable is installed on the 3D Video output. The 2D Video Output can be connected directly to a second monitor if pass through is not being used.
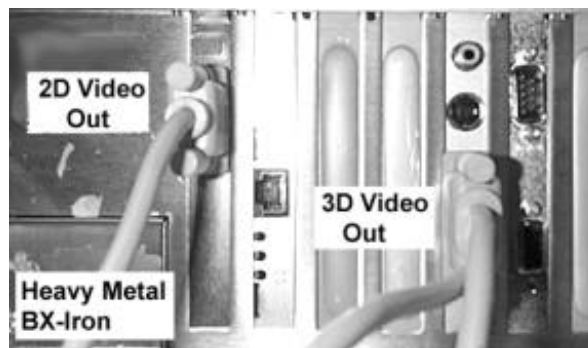
Figure 5-4 Video Output connections for Heavy Metal GX+ with a 200SB/200SBi Graphics Subsystem. The medusa cable is installed on the 3D Video output. The 2D Video Output can be connected directly to a second monitor if pass through is not being used.

5.1.6. Install the Mercury Swaplock Cable

To use a GX+ Mercury cabled for external SwapLock as a stand alone channel you must install the SwapLock cable as shown below.
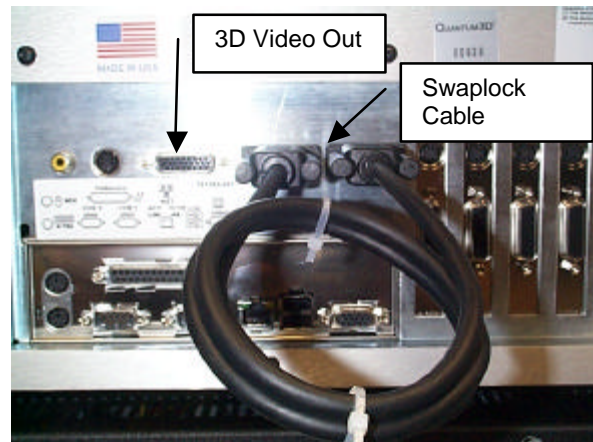
Figure 5-5 External Swaplock cable installed for stand alone single channel operation. If you have a multi-channel system, these are connected from one PC to another to form a ring.

The Mercury Graphics Subsystem the 25 Pin video output is located in the middle of the system, and is oriented in a horizontal configuration.

Attach the power cord to the system and plug it in to a 110-220V grounded power source.

5.2. Powering on a Single Channel, Stand-alone System

Open the front access door of the PC by turning the chrome knob on the left of the panel. The media devices and power switches are protected by this door. Press and release the bottom black button. This will turn on power to the system.

Figure 5-6 The Power Switch is the lowest of the two black switches. The reset switch is the black switch above the power switch. .

5.2.1. Type your question here and then click SearchConfirm that RAM and CPUs are recognized.

As the system boots for the first time, confirm that RAM and CPUs are recognized correctly.

5.2.2. Login to the system

Login to the system by using the Administrator user and pressing the Enter key. We recommend that you change the password the first time you use the system.

Windows 98 Systems automatically logon to the system. This must be changed along with network properties.

5.3. System Shutdown Procedures

To shutdown an individual Heavy Metal PC, you must perform a proper Windows Shutdown. To do this perform the following steps:

- Logon to the system

- Choose Shutdown from the Start Menu.

- Choose the Shutdown Bubble in the Shutdown Computer Window

- Click OK.

If you are running Windows 95 or Windows 98, the system will automatically shu down and power will be turned off.

If you are running Windows NT, a window will appear that will display a Restart Button. At this point it is safe to **press and hold the power switch**. When the system power turns off, you may release the power switch.

If the system will not power off, **hold the on/off switch for 5 seconds.**

6. Verifying System Operation

6.1. 2D Output and Windows Operation

During power on the system will complete the boot process, Windows Startup Screen and Logon window. This is confirmation that power on has been successful. You can now try to logon to the system. If everything is operating well proceed to test 3D video output. The system will be delivered without an administrator password. If you are unable to logon, you must confirm that all devices are connected properly. If you are still unable to logon, if there is no keyboard, mouse, or video output then you should contact Quantum3D Technical Support. Quantum3D Obsidian2 or Mercury 3D Output

6.1.1. Testing the Glide Drivers

After you logon to the system, use the Obsidian2 Display Properties and **Click the Test Button in the Glide Area** of the Window. The device to which the Medusa Cable is connected should sync to the signal and the Quantum3D Logo Test Pattern should appear on the 3D Output device. You can change the resolution and refresh rate to determine if the card, drivers, and monitor are functioning properly.

6.1.2. Running OpenGVS Realworld Benchmarks

For additional confirmation that the system is operating properly, use the OpenGVS Realworld Benchmarks. OpenGVS Realworld Benchmark Demonstrations are found in the following menu:

StartMenu/Programs/OpenGVS RWB 2.3/Glide3/Demo/1024x768

All of the demonstrations under the above menu should operate as expected.

Use F1 for help in using these demonstrations.

6.1.3. Running the OpenGVS SDK Demos

If you have a license for the OpenGVS SDK, the software will be installed in c:\gem. If you wish to run the sample demonstration applications, they may be found in the following menu:

StartMenu/Programs/OpenGVS SDK V4.3/Glide 3 Demos

Any of the shortcuts that are located in the above menu and that that are accompanied by text that designates them as a multi-channel demo (i.e. Fly Comanche (Center Channel), should be run on multi-channel systems only. If you run the center channel application on a stand alone system it will operate, but will be sending channel synchronization messages over the network.

6.1.4. OpenGVS Demo Help

Use F1 for help in these demonstrations. The following keys are excellent examples of Quantum3D Heavy Metal BX and GX performance and image quality. Below are summaries of some of the most valuable control keys that are shared between all demo applications.

F1   Help
Display the help screen over the 3D Output

TAB   Toggle Frame Rate Statistics
Display the Frame Rate in the upper left of the window

F3   Toggle More Detailed Statistics
Display the number of polygons, objects, fill rate and other vital information. This can help locate performance issues like a high ratio of culled objects to examined object ratios.

F4   Reset to Initial States and Position

F5   Toggle Mercury Anti-aliasing
Toggle AA on and off with no performance change.

F7   Toggle Wireframe
Turn solid fill on/off. Useful for viewing where individual polygons are.

F8   Pause
Pause Autopilot

F9   Toggle Texture Mapping
Toggle textures on/off. Useful to see how unrealistic scenes are without textures.

F11   Texture Minification
Toggle between point samples, Mipmapped Bilinear and Mipmapped trilinear. These forms of texture minification filters are used to anti-alias textures. To turn off all AA first turn off Mercury AA with F5 then use F11 to change to point sampling. All AA is free with Mercury.

F12   Screen Capture
Capture the 3D view to a snapXX.tif file in the local directory.

a/A   Toggle Autopilot
Toggle between mouse fly and auto pilot fly.

,/<   Autopilot Playback Speed
Decrease/Increase Playback speed of autopilot.

c/C   Change Camera
Cycle through predefined cameras

l/L   Sun Direction
Decrease/Increase the sun elevation angle

t/T   Time of Day
cycle through predefined time of day settings

f/F   Fog Thickness
Decrease/increase fog thickness

o/O   Record Ownship Position & Rotation Toggle
Start and Stop Recording the Ownship

6.2. Network Operation

See paragraph 5.1.4 for details on connecting the network cable. A green light will blink on the network adapter if the connector is operating. You will need the following information in order to connect to your LAN:

- IP address or DHCP Server Name
- Network mask
- Default gateway
- Domain or workgroup
- Domain suffix search order

All of the above parameters can be specified in the *Network Control Panel* found under the *Start Menu/Settings/Control Panels/Network*.

Alternatively use *Right Mouse on the Network Neighborhood Icon and Choose Properties.* The new Network Properties are set after you reboot. Computers on the network are represented as Icons when you double-click on the Network Neighborhood icon.

7. Heavy Metal Device Numbers and PCI Detection Order

Heavy Metal systems have controls in the Bios Setup that determine the order in which devices are accessed on the PCI bus. The BIOS detection order is displayed in the Obsidian2 Display Properties as the device priority number. This device number is important for the proper monitor connections and Swaplock connections.

7.1. PCI Device Detection Order

The PCI bus detection order is defined by the Bios and usually starts with PCI slot 0 closest to the AGP slot and ends with PCI Slot 3 closest to the ISA connectors. The PCI bus detection order is directly related to the Obsidian 2 device priority number.

7.2. Graphics Device Enumeration

The Device Enumeration determines the Device number that is displayed in the Obsidian2 Display Properties. Device numbers are assigned by the display drivers starting with the default device [0] and incrementing by one as devices are detected in the PCI slots.

7.3. Heavy Metal BX Device Enumeration

The Heavy Metal BX uses the Super Micro P6DBS motherboard. This motherboard BIOS has the ability to change the PCI bus detection order. Under the PNP/PCI icon in the Bios setup page is the PCI bus detection order. This can be either **First to Last** or **Last to First**. The default setting from Quantum3D is **Last to First**.
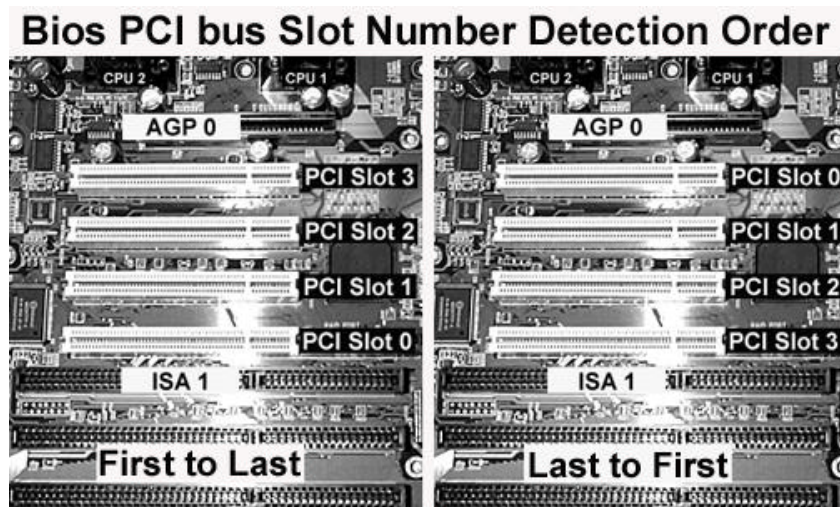
Figure 7-1 Above shows the device detection order for Heavy Metal BX systems.

7.4. Heavy Metal GX+ Device Enumeration

The Heavy Metal GX+ motherboard has a set PCI bus device detection order that cannot be changed. PCI Slot 0 and 1 are on the primary 66Mhz PCI bus. PCI Slots 2 thru 5 are on the secondary PCI bus that runs at a 33Mhz clock rate. The L440GX+ achieves better performance since required application bandwidth can be split across the two PCI buses.

200SBi graphics subsystems should be installed in slots 0-3 respectively. Mercury Graphics Subsystems utilize 4 PCI slots, these devices should be installed in slots 0-3.
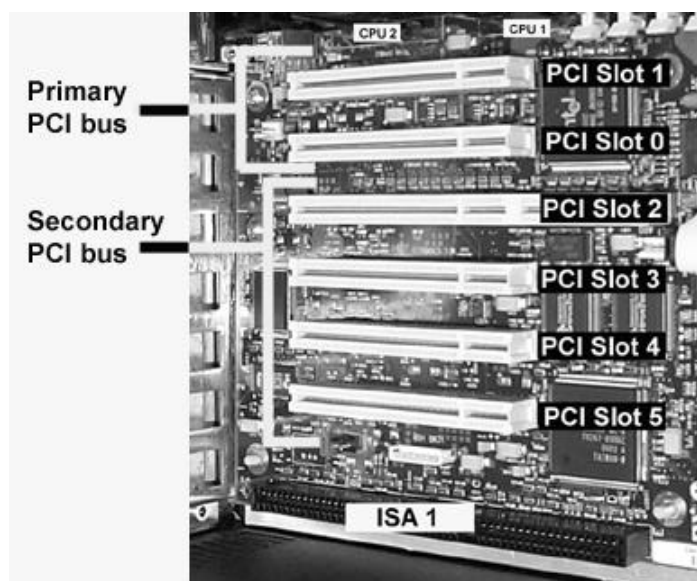
Figure 7-2 The picture above shows the device detection order for Heavy Metal GX+ systems.
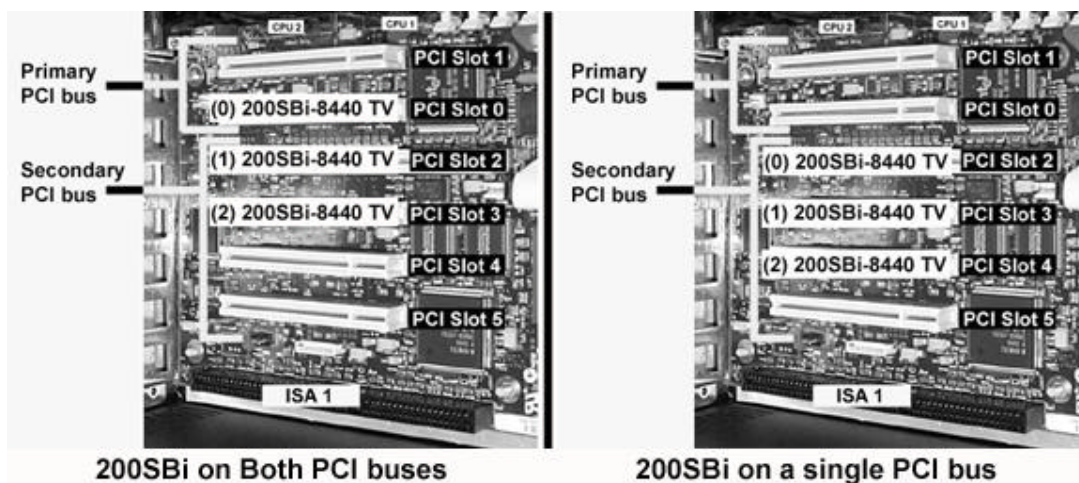
Figure 7-3 The two possible configurations for using multiple 200SBi in a Heavy Metal GX+ system. Both avoid cabling interference of the Swaplock header connectors and the CPU.

7.5. Understanding the Device Number

When working with multiple 200SBi install in a single Heavy Metal system, the Obsidian2 Display Properties Sheet will assign a device number to each 200SBi detected by the drivers. These device numbers correspond to the order in which the PCI bus detected the devices. The device number determines which the order in which the graphics devices are used by an application. Typically each 200SBi is used to display to a single display device such as a monitor or projector. If there is more than one 200SB device then the device number or device priority number is displayed in the Obsidian2 Display Properties Sheet. The device number is denoted by square brackets. This number also corresponds to the order in which the device was enumerated on the PCI bus.

The picture below represents a system with 3 200SBi installed in PCI slots 0-2 or 1-3.
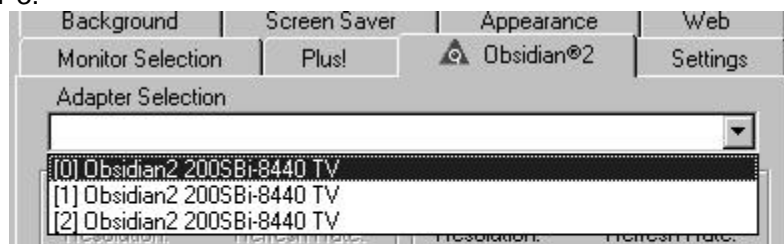
An application program written to use a single device, will use device [0] by default. However an application program implemented to support multiple graphics devices will reference devices in the order in which they are detected on the PCI bus. OpenGVS uses the convention of device[0]=left, device[1]=center and device[2]=right.

EXAMPLE 1: The first 200SBi is installed in a BX system in PCI slot 0. The device is denoted with a [0] in the display properties. Then one more 200SBi is installed in PCI slot 2. This second device is denoted with [1] in the Obsidian2 Display Properties since it is the next available device (even though it is in PCI slot 2).
EXAMPLE 2: First 200SBi is installed in a GX+ system in PCI slot 2 the Obsidian 2 Display Properties specifies the device as device [0]. Then a 200SBi is installed in PCI slot 3 . The device numbers for the second device in PCI slot 3 is [1]. A third 200SBi is installed in PCI slot 4 . The device numbers for the third device in PCI slot 4 is [2].

In a 3 channel system utilizing Swaplock, device [0] must always have the Master Bubble checked in the Obsidian2 Display Properties. Device [1] and [2] are then set to slave. The cabling must also be correct when connecting all three 200SBi for a Swap Lock ring. See the chapter **8 Swaplock** and section **9.5 Display Properties Settings for SwapLock** for further details.

8. Swaplock

8.1. Overview of SwapLock

The SwapLock feature synchronizes the low level 3dfx Glide function grBufferSwap vertical retrace across multiple 200SB or Mercury systems. This eliminates artifacts associated with lack of hardware vertical retrace syncronization. SwapLock syncronizes the buffer swap operation associated with double and triple buffered graphics systems such as the 200SB, 200SBi and Mercury.

One channel (Obsidian2 Secondary Display Device) is designated as Master and initiates the synchronization signals. This can be done using the Obsidian2 Display Properties.

The master is always Device [0] in Display Properties and there is never more than one master in a SwapLock ring.

Synchronization signals are carried from the Master card to Slave cards via cables. Both internal ribbon cables and external 9-Pin male to female cables can be used. These cables are specifically manufactured for Quantum3D systems.

The Master and Slave devices are connected in a "ring" so that each slave in turn passes on the synchronization signals to those "downstream", until finally the signals are once again connected back to the Master.

8.2. SwapLock™ Cable Connectors for Mercury

8.2.1. Mercury Cap Card Header Connections

There are 2-10 Pin headers located on the device that are used for SwapLock. Mercury SwapLock headers are labeled identical to the 200SB and 200SBi. J23A is the input and J23B is the output. The output connector J23B is located closest to the CPU and is labeled with a 1.

8.2.2. Mercury Internal SwapLock Cabling

For single channel operation Heavy Metal GX+ must have a SwapLock cable installed. This can be done using an internal loopback ribbon cable as shown below. Damage may occur if these are not properly connected.
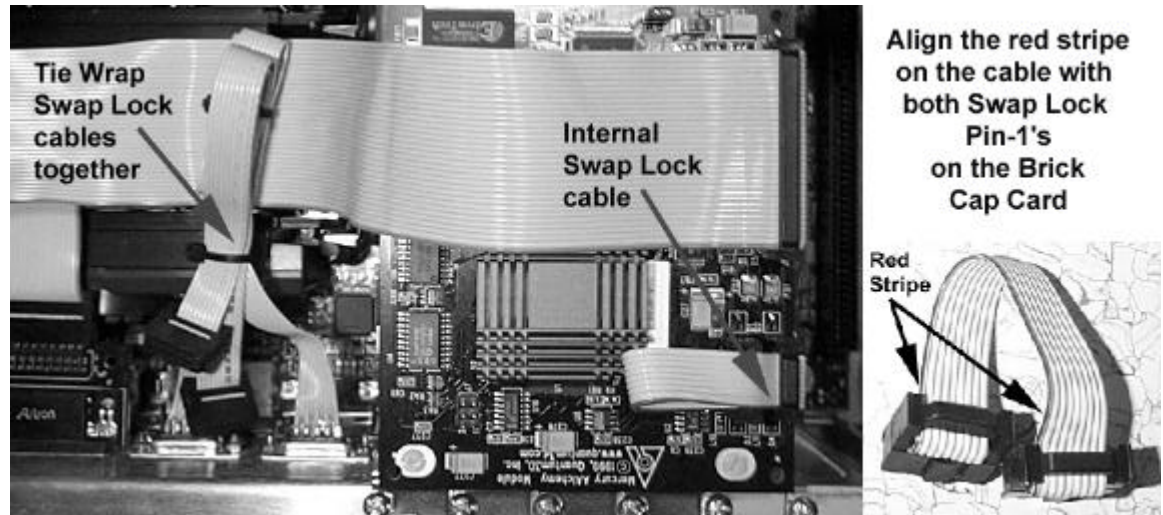
8.2.3. Mercury External SwapLock Cabling

For single channel operation and for easy integration into a Multi-channel system Heavy Metal GX+ can be cabled to use external 9 pin cables. To do this the J23A and J23B are connected to the male and female connectors as shown in the pictures below.
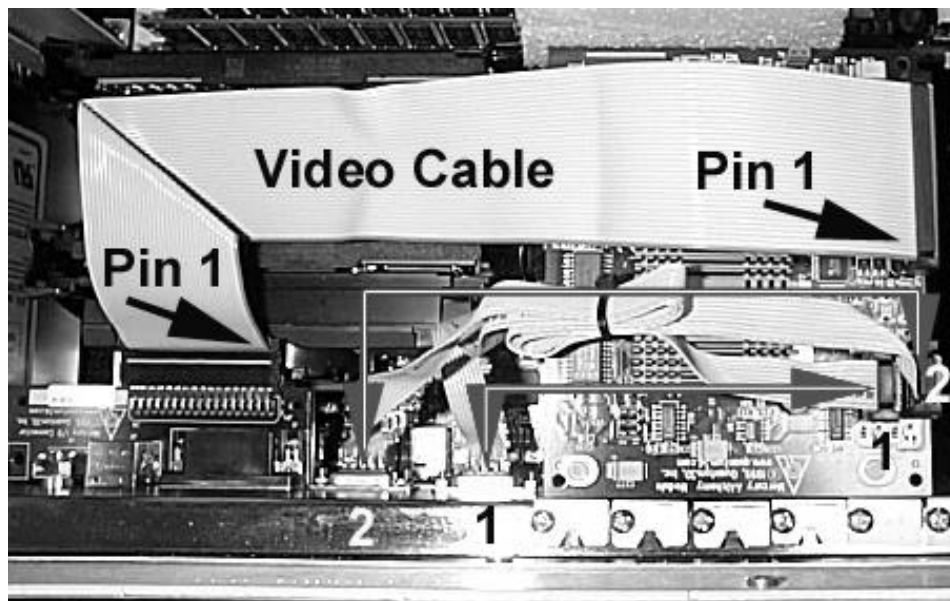
To use a GX+ Mercury cabled for external SwapLock as a stand alone channel you must install the SwapLock cable as shown below.

8.2.4. Configuring Multi-channel Mercury Systems

The single channel Heavy Metal Mercury channels described above can be SwapLocked together using the External Swaplock 9 Pin Cables. In this case you must also use the Obsidian2 Display Properties to control SwapLock. Only one channel must have the SwapLock master bubble turned on. All others must be slaves. Below is a picture of the proper configuration of a 3 Channel Mercury System.
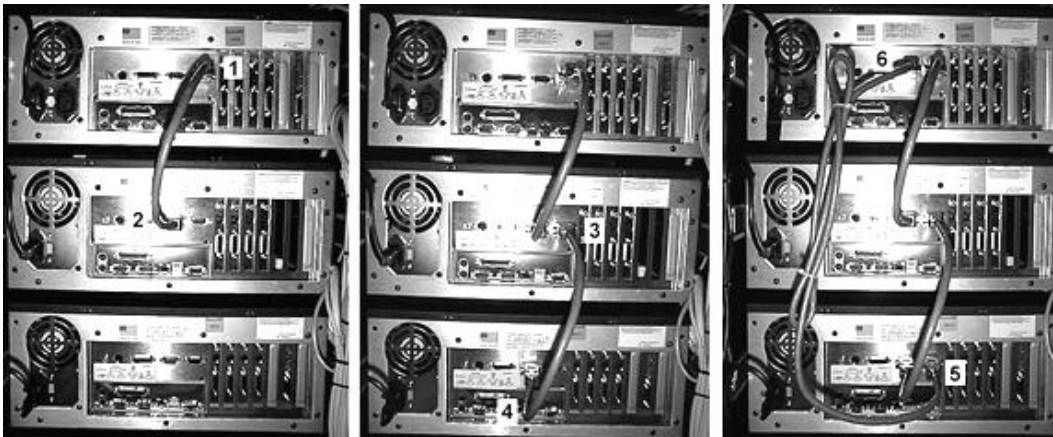
8.3. SwapLock Connections for the 200SB and 200SBi

A single channel Heavy Metal BX with 200SBi does not require any internal or external cabling. When connecting more than one 200SBi accelerator you use 2 10-Pin headers. The SwapLock Input header is labeled J23A and the SwapLock Output Header is labeled J23B as shown below.
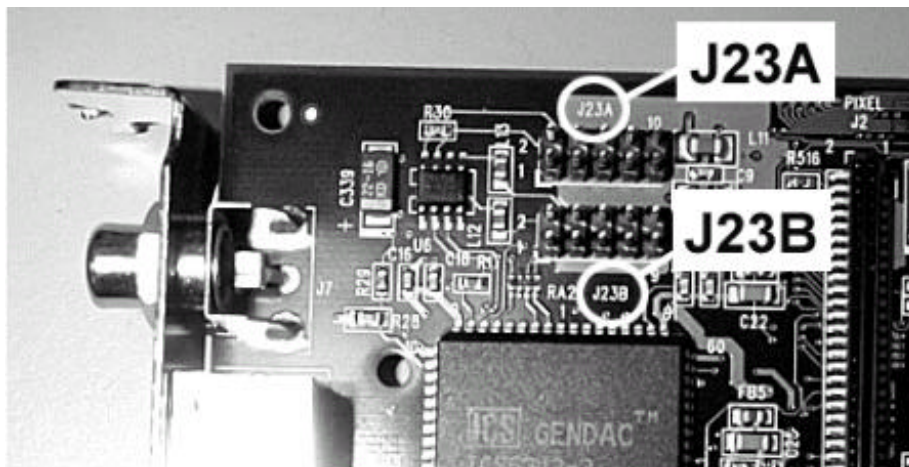
When cabling for SwapLock, J23A (input) and J23B (output) are connected from device[0] to device[n]to form a ring.

If the accelerators are located within the same computer chassis, you use ribbon cables to connect the accelerators.

If the accelerators are in other PCs, you must use the external SwapLock bracket as well as 9-Pin cables as shown below.

The picture below shows the external view of the Swaplock Bracket and on the left and the 9-Pin cables installed on the right. The male and female 9-Pin cable connector are connected to J23A and J23B on the 200SBi (respectively). They may be connected to a single 200SB or incorporated into a larger SwapLock ring as discussed below.
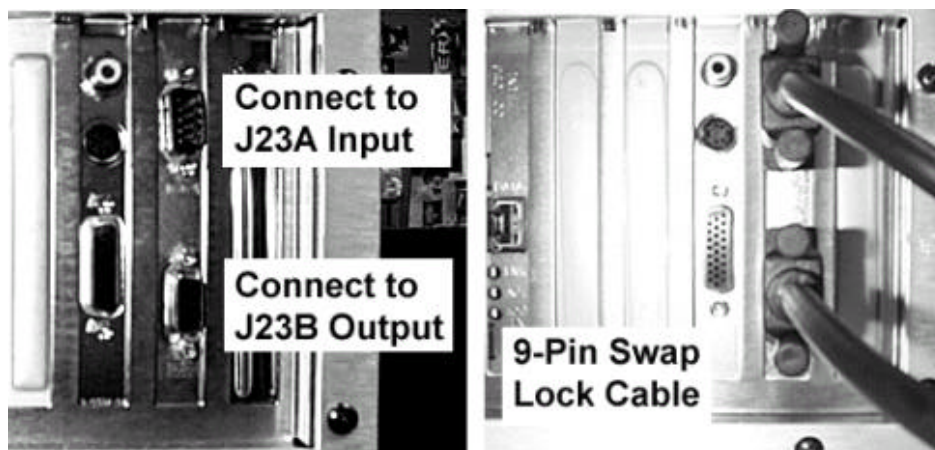
NOTE: When connecting ribbon cables to the SwapLock headers it is important to align Pin1 of the cable with Pin 1 of the header. Pin 1 of these connectors is located on the bottom of the header towards the bulk head bracket and video output. The red stripe on the ribbon cable identifies pin 1 as does an arrow on the ribbon cable connector.

8.4. SwapLock for Shared 200SB Channels

8.4.1. Shared 200SB/200SBi Channels

For Heavy Metal systems with more than one Obsidian2 200SB device, the internal ribbon cables are fitted such that J23B on Device 0 is connected to the J23A of Device 1. This cabling scheme is then replicated on each successive device in the order that they are enumerated. J23B of the last device is then connected to J23A of Device 0. This cabling is internal to the system using ribbon cables.
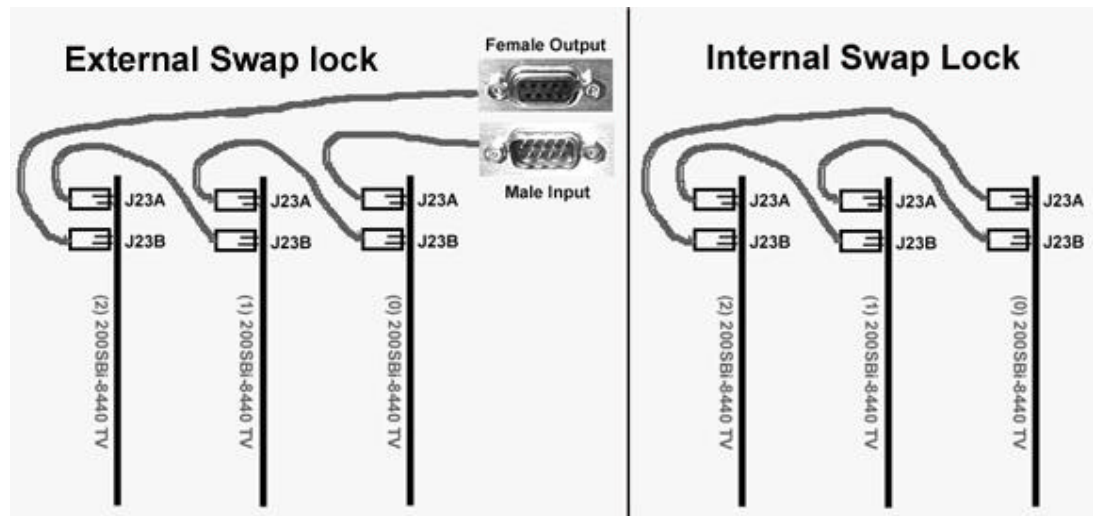
The picture above shows proper cabling for a system using 3 200SB or 200SBi graphics accelerators. External SwapLock can be used to integrate the system with additional channels. Internal SwapLock cabling can be used for a single chassis 3 channel system. If the system is cabled for External SwapLock and is being used as a stand alone system a 9-Pin SwapLock cable must be installed on the Female Output and Male Input.

NOTE: In a 3 channel system utilizing SwapLock Device[0] must always have the Master Bubble checked in the Obsidian2 Display Properties. Device[1] and [2] are then set to slave. The cabling must also be correct when connecting all three 200SBi for a SwapLock ring

8.4.2. 200SB/200SBi Distributed Channels

You can connect this multiple Heavy Metal systems together in a SwapLock ring by using 9-Pin SwapLock cables to connect the chassis.
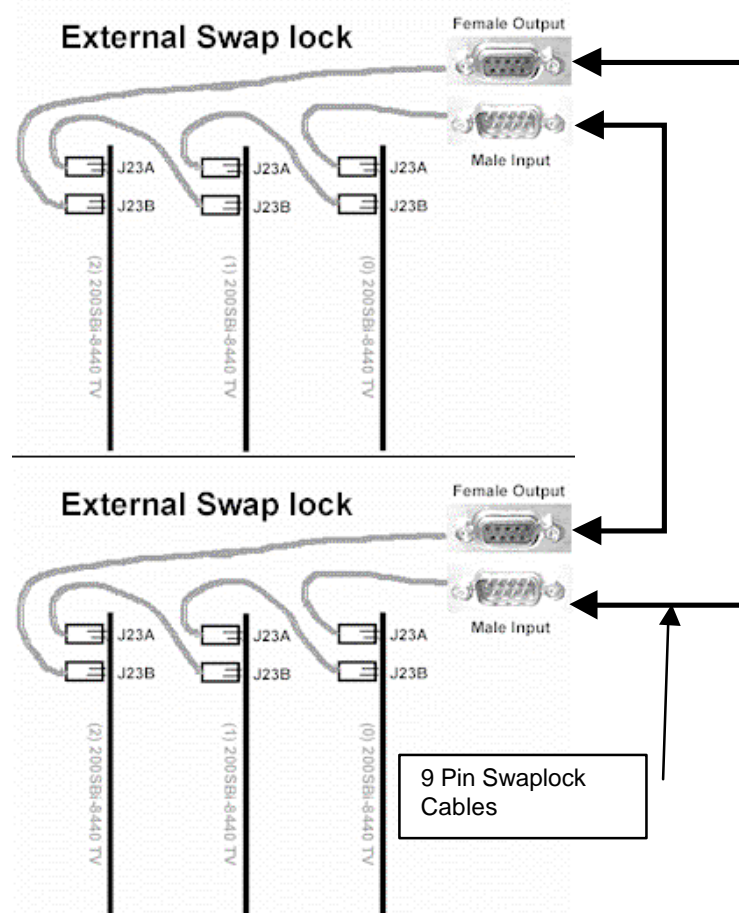
8.5. Application Startup

Applications driving the SwapLock channels must initialize graphics operations in the correct order, otherwise a SwapLock deadlock can occur.

OpenGVS applications that use the Multi-frame buffer utility functions will automatically enable the devices in the order that they are enumerated.

If you are developing in Glide or SimGL the devices should be initialized in increasing order. Device 0 must be the master in the Obsidian2 Display Properties.

If you have more than one application running on multiple PCs then the applications should send information via ethernet to signal that the applications have finished initialization and is ready to loop through the enumerated devices issuing grBufferSwap calls. Typically in this configuration each Heavy Metal PC has only a singlegraphics device.

8.6. Application Shutdown

Applications driving the SwapLock channels must shuitdown graphics operations in the correct order, if one channel is shutdown or halts unexpectedly even channel must be brought down and re-initialized. This means that the application must free all graphics resources, call grGlideShutdown() and then re-initialize all graphics devices with grGlideInit.

8.7. SwapLocking Various Obsidian2 Graphics Systems

SwapLock can also be done with a combination of 200SBi and Mercury

To use Mercury and the 200SBi in a multi-channel SwapLock configuration, the 200SBi must have the Master bubble checked in the Obsidian2 Display Propertied Tab. A Mercury can be a slave to the 200SBi but the 200SBi cannot be a slave to Mercury.

9. Using Obsidian2 Display Properties

9.1. Confirming Device Enumeration

Confirm the device numbering using the display properties page (shown below). First disable **Multi-Channel Synchronization** by Turning off the **Override Application Settings Check Box** and connect monitors to all Obsidian2 3D output connections. Select each device and click the **Test Button** under the **Glide Settings**. Confirm that the test pattern is displayed on the proper display device and that this is the appropriate device in your SwapLock cabling.
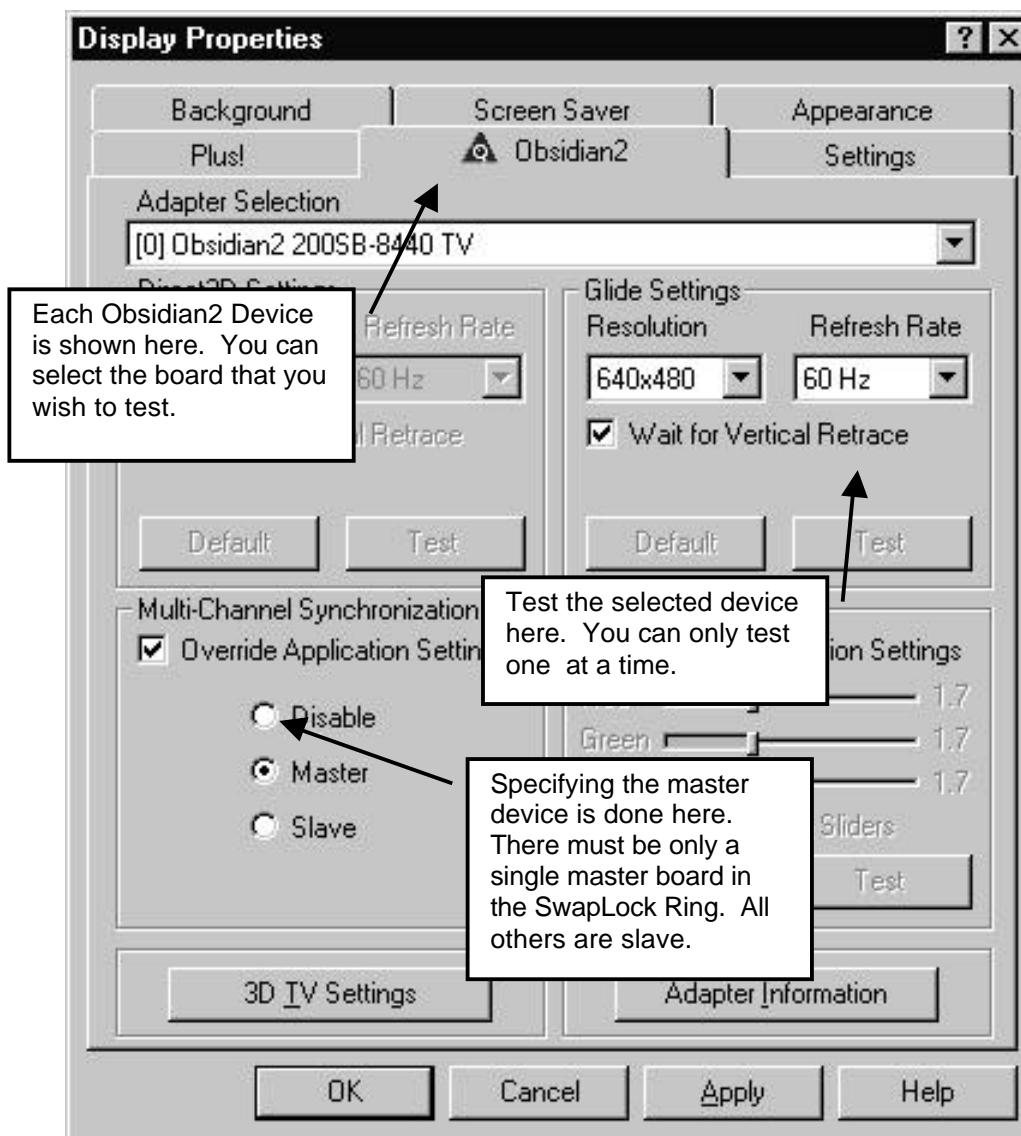
9.2. Using the Glide Test

You can use the Glide Test Button to test the operation of the graphics accelerator. By changing the Display Resolution, Display Frequency and Gamma Correction values you can see the results using the Test Button under Glide Settings.

9.3. Using the Adapter Information

This button will give you information on the Adapter and Current Revision of the drivers that are installed on your system. This information is very useful to Quantum3D Technical Support and should be noted before calling for technical support.

```
Adapter Information                                    [X]

   [icon]   Obsidian2 200SBi-8440 TV

   Manufacturer :                        Quantum3D, Inc.
   Frame Buffer Memory :                 8 MB
   Number of Texelfx Processors :        4
   Texture Memory per Texelfx :          4 MB
   Scan Line Interleaving Capability :   Yes
   Driver Set Release Name :             Release 5.1P
   Driver Set Build Date :               28-Sep-1999
   Glide2 Driver Manufacturer :          Quantum3D, Inc.
   Glide2 Driver Version :               2.53.7
   Glide3 Driver Manufacturer :          Quantum3D, Inc.
   Glide3 Driver Version :               3.01.7
   Direct3D Driver Manufacturer :        N/A
   Direct3D Driver Name :                N/A
   Direct3D Driver Version :             N/A

                        [  OK  ]
```

9.4. Using the 3D TV Settings

If you are using a S-Video or RCA connection to a projector, monitor or TV you can enable the output of these signals using 3D TV Settings. There are advanced features to control the NTSC or PAL signac.

This is not available on Mercury and is not supported on resolutions other than 640x480 and 800x600.
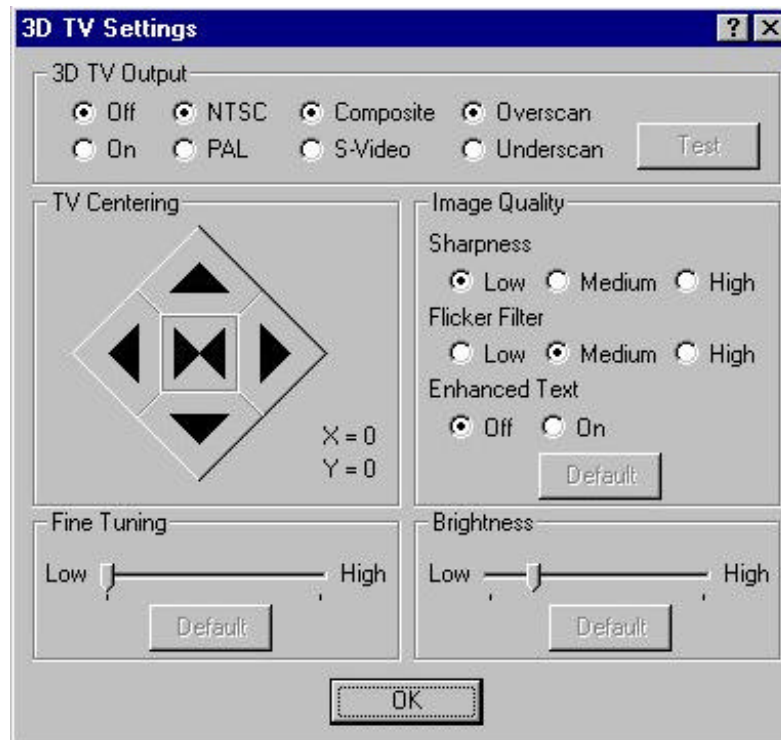
9.5. Display Properties Settings for SwapLock

1. Set Device 0 to be Master
On a chosen heavy metal system select device 0 to be the Master by First choosing Device [0], checking the Override Application Settings Check Box and Selecting the Master Radio Button.

2. Set the Master Display Resolution and Frequency
Select the desired Display frequency for the entire SwapLock ring.
Choose these values in the display properties and click the Apply Button.

3. Set all other devices to be Slave
On each other device select device, Click the Override Application Settings Check Box, SwapLock Enable, and select the Slave Radio Button.
Choose the same display resolution and frequency of the master and click the Apply Button. NOTE: If all display frequencies and resolution are not the same, you may have unsatisfactory results.

4. Testing The SwapLock Configuration

The basic fly demonstration within OpenGVS SDK demos is adapted to support mutiple channels within a single system. Build gem\gv\demos\fly\basic demos, and edit msf.bat to reflect a –m=4 switch, where 4 is the maximum number of accelerators in your systems. This can then be executed on the system designated with the Master 200SB and then on all the remaining systems. All channels should display and be SwapLock ed. If the Master system is closed before the slaves, then the slave fly applications will hang, and must be terminated with End Process from the Task Manager.

10. Included Software

10.1. 200SB and 200SBi 3dfx Glide Drivers

3dfx Glide drivers are supported on all systems that use the 200SB and 200SBi graphics. Glide is a 2D Screen space API that is extremely efficient on Quantum3D hardware. 3D transformations and lighting are performed by the CPU, and 2D screen space shaded, textured polygons are sent by Glide over the PCI bus to the graphics accelerator.

On-line documentation can be found in the following files:
>Relnotes.txt
>Readme.txt
>Q3dsimgl.txt

10.1.1. 200SB/200SBi Video Formats

Resolution	Refresh Rate
512x384	72,75,85 Hz
640x400	70,75,85 Hz
640x480	60,75,85 Hz
800x600	60,75,85 Hz
960x720	60,75,85 Hz (Glide only)
1024x768	60,75,85 Hz

10.1.2. TV Output Capabilities

The 200SB and 200SBi 3D TV output operate sonly when the accelerator running and at the following video timings

Resolution	Refresh Rate	Format	Scan Option
640x480	60Hz	NTSC	Overscan and Underscan
640x480	50Hz	PAL	Overscan and Underscan
800x600	60Hz	NTSC	Underscan
800x600	50Hz	PAL	Overscan and Underscan

10.1.3. 3dfx Glide 200SB/200SBi Professional Driver Files

The 200SB and 200SBi support 3dfx Glide on Windows NT Workstation Version 4. The following files are installed on a system under Windows NT.

	Q3DRedG3.dll
ADVPACK.DLL	Q3dInfUt.exe
BackGnd.3df	Q3dMapNx.sys
GDetect.exe	Q3dPs2.CNT
GMojo.exe	ReadMe.txt
License.txt	RelNotes.txt
Q3DPS2.HLP	TESTDIR.TMP
Q3DPSMGV.HLP	W95INF16.DLL
Q3DRedG2.dll	W95INF32.DLL

detect.exe	mojo.exe
foo.txt	obsidian.inf
genport.sys	pass.exe
glide2x.dll	pcirw.exe
	q3dlogo.3ds
glide3x.dll	q3dmtrr.exe
glug2.dll	q3dps2.dll
glug3.dll	q3dpsmgv.CNT
glut32.dll	q3dsglg2.dll
glutg2.dll	q3dsglg3.dll
glutg3.dll	q3dsimgl.txt
gwhat.exe	testgama.3df
mapmem.sys	testtv.3df

The 200SB and 200SBi support 3dfx Glide and Direct3D on Windows 95.
The following files are installed on a system under Windows 95.

3DfxSpl3.dll	glide3x.ovl
40Comupd.exe	glud3.dll
ADVPACK.DLL	glug2.dll
BackGnd.3df	glug3.dll
BackGnd.bmp	glut32.dll
GDetect.exe	glutd3.dll
GMojo.exe	glutg2.dll
License.txt	glutg3.dll
Q3DOB216.DLL	gwhat.exe
Q3DPS2.HLP	mojo.exe
Q3DPSMGV.HLP	obsidian.inf
Q3dInfUt.exe	pass.exe
Q3dOb2.drv	pcirw.exe
Q3dOb232.dll	q3dCC32.exe
Q3dPs2.CNT	q3dlogo.3ds
ReadMe.txt	q3dlogo.x
RelNotes.txt	q3dmtrr.exe
TESTDIR.TMP	q3dps2.dll
W95INF16.DLL	q3dpsmgv.CNT
W95INF32.DLL	q3dsgld3.dll
detect.exe	q3dsglg2.dll
foo.txt	q3dsglg3.dll
fxmemmap.vxd	q3dsimgl.txt
glide2x.dll	testgama.3df
glide2x.ovl	testtv.3df
glide3x.dll	

10.2. Mercury 3dfx Glide Drivers

3dfx Glide drivers are supported on all systems that use Mercury graphics.
Glide is a 2D Screen space API that is extremely efficient on Quantum3D
hardware. 3D transformations and lighting are performed by the CPU.
The resulting 2D screen space shaded, textured polygons are sent by the
Glide driver over the PCI bus to the each accelerator board in the Mercury
graphics subsystem. Due to this 4x PCI bus load Mercury uses the Dual
Peer PCI bus of the Intel L440GX+ Server Motherboard.

On-line documentation can be found in the following files:
Relnotes.txt
Readme.txt
Q3dsimgl.txt

10.2.1. Mercury Video Timings

Resolution	Refresh Rate
512x384	72,75,85 Hz
640x400	70,75,85 Hz
640x480	60,75,85 Hz
800x600	60,75,85 Hz
960x720	60,75,85 Hz (Glide only)
1024x768	60,75,85 Hz

10.2.2. Mercury TV Output Capabilities

Mercury does not support 3D TV Out.

10.2.3. 3dfx Glide Mercury Driver Files

3Dfx Glide is the only low level API supported on Mercury graphics subsystems. These drivers are supported only on Windows NT Workstation 4. The following files are installed with the drivers.

ADVPACK.DLL
BackGnd.3df
GDetect.exe
GMojo.exe
License.txt
Q3DPS2.HLP
Q3DPSMGV.HLP
Q3DRedG2.dll
Q3DRedG3.dll
Q3dInfUt.exe
Q3dMapNx.sys
Q3dPs2.CNT
ReadMe.txt
RelNotes.txt
TESTDIR.TMP
W95INF16.DLL
W95INF32.DLL
detect.exe
foo.txt
genport.sys
glide2x.dll

glide3x.dll
glug2.dll
glug3.dll
glut32.dll
glutg2.dll
glutg3.dll
gwhat.exe
mapmem.sys
mojo.exe
obsidian.inf
pass.exe
pcirw.exe
q3dlogo.3ds
q3dmtrr.exe
q3dps2.dll
q3dpsmgv.CNT
q3dsglg2.dll
q3dsglg3.dll
q3dsimgl.txt
testgama.3df
testtv.3df

10.3. Driver Software Utilities

During the 200SB and Mercury driver installation, a number of diagnostic utilities are installed under the following folder C:\Program Files\Q3D\Obsidian.2P\WinNT This section describes the software utilities for the Obsidian2.

10.3.1. GDETECT.EXE
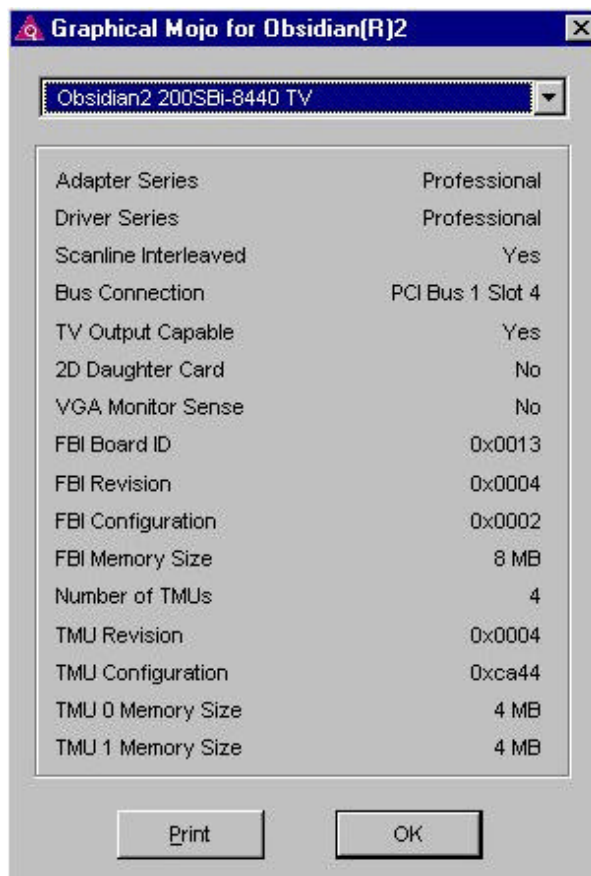
This utility runs from Windows and lists the PCI and AGP devices in the computer and what memory resources are used by each device.

```
GDetect                                                          _ □ ✕

Bus    Slot   Vendor   Device  Address     Description

0x00   0x00   0x8086   0x7190  0xEC000008  Intel Cor:Host bridge
0x00   0x01   0x8086   0x7191  0x00000000  Intel Cor:PCI-toPCI bridge
0x00   0x07   0x8086   0x7110  0x00000000  Intel Cor:ISA bridge
0x00   0x0E   0x9004S  0x7895S 0x0000E401  ADAPTEC:SCSI bus controller
0x00   0x10   0x1011   0x0022  0x00000000  DIGITAL E:PCI-toPCI bridge
0x00   0x12   0x8086S  0x0009S 0xF14FF008  Intel Cor:ethernet controller
0x00   0x14   0x107DS  0x2117S 0xF8000000  LEADTEK R:VGA-compatible display co
0x01   0x04   0x121A   0x0002  0xE7000008  3DFX INTE:video multimedia adapter
0x01   0x05   0x121A   0x0002  0xE8000008  3DFX INTE:video multimedia adapter


                                                    Close        Print
```

10.3.2. GMOJO.EXE

This utility runs from Windows and displays the Obsidian2 acceleraor information such as virtual base address, Vendor ID, chip revisions and more. In this information the Pixelfx2 and Texelfx2 chips are referred to as the FBI (Frame Buffer Interface) and TMU (Texture Mapping Unit) respectively.

```
Graphical Mojo for Obsidian(R)2                    ✕

Obsidian2 200SBi-8440 TV                       ▼

Adapter Series                         Professional
Driver Series                          Professional
Scanline Interleaved                            Yes
Bus Connection                     PCI Bus 1 Slot 4
TV Output Capable                               Yes
2D Daughter Card                                 No
VGA Monitor Sense                                No
FBI Board ID                                 0x0013
FBI Revision                                 0x0004
FBI Configuration                            0x0002
FBI Memory Size                                8 MB
Number of TMUs                                    4
TMU Revision                                 0x0004
TMU Configuration                            0xca44
TMU 0 Memory Size                              4 MB
TMU 1 Memory Size                              4 MB


              Print              OK
```

10.3.3. DETECT.EXE

Detect is a utility that prints the same information as that printed by gdetect. Because it is in a window you can easily copy and paste the text into a file. For example using the command detect > detect.txt will create a file named detect.txt that can be printed or emailed to Quantum3D Technical Support.

```
Command Prompt                                              _ □ X

C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>detect

          subsys! subsys!
bus slot venId v devId v baseAddr0   cmd      description
---- ---- ------- ------- ---------- ------   -----------
   0    0 0x8086  0x7190  0xEC000008 0x0006   Intel Cor:Host bridge
   0    1 0x8086  0x7191  0x00000000 0x001F   Intel Cor:PCI-toPCI bridge
   0    7 0x8086  0x7110  0x00000000 0x000F   Intel Cor:ISA bridge
   0   14 0x9004S 0x7895S 0x0000E401 0x0117   ADAPTEC:SCSI bus controller
   0   16 0x1011  0x0022  0x00000000 0x0107   DIGITAL E:PCI-toPCI bridge
   0   18 0x8086S 0x0009S 0xF14FF008 0x0117   Intel Cor:ethernet controller
   0   20 0x107DS 0x2117S 0xF8000000 0x0007   LEADTEK R:VGA-compatible display c
   1    4 0x121A  0x0002  0xE7000008 0x0002   3DFX INTE:video multimedia adapter
   1    5 0x121A  0x0002  0xE8000008 0x0002   3DFX INTE:video multimedia adapter

Completed Successfully.

C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>_
```

10.3.4. MOJO.EXE

```
Command Prompt                                              _ □ X

C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>mojo
Mojo for Voodoo^2 -- Version 2.01

Info for Voodoo^2 chip # 0:
===========================================================
Virtual Base Address:              0xc00000
Physical Base Address:             0xe7000008
PCI Device Number:                 0x24
Vendor ID:                         0x121a
Device ID:                         0x2
Board ID:                          0x13
FBI Revision:                      4
FBI Memory:                        4 MB
FBI PowerOn Sense:                 0x2
TMU PowerOn Sense:                 0xca44
FBI DAC Output Color Format:       24BPP
Scan-Line Interleaved?             Yes
TMU Revision:                      4
Number TMUs:                       2
TMU 0 RAM:                         4 MB
TMU 1 RAM:                         4 MB

Info for Voodoo^2 chip # 1:
===========================================================
Virtual Base Address:              0x1c00000
Physical Base Address:             0xe8000008
PCI Device Number:                 0x25
Vendor ID:                         0x121a
Device ID:                         0x2
Board ID:                          0x13
FBI Revision:                      4
FBI Memory:                        4 MB
FBI PowerOn Sense:                 0x2
TMU PowerOn Sense:                 0xca54
FBI DAC Output Color Format:       24BPP
Scan-Line Interleaved?             Yes
TMU Revision:                      4
Number TMUs:                       2
TMU 0 RAM:                         4 MB
TMU 1 RAM:                         4 MB

C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>
```
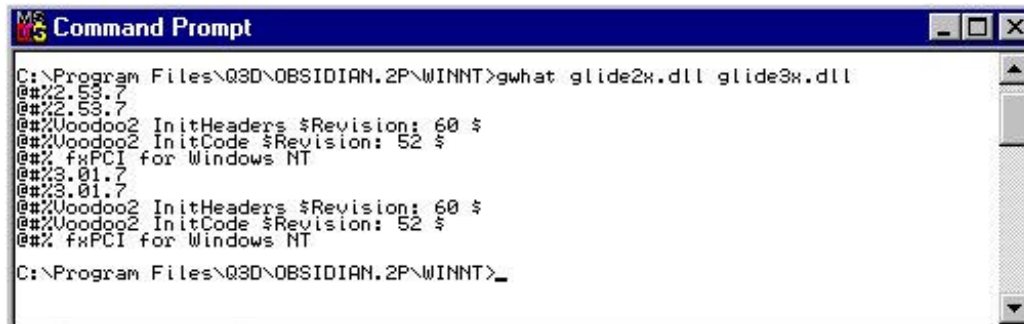
10.3.5. GWHAT.EXE

This program prints the version information for the files specified on the command line.
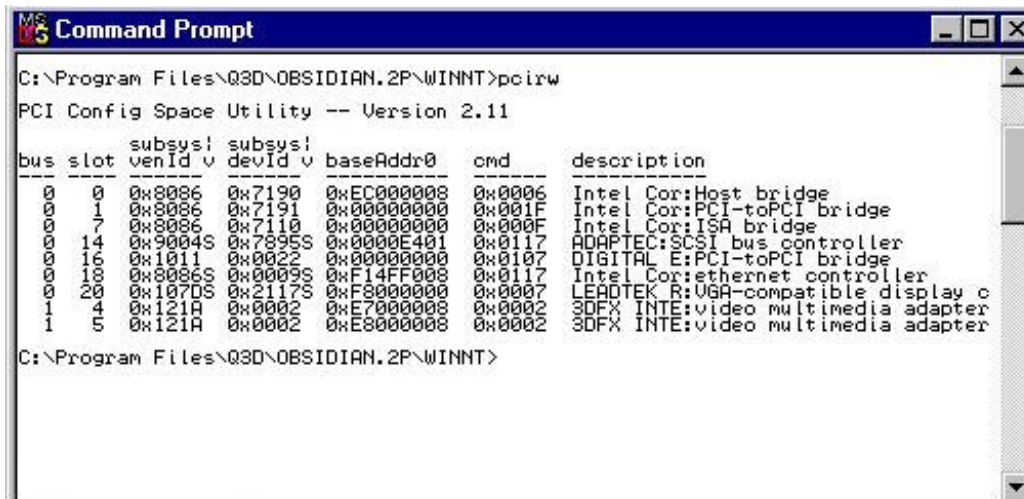
```
C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>gwhat glide2x.dll glide3x.dll
@#%2.53.7
@#%2.53.7
@#%Voodoo2 InitHeaders $Revision: 60 $
@#%Voodoo2 InitCode $Revision: 52 $
@#% fxPCI for Windows NT
@#%3.01.7
@#%3.01.7
@#%Voodoo2 InitHeaders $Revision: 60 $
@#%Voodoo2 InitCode $Revision: 52 $
@#% fxPCI for Windows NT

C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>_
```

10.3.6. PASS.EXE

This program enables pass through. It is not recommended to run this application on a single monitor system that uses a pass through cable since you will not be able to regain control over the monitor. On a dual monitor configuration the Obsidian2 Display Properties can be used to regain control over the windows display.

10.3.7. PCIRW.EXE

This program gives the same information as detect.exe

```
C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>pcirw

PCI Config Space Utility -- Version 2.11

        subsys! subsys!
bus slot venId v devId v baseAddr0   cmd    description
--- ---- ------ ------ ---------   ------   -----------
  0   0  0x8086 0x7190 0xEC000008 0x0006 Intel Cor:Host bridge
  0   1  0x8086 0x7191 0x00000000 0x001F Intel Cor:PCI-toPCI bridge
  0   7  0x8086 0x7110 0x00000000 0x000F Intel Cor:ISA bridge
  0  14  0x9004S 0x7895S 0x0000E401 0x0117 ADAPTEC:SCSI bus controller
  0  16  0x1011 0x0022 0x00000000 0x0107 DIGITAL E:PCI-toPCI bridge
  0  18  0x8086S 0x0009S 0xF14FF008 0x0117 Intel Cor:ethernet controller
  0  20  0x107DS 0x2117S 0xF8000000 0x0007 LEADTEK R:VGA-compatible display c
  1   4  0x121A 0x0002 0xE7000008 0x0002 3DFX INTE:video multimedia adapter
  1   5  0x121A 0x0002 0xE8000008 0x0002 3DFX INTE:video multimedia adapter

C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>
```

10.3.8. Q3DMTRR.EXE

This program can be used to see the Memory Type Range Register (MTRR) addresses and masks. Pentium II and Pentium III processors have MTRRs which are used to set the caching mode of the memory ranges occupied by Quantum3D graphics accelerators. MTRRs are set by Glide on all processors on which the current affinity mask of the thread that calls the Glide function grGlideInit(). Intel requires that the MTRRs be set identically on all processors. This means that the mask must be set to include all processors.

```
Command Prompt                                          _ □ ×

C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>q3dmtrr
Quantum3D MTRR Utility -- Version 1.01

Processor number: 0
Raw Values
MSR#    Hi                  Lo
0x200   0x00000000          0x00000006
0x201   0x0000000F          0xE0000800
0x202   0x00000000          0xFE000001
0x203   0x0000000F          0xFF800800
0x204   0x00000000          0x00000000
0x205   0x00000000          0x00000000
0x206   0x00000000          0x00000000
0x207   0x00000000          0x00000000
0x208   0x00000000          0x00000000
0x209   0x00000000          0x00000000
0x20a   0x00000000          0x00000000
0x20b   0x00000000          0x00000000
0x20c   0x00000000          0x00000000
0x20d   0x00000000          0x00000000
0x20e   0x00000000          0x00000000
0x20f   0x00000000          0x00000000

Interpreted
MTTR#   Type    PhysBase    PhysMask
0       WB      0x000000    0xFE0000
1       WC      0x0FE000    0xFFF800
2       Free
3       Free
4       Free
5       Free
6       Free
7       Free

Processor number: 1
Raw Values
MSR#    Hi                  Lo
0x200   0x00000000          0x00000006
0x201   0x0000000F          0xE0000800
0x202   0x00000000          0xFE000001
0x203   0x0000000F          0xFF800800
0x204   0x00000000          0x00000000
0x205   0x00000000          0x00000000
0x206   0x00000000          0x00000000
0x207   0x00000000          0x00000000
0x208   0x00000000          0x00000000
0x209   0x00000000          0x00000000
0x20a   0x00000000          0x00000000
0x20b   0x00000000          0x00000000
0x20c   0x00000000          0x00000000
0x20d   0x00000000          0x00000000
0x20e   0x00000000          0x00000000
0x20f   0x00000000          0x00000000

Interpreted
MTTR#   Type    PhysBase    PhysMask
0       WB      0x000000    0xFE0000
1       WC      0x0FE000    0xFFF800
2       Free
3       Free
4       Free
5       Free
6       Free
7       Free

C:\Program Files\Q3D\OBSIDIAN.2P\WINNT>_
```

10.4. **SimGL**

10.4.1. **How to get SimGL**

SimGL is supplied with Quantum3D 200SB/200SBi and Mercury drivers. When the drivers are extracted SimGL files will be in the Winnt folder. The files distributed with SimGL are:

glug2.dll	glu that calls q3dsglg2.dll
glug3.dll	glu that calls q3dsgl32.dll
glut32.dll	glut that calls glutg2.dll and glutg3.dll
glutg2.dll	glut that calls q3dsglg2.dll
glutg3.dll	glut that calls q3dsglg3.dll
q3dsglg2.dll	SimGL library for Glide 2
q3dsglg3.dll	SimGL library for Glide 3
q3dsimgl.txt	SimGL Documentation

If you require static library files (.lib) files in order to link your application program with SimGL contact Quantum3D Technical Support.

10.4.2. **Running with SimGL**

If the application has been linked against the OpenGL library, place SimGL (q3dsglg2.dll or q3dsglg3.dll) in the directory along with the application or in the system directory, rename the file to opengl32.dll. More details are supplied with the SimGL SDK or q3dsimgl.txt. This file is delivered with SimGL.

If the application has been linked against a SimGL library, then all that needs to be done is to place the desired SimGL library in the current working directory, a directory in the application's path or in the system directory. The same must be done for the GLU utility libraries if they are also being used.

10.4.3. **How SimGL works on Obsidian2 Graphics**

Quantum3D Obsidian and Obsidian2 graphics subsystems support full screen 3D only. These accelerators are secondary display devices in Windows 9X and Windows NT. The application program's OpenGL window will appear on the Windows desktop as normal, but will appear blank. The SimGL 3D graphics output will appear on the secondary display and will be positioned in the lower left corner. The SimGL view port will be the same size, measured in pixels as the OpenGL window on the primary display. If a single display and the pass through feature of the Obsidian2 is used, only the SimGL 3D view port will be viewable. SimGL has been optimized for Display List rendering so even though immediate mode is fas, it is not as efficient.

10.4.4. **Background and History**

SimGL, although identical in many ways to the OpenGL API published by SGI, has some key differences and benefits. The technology used in SimGL can help application developers by providing a highly optimized API specifically designed for realtime 3D graphics. In general, SimGL can be considered a subset of OpenGL specifically designed and optimized for interactive 3D graphics applications.

SimGL's history stems from the port of Quantum3D's OpenGVSs scene management software to the 3dfx® Glide graphics API. Since OpenGVS is based on OpenGL, the port to a 3dfx platform drove the development of an abstraction layer of software called Subset GL or SGL. In 1997, the lack of OpenGL drivers for the 3dfx Voodoo and Voodoo2 chipsets led to agreements between Quantum3D and 3dfx that resulted in a teamed effort of to form the product SimGL.

10.4.5. What is OpenGL?

An excerpt from http://www.OpenGL.org defines OpenGL states: "OpenGL fosters innovation and speeds application development by incorporating a broad set of rendering, texture mapping, special effects, and other powerful visualization functions. Developers can leverage the power of OpenGL across all popular desktop and workstation platforms, ensuring wide application deployment." Although this is not a complete technical description of OpenGL, this is a good starting point for comparison.

With this said it can be assumed that the OpenGL API in general is not specifically designed for the development of realtime 3D applications. Rather, OpenGL is primarily a robust mechanism for programming any 3D graphics application, which would include CAD/CAM, games, realtime 3D and more. Developers using OpenGL to develop a realtime 3D application must be very cautious not to use OpenGL functionality that may have an adverse affect on realtime performance on the target platform. Calling the wrong function can result in an intense amount of CPU or graphics computation that will likely severely impact an application's performance. A generic OpenGL compliant driver does not alone guarantee realtime performance; in fact, it could imply otherwise.

10.4.6. What is SimGL?

SimGL is an API that uses the same calling conventions as OpenGL. The function calls for SimGL are identical to OpenGL including arguments and function names. SimGL does not implement a compliant OpenGL driver. This means that not all functions are implemented and not all computations performed by the API are done in a compliant manner. SimGL has two native graphics APIs as its foundation; Direct3D and Glide. SimGL is a very fast API and it is not only fast on 3dfx graphics accelerators —the Direct3D implementation is fast on all PC graphics accelerators.

SimGL is typically faster than OpenGL because of the internal optimization done specifically for realtime 3D operations. In most cases using SimGL rather then OpenGL display drivers will result in increased performance, regardless of the accelerator being used. Display List operation performs extremely well in the SimGL API. SimGL is authenticated on Quantum3D Obsidian and Obsidian2 Professional graphics subsystems and does not require a license for Quantum3D Professional graphics subsystems and systems products.

10.4.7. SimGL Use of Low level Graphics APIs

SimGL has implementations that use Microsoft Direct3D and 3dfx Glide graphics APIs. Both Glide 2.X and Glide 3.X are supported by SimGL. SimGL DLLs for the Direct3D and Glide versions are available with all Quantum3D Professional Drivers. Versions of the GLU libraries are also

available for applications developers that link directly with SimGL and also use GLU.

10.4.8. Developing an Application with SimGL

Developers must have access to the SimGL SDK. This SDK can be delivered as part of the OpenGVS SDK or as a standalone SimGL SDK. Either SDK can be obtained from a Quantum3D sales representative. OpenGL applications must be linked against SimGL. This enables the application to run in an OpenGL or SimGL runtime environment. It is possible to use OpenGL and SimGL simultaneously in the application if the application loads either the OpenGL DLL or SimGL DLL.

10.4.9. OpenGL Functions available in SimGL

Some functions in SimGL offer only a partial implementation of the OpenGL functionality. Many functions are defined only as stubs and issue a warning message the first time they are called. For a complete for a complete up-to-date list of these functions see the appendices of the SimGL document q3dsimgl.txt that is supplied with the SimGL SDK.

10.4.10.   SimGL Extension Functions

SimGL implements certain extensions that enable users to take advantage of unique features of Quantum3D Obsidian and Obsidian2 hardware. Extensions are also available for multi-channel support. This enables the development of PC systems that utilize more than one graphics accelerator per system. Other extensions are available to perform extremely efficient clipping and lighting. Other SimGL hint functions are available to avoid certain limitations of the range of texture coordinates on polygon vertices.

10.4.11.   Conclusion

SimGL is a high performance API designed specifically for realtime 3D application development. It is a more efficient API that gives you improved performance over standard (compliant) OpenGL drivers. Because of SimGL's history and background with OpenGVS, it supports and is optimized for the specific functions needed by simulation and deployment applications. SimGL is a realtime 3D API used for application developers that require efficiency and high performance graphics. For more technical information on SimGL, please contact support@quantum3d.com.

10.5. Useful Environment Variables

10.5.1. SSTV2_MDETECT

If set to one, this forces the drivers to detect the presence of a monitor, even if one is not connected.

10.5.2. SST_DUALHEAD

If set to 1 the drivers that we are running with 2 monitors, one for 2D and one for 3D. This is used by the Glide driver and by OpenGVS. OpenGVS will use this and automatically reduce the size of the Mouse Arena in a way that you can easily navigate windows.

10.5.3. GV_PATH_MODELS

A list of directories, separated by semi-colon (;) which tells OpenGVS where to search for external models if not found in normal model locations (as specified by the model).

10.5.4. TXTPATH

A list of directories, separated by semi-colon (;) that tells OpenGVS where to search for external models if not found in normal model locations (as specified by the model). The default value for this environment variable is.

10.5.5. GV_ENV_SPLASH

If set to 0 this will disable the OpenGVS splash window.

10.5.6. GV_ENV_FBF_RESOLUTION

Used to set the resolution of the Frame Buffer to the desired (valid) resolution. For example:

> set GV_ENV_FBF_RESOLUTION=640x480.

10.5.7. GV_ENV_FBF_UNIT

If there is more than one frame buffer in a system, use only the one specified in the variable. For example if you have 2 accelerators installed and GV_ENV_FBF_UNIT is set to 1, then you will use the second device detected on the PCI Bus. If you set to 0, then you will use the first (which is default).

10.5.8. GV_ENV_SGL_SSE

IF set to 0, the drivers will disable Pentium III SSE optimizations.

10.5.9. FX_GLIDE_NO_SPLASH

If set to 0, the drivers will not display the 3dfx logo on initialization.

10.5.10.   FX_GLIDE_SHAMELESS_PLUG

If set to 1, the drivers will enable the Quantum3D Shameless plug.

10.5.11.   FX_GLIDE_SWAPINTERVAL

If set to a integer value the driver function call to grBufferSwap will be called only between FX_GLIDE_SWAPINTERVAL vertical retrace intervals.

10.5.12.   SST_INITDEBUG

Set to 0, the drivers will not produce any debug text. Set to 3 or more will result in verbose information.

10.5.13.   SST_INITDEBUG_FILE

Specify the name of the file that will contain the driver debug text.

10.6. OpenGVS Realworld Benchmarks

The purpose of the benchmarks is to help users evaluate 3D products that are being considered for realtime roles such as visual simulation and

training applications. The performance test suite was unique when it was introduced because it allowed users to compare UNIX 3D graphics workstations to 3D hardware solutions on the PC. This was possible because the benchmark application software was written using OpenGVS, a highly portable realtime scene management API for 3D developers. The benchmarks remain unique because they support all the leading rendering APIs: OpenGL, Microsoft Direct3D, and 3Dfx Glide2 (and now Glide3). OpenGVS Realworld Benchmarks com pre-installed on heavy Metal Systems. For more information about RWB please see:

- StartMenu/Programs/OpenGVS RWB 2.3/Frequently Asked Questions
- StartMenu/Programs/OpenGVS RWB 2.3/Overview Document
- StartMenu/Programs/OpenGVS RWB 2.3/Readme

11. Trouble Shooting

11.1. Power on issues

The following problems can occur during startup of the system. If you experience any of these problems, follow the defined procedures to diagnose and fix the problem. The primary resource for the problems below is the motherboard documentation. However, Quantum3D Technical Support, the Quantum3D website, and component manufacturers documents are excellent technical resources. See the websites listed under section 13 for more information if you require it.

11.1.1. System Beeps

Beeps during system startup usually indicate a problem with the Primary Display Adapter, Memory, or CPUs. Consult the motherboard documentation for a complete description of these beeps. Trouble shooting guides may be found in the SuperMicro Super P6DBS User's and BIOS Manual Chapter 3 and in the L440GX+ Server Board product guide, Chapter 4.

11.1.2. No Video Signal

If there is no video signal and you hear beeps during the POST, you should look in the Motherboard documentation listed in the previous section. If everything else appears normal, check to make sure that your monitor cable connections are to the Primary Display Device. If you are operating with a single monitor, confirm connections of the Monitor Pass Through (Medusa) cable.

11.1.3. Processor(s) Not Recognized

If your system has been delivered with 2 CPUs, but they are not recognized, you may need to use a BIOS setting to retest for both processors. Restart the system and enter the BIOS setup. Choose the server settings and choose to retest for processors during startup. Exit the BIOS and ave changes. If they are operating correctly both processors will be recognized.

11.1.4. Processor Fails Test

Consult the motherboard documentation for a complete description of these processor tests in the Trouble Shooting or Solving Problem sections. If a processor fails a test then the processor may be defective, not seated properly, or the motherboard BIOS may be corrupt. You will need to seat the CPU properly after powering down the system and then flash the motherboard BIOS and with the latest BIOS revision.

11.1.5. Boot device not found

This could be the result of a device failure, power connection, device cabling, or improper BIOS settings. Confirm that your disk drive is locked in place with the key. If the disk drive LED is displaying a solid number then it is locked in place properly. If the disk drive displays a U then you

must power off the system, place the key in the drive and lock it shut. When the disk drive is locked you should not be able to remove it from the bay. Confirm that the device is found by the BIOS by checking the peripheral settings. The BIOS should find IDE CDROM, Floppy Drive, and Hard Disk drives. The BIOS should also specify device boot order. Removable drives are tested for a bootable file system first, then the hard disk.   If the BIOS does not find a device, it may not have the ribbon cable or power cable connected properly.

11.1.6. Where to find additional information

Additional information may be found in the motherboard documentation, FAQs on the web or through Quantum3D Technical Support.

11.2. Systems Operation Problems

Below are some basic problems that can happen during the time that you are operating the system. If you experience a problem, are unable to resolve it, and believe it is the result of a defective Quantum3D hardware or software product, please contact Quantum3D Technical Support.

11.2.1. NMI Memory Parity Errors

If you receive NMI Memory Parity errors regularly during graphics operations, they could be a result of problems the application software or Quantum3D Obsidian2 Drivers. In these cases the problem is not related to RAM. Rather it is a side effect of a problem in the application software or driver. It has been found that floating point exceptions in the Intel Pentium III SIMD instructions are not always trapped properly and instead of raising an access violation only, they also create NMI Memory Parity Errors.   Other problems with bad pointers, access violations, or linear frame buffer reads without locking the frame buffer may cause what appear to be a memory parity error. To debug these types of problems you can disable PERR in the BIOS. You must use Quantum3D Obsidian2 drivers release 5.1 or greater to eliminate the drivers as a possible cause to the problem. If your system has NMI memory parity errors during normal operation (non-graphics or PCI Bus intensive), you probably need to replace the memory.

11.2.2. BSOD with Stack Dump

Typically BSODs are the result of a software bug or hardware problem. You should first attempt to reproduce the problem. If the problem is reproducible, you should provide this information to the appropriate software vendor for the application you are using. If the problem appears to be related to hardware contact the appropriate hardware vendor or contact Quantum3D Technical Support.

11.2.3. Cannot Login to Administrator Account

The Administrator Account has been provided without a password. To login, type Administrator in the user name field and press the enter key. If this does not work, contact Quantum3D Technical Support.

11.2.4. Problem starting some services

It is normal for the system to fail to start network services. After connecting your network and specifying the proper network properties this message

will go away. If it continues, consult the Event Log to determine the source of the problem.

11.2.5. Cannot logon properly, hour glass never goes away

This could mean that the Secondary Display Device did not initialize properly. Try using ctrl-alt-delete to raise the task manager. If there is a rundll32 process running, end the process. The system should logon as normal. Use the Glide Test under Display Properties/Obsidian2 to test the Secondary device(s). If they operate, then reboot. If the problem persists, check the Obsidian2 200SBi FAQ, Mercury FAQ or the Heavy Metal FAQ on Quantum3D's website where there are other suggestions for resolving this issue.

11.2.6. Where to find additional information

Additional information may be found in the motherboard documentation, FAQs on the web or through Quantum3D Technical Support.

11.3. Graphics Issues

11.3.1. Black Screen on 3D Device

Confirm that a monitor cable is connected to the short end of the monitor adapter. Confirm that the monitor is operating and is capable of the resolution and refresh rate as it is specified in the Obsidian2 Display Properties. Confirm that you have SwapLock cables configured for single channel operation and that SwapLock is currently disabled in the Obsidian2 Display Properties.

11.3.2. Graphics Freeze on First Frame

This usually means that you do not have the SwapLock cables properly installed for single channel use, or are trying to run a SwapLock slave and not all channels are up and running.

11.3.3. Flashing and Tearing on the 3D Device

The Wait for Vertical Retrace Flag is turned off in the Obsidian2 Display Properties or FX_GLIDE_SWAPINTERVAL is set to 0.

11.3.4. Glide Test is Not Active

Another application is already using the Graphics Accelerator or did not complete successfully. Close all windows and use the Task Manager to kill any stray applications that are using Glide or any rundll processes.

11.3.5. Mutual Exclusion Error

Another application is already using the Graphics Accelerator or did not complete successfully. Close all windows and use the Task Manager to kill any stray applications that are using Glide or any rundll processes.

11.3.6. Where to Find Additional Information

Additional trouble shooting information can be found with the supplemental FAQ documents, or at the Quantum3D web site.

12. Recovering Your System

In the event that you have a software configuration issue or failed hard disk, you may need to restore the original hard disk image. To do this you will use a bootable CDROM that is supplied by Quantum3D. This process will destroy all contents of the disk as well as assign a new System ID#. You should backup all user data on the C: Drive, since you will restore the image onto this drive. Restart the system, enter the BIOS and confirm that the boot checks the CDROM drive before the hard disk (change if necessary). Place the Recovery CDROM in the drive and Save and/or Exit the BIOS to continue booting.

The system will boot to a stripped down version of Windows 95. Partition Quest Restore Image will enable you to recover your system to a base configuration. To recover perform the following steps.

1) Click on the Restore Image Button
2) Click the Browse Button
3) Choose the .PQI file for your licensed Operating System, Click OK, Click Next
4) Select the Destination Partition or Free Space
5) The software will notify you that it will delete this partition in order to restore
6) Click OK to confirm that the new partition will be automatically resized
7) Choose Fast Mode, Click OK, then Finish
8) Click No to view results
9) Click the exit button
10) Press and release the reset button on the computer

After completing these steps your system will be configure as follows
       a. System Drivers are installed (i.e. SCSI, CDROM)
       b. Video Drivers are installed (Viper 770)
       c. Mercury Drivers are installed (GX+ Only)

Your system will require a new SID or obtain the SID from your DNS server. You need to configure the network protocol to work on your LAN.

If you have a 200SB or 200Sbi you will need to download the latest drivers and install them on the system. Use Add/Remove Programs to remove exiting Quantum3D Obsidian2 200SB drivers.

Use the OpenGVS Realworld Benchmarks CDROM to install the these benchmarks. For proper operation on Quantum3D Obsidian2 200SB and Mercury install the Glide versions (Glide 2 and Glide 3).

Use the OpenGVS SDK disk to install the OpenGVS Software Development Kit. Choose all of the options that you wish to install. You will need a new key to match your new computer SID.

13. System Options

Heavy Metal systems can be ordered with a number of configurable hardware options. These options are outlined below. The latest drivers for these hardware options can be found on manufacturers' websites. Drivers qualified by Quantum3D can be found on the Quantum3D systems drivers web site at http://www.quantum3d.com/support/Sysdrivers/Device_drivers.html

13.1. Motherboards

Motherboards for the Quantum3D Heavy Metal Family are the latest high performance motherboards based on the Intel 440BX and 440GX+ chipsets.

13.1.1. Heavy Metal BX Motherboard Make and Model

SuperMicro P6DBS

Specifications and Documentation
See motherboard documentations supplied with the system.
Motherboard Manufacturer Web Site Home Page
http://www.supermicro.com/
To date motherboard documents web page
http://www.supermicro.com/PRODUCT/MotherBoards/440BX/p6db
s.htm

13.1.2. Heavy Metal GX+ Motherboard Make and Model

Intel L440GX+

Specifications and Documentation
See motherboard documentations supplied with the system
Motherboard Manufacturer Web Site Home Page
http://www.intel.com/
To date motherboard documents web page
http://support.intel.com/support/motherboards/server/L440GX/

13.2. Primary Video Options

The 2D Windows accelerator installed on a Heavy Metal system depends upon which system you have purchased. Drivers for the 2D Video Cards are preinstalled on your system. Outlined below are the 2D Video Options for Heavy Metal BX and Heavy Metal GX+. If your display adapter is not listed here it is likely you have a custom configuration and you should review your Bill of Materials.

13.2.1. Heavy Metal BX Primary Video Options

Voodoo 3: Ventana3 and Voodoo3 Accelerators are the fastest accelerators offered by Quantum3D as a Primary Display Device. These devices are fast enough to perform many realtime 3D functions without the need for a secondary display device.

Manufacturer URL

http://www.quantum3d.com

To Date Product URL

 http://www.quantum3d.com/product%20pages/voodoo3.html

To Date Product FAQ

http://www.3dfx.com/view.asp?IOID=102

To Date Product Drivers URL

http://www.3dfx.com/view.asp?PAGE=nusV3drivers

Diamond Viper 770: The Diamond Viper 770 provides excellent 2D imagery with an Nvidia TNT2 chipset with robust Direct3D and OpenGL drivers and 16 MB SDRAM

Manufacturer URL

http://www.diamondmm.com

To Date Product URL

http://www.diamondmm.com/products/current/viperv770.cfm

To Date Product FAQ

http://www.diamondmm.com/products/faqs/current/viper_v770-faq.html

ATI Rage Pro: Features 8MB of powerful memory and ATI RAGE graphics technology.

Manufacturer URL

http://www.ati.com

To Date Product URL

http://www.atitech.com/ca_us/products/pc/aiw_pro/index.html

To Date Product Drivers URL

http://support.atitech.ca/drivers/drivers.html

To Date Product FAQ

http://support.atitech.ca/info/3drg_pro_inf.html

13.2.2. Heavy Metal GX+ Primary Video Options

Cirrus* Logic CL-GD5480: The CL-GD5480 is built onto the L4440GX+ motherboard and provides many advanced management features. See section

http://www.cirrus.com

To Date Product URL

http://www.cirrus.com/products/overviews/gd5480.html

To Date Product Drivers URL

http://support.intel.com/support/motherboards/server/l440gx/5480_NT.HTM

13.3. Realtime 3D Graphics Options

Auxiliary or Secondary Display Devices or Graphics Subsystems are means to produce compelling realtime 3D applications. These subsystems are based on 3dfx Voodoo2 and Voodoo3 chipsets. Below is the list of graphics subsystems offered by Quantum3D.

13.3.1. Heavy Metal BX Realtime 3D Graphics Subsystems

Quantum3D Obsidian2 200SBi: Quantum3D, Obsidian2 200SBi is a Voodoo2 based accelerator with single board SLI. Typically a single 200SBi is used in each PC for multi-channel systems. This results in the best in scalable performance. However, in cost sensitive applications, more than one 200SBi can be configured in a single Heavy Metal system. This yields a very cost effective solution for multi-channel systems. In the case of the GX+ system with a dual PCI architecture, multiprocessing applications can achieve very high performance.

Manufacturer URL
    http://www.quantum3d.com
To Date Product URL
    http://www.quantum3d.com/product pages/200sbi.html
To Date FAQ URL
    http://www.quantum3d.com/support/200SBi.html

Voodoo3: Ventana3 and Voodoo3 Accelerators are the fastest accelerators offered by Quantum3D as a Primary Display Device. These devices are fast enough to perform many realtime 3D functions without the need for a secondary display device.

Manufacturer URL
    http://www.quantum3d.com
To Date Product URL
    http://www.quantum3d.com/product%20pages/voodoo3.html
To Date Product FAQ
    http://www.3dfx.com/view.asp?IOID=102
To Date Product Drivers URL
    http://www.3dfx.com/view.asp?PAGE=nusV3drivers

13.3.2. Heavy Metal GX+ Realtime 3D Graphics Subsystems

Quantum3D Mercury: Quantum3D's Mercury is a Voodoo2 based accelerator using SLI and 4 200SBi accelerators combined to provide full scene hardware anti-aliasing with higher image quality than 2x2 sub pixel anti-aliasing. Mercury is only delivered on Heavy Metal GX+ systems. Multi-channel Mercury systems always use a single Heavy Metal GX+ Mercury for each 3D channel.

Manufacturer URL
    http://www.quantum3d.com
To Date Product URL
    http://www.quantum3d.com/product pages/mercury.html
To Date FAQ URL
    http://www.quantum3d.com/support/Hm_gx.html

13.4. Storage Options

Quantum Viking II 4.5 / 9.1 SCSI: The Viking II uses a SCSI interface. It come with either a 4.5 or 9.1 GB formatted capacity. These disks are typically used by default on Heavy Metal GX+ systems. The hard disk is typically mounted in a removable sled manufactured by Kingston. This sled is opened and closed with a key. These removable disks are not

currently hot swapping devices. The SCSI controller for Heavy Metal systems is built onto the motherboard.

Manufacturer URL
> http://www.quantum3d.com

To Date Product URL
> http://www.quantum3d.com/product pages/200sbi.html

To Date FAQ URL
> http://www.quantum3d.com/support/200SBi.html

Quantum Fireball CX Ultra ATA/66 ATA/4: The Fireball uses an EIDA interface and can be ordered in many capacities ranging from 6.4 to 20.4 GB formatted capacity. The EIDA controller for Heavy Metal systems is built onto the motherboard.

Manufacturer URL
> http://www.quantum.com

To Date Product URL
> http://www.quantum.com/support/hdd/fireball_cx_ata_support.htm

To Date FAQ URL
> http://www.quantum.com/products/hdd/resources/hdd_resources.htm

Western Digital: Western Digital drives offered in Quantum3D systems use an EIDA interface and can be ordered in many capacities ranging from 10.2 to 27.3 GB formatted capacity. The EIDA controller for Heavy Metal systems is built onto the motherboard.

Manufacturer URL
> http://www.westerndigital.com/

To Date Product URL
> http://www.westerndigital.com/products/

To Date FAQ URL
> http://www.westerndigital.com/service/

13.5. CD Options

Your system will be delivered with either a Toshiba or Sony CDROM.

13.6. Audio Options

Any Heavy Metal system may be configured with either of the two following Audio Cards.
Aureal Vortex2:
Manufacturer URL
> http://www.aureal.com

To Date Product URL
> http://www.aureal.com/products/pp_soun.htm

To Date Driver URL
> http://www.a3d.com/html/download/drivers/

Sound Blaster Family:
Manufacturer URL
> http://www.creative.com/

To Date FAQ URL
> http://support.soundblaster.com/faqs/products/

To Date Driver URL
http://support.soundblaster.com/files/download.asp

13.7. Operating Systems

All current versions of Microsoft Operating Systems are supported on Heavy Metal systems. For more information or to place a request to support a certain operating system please contact Quantum3D Technical Support.

Heavy Metal BX: Windows98, Windows NT 4 with SP5
Heavy Metal GX+:   Windows NT 4 with SP5

13.8. CPU Options

Quantum3D currently delivers Heavy Metal systems starting with the Intel Pentium II 450 up to the latest Pentium III products.

Manufacturer Home Page
http://www.intel.com/
To date Current CPU Home Page
http://developer.intel.com/design/pentiumiii/
http://developer.intel.com/design/pentiumii/

13.9. Network Options

Quantum3D offers the Intel Pro/100+ PCI and Pro/100B PCI Ethernet Network Adapters in Heavy metal BX Systems.   This same chipset is built on the L440GX+ motherboard on the Heavy Metal GX+. This adapter support 10 and 100 Mb/s

NIC Manufacturer URL
http://www.intel.com/
To date 82557 Based NIC datasheet web page
http://support.intel.com/support/network/adapter/pro100/pro100plus/index.htm
To Date Driver URL for GX+ Onboard NIC
http://support.intel.com/support/motherboards/server/l440gx/nt_336s.htm
To Date Driver URL for BX Add-on Intel PCI NIC
http://support.intel.com/support/network/adapter/pro100/pro100plus/index.htm

13.10.   Memory Options

Memory can be configured as required. The maximum RAM on Heavy Metal BX is 1 GB. The GX+ has a greater capacity at 2 GB. It is recommended that at a minimum 128 MB RAM is used on all systems and that Quantum3D is consulted for memory upgrades.

13.11.   I/O Options

13.11.1.   Quantum3D GCI2

This is a JAMMA compliant card used for translating the analog and digital controls of joysticks, inertial tracking devices, buttons, coin-mechanisms, and bill acceptors into a digital serial packet format optimized for PC-based deployment.

GCI2 Documentation and Drivers can be found at www.quantum3d.com.

13.11.2.   High Speed Serial

Your system can be delivered with a D-Flex ISA expansion card for high speed serial communications.

14. Warranty

14.1. General Warranty Information

Quantum3D, Inc. warrants to the original purchaser that the product purchased from Quantum3D, Inc. or from an authorized Quantum3D, Inc. re-seller, excluding software, disks and drivers, compact discs, documentation and related information, is free from defects in parts and/or workmanship for one year from the date of purchase. During this year of warranty period Quantum3D, Inc. or an authorized agent of Quantum3D, Inc. will correct any defects in parts and workmanship at no charge for labor and materials. This warranty is limited to parts and products sold on the original purchase of the system. Add on parts and failures directly caused due to add-on cards or peripherals are not covered in this warranty.

You are responsible for prepaying shipping and insurance expenses incurred in returning the defective product or products. Quantum3D, Inc. is not liable for loss or damage during shipment of your returned system or part. For international shipping, you must prepay export taxes, custom duties and taxes or any other charges associated with return shipment of the product. Replacement products shall be new or serviceable used products, and are warranted for the remainder of the warranty period or 30 days, whichever is longer.

14.2. Warranty Service

If at some point you require Warranty Service, you must contact Quantum3D Technical Support at **408-361-9998**. If technical support staff determine that a Quantum3D product is defective, a Return Merchandize Authorization (RMA) number will be issued.

A replacement product will be sent to you within 10 business days after Quantum3D, Inc. receives the defective part. Quantum3D will replace using the same part or a compatible part of equal capability and performance. Quantum3D is not liable for delays due to the availability of replacement parts.

Advance replacement RMA can be done at the purchasers expense (PO or Credit Card). Quantum3D reserves the right to charge purchaser for replacement parts or return the product at purchaser expense, if it is determined that the product is not defective in workmanship.

14.3. Quantum3D Extended Warranty Coverage

Extended warranty coverage can be purchased for 10% of the MRSP per additional year if ordered within 90 days of purchase date.

14.4. Quantum3D Express Warranty Coverage

Quantum3D Express Warranty Coverage covers advance replacement shipping. Quantum3D will priority ship, next business day replacement product when given a valid Federal Express, DHL or UPS tracking number of the part being returned. Extended Express warranty coverage can be purchased for 5% of the MRSP per additional year if ordered within 30 days of purchase date. Express is free for those products registered and purchased in the Quantum3D Partners plan.

15. Technical Support

Free telephone, email and online support are provided for Heavy Metal systems during the warranty period. In addition to helping with trouble shooting and diagnosing defective parts technical support is prepared to help you with questions about the operation of Quantum3D products.

When you contact technical support Quantum3D might need some background information about the product that you are calling about. Please have the following available to aid our technical support process.

>Your Mailing Address and telephone number

>The name of the product that you are contacting technical support about

>A summary of the question or a description of the problem and, if necessary a method of reproducing the problem

>Software used on the system and software added to the system after purchase

>Cards added after the original purchase of the system

Technical Support is available from **8:00-5:00PST**. Call **408-361-9998** to reach a technical support staff member. Email support is available if you email to mailto:**support@quantum3d.com** or in Europe at **mailto:eurosupport@quantum3d.com**. Quantum3D has online technical support resources including FAQs, White Papers and Downloads at http://www.quantum3d.com.

Priority Technical Support is available for products registered in the Quantum3D Partners Plan. Registered partners receive a personal, experienced single point of contact in technical support. Access to advanced releases of hardware and software enable you to be prepared for future products. For more information about Quantum3D Partner plans contact info@quantum3d.com.

16. Supplement Materials

16.1. Glossary

The glossary on the following page covers terms used in this document.

Glossary

A

AGP: Accelerated Graphics A high-bandwidth 32-bit PC bus that provides up to 528 MBytes/sec to a graphics controller, yielding the bandwidth necessary for texturing directly from system memory. A.G.P. uses memory local to the graphics controller and system memory for graphics data storage.

Aliasing: Visual artifacts created by computer graphics that are the result of sampling discrete mathematical values. These artifacts result in flashing, flickering jaggies and other distracting visual effects.

Anti-Aliasing: The act of removing aliasing.

B
Bilinear Blending: The most basic of anti-aliasing techniques for rendering textured objects, bilinear blending removes the hard edge of point sampling by linearly interpolating between adjacent texel colors (in both X and Y dimensions). Bilinear blending results in reduction of pixel fighting when zoomed far out. When used with mipmapping an line artifact is present where mipmap levels change. This can only be anti-aliased further with Trilinear Blending and/or Full screen anti-aliasing.

BSOD: Blue Screen of Death. Typically the BSOD is a complete failure of software or hardware. When related to software a valuable stack trace is given.

C

D
Distributed Channel: Each PC used for a visual channel as a single graphics subsystem. Interchannel communication is done via a dedicated high speed network.

E
Edge Anti-aliasing. Uses a filter along the pixels that represent an edge of a polygon to average or blur out the stair step effect of edge jaggies. This usually results in some loss of graphics performance. On Quantum3D Obsidian2 this performance loss is equal to the amount of performance to process extra polygons., since there are as many more polygons as there are edges in the scene. To avoid this tremendous performance hit Quantum3D systems have a mechanism to only select which polygon edges will be edge anti-aliased. There is no need to use this feature along with full scene anti-aliasing.

Edge Blending: The ability to overlap mulit-channel views when they are viewed on a single projection area as well as to perform a smooth transition between the channels and remove any projector or channel anomalies.

EIDE: Extended IDE, capable of faster burst rates of up to 16.6MBps and capacities up to 137 GB.

F

FBI: This is the frame buffer chip in the Voodoo and Voodoo2 chipsets. In Voodoo3 the frame buffer is an integral part of the chip.

Fill Rate: The rate at which pixels can be drawn to the screen. This is typically measure in the number of 1024k Pixels that you can fill per second, or Mega Pixels (MP) per second. A system such as the Obsidian2 200Sbi can display a peak rate of 180 MP per second. This means that you can redraw the screen (180x1024x1024)/(1024x768) = 240 in a second. If you assume a frame rate of 60 Hz then this accounts for an average depth complexity of 4. The Obsidian2 and Mercury have the same peak fill rate.

Flashing: Drastic changes in contrast

Flickering: Drastic changes in contrast

Frame Buffer: A memory buffer that holds enough data to draw a single frame. In the 3dfx Voodoo, Voodoo2 and Voodoo3 architectures, the Frame Buffer Intelligence is in the FBI chip. Memory is interfaced to the FBI . Collectively the FBI and FBI Memory are the Frame Buffer.

Full Scene Anti-aliasing: Anti aliasing the entire scene that is displayed on the screen. There are two methods typically used to do this. The most common is subpixel anti-aliasing. In this scheme the image is computed at higher resolution and the pixels are averaged to get a more smooth image. Full scene anti-aliasing works in addition to other anti-aliasing methods. However the impact is most visible on subpixel flashing and jaggies.

G
Glide: The lowest level "native" language of the Voodoo, Voodoo2 and Voodoo3 chipsets. This is a 2D only API that offers extreme performance.

GUI: Graphical User Interface

H
I

IDE: Integrated Drive Electronics, as well as a number of standards the most significant thing brought to us by IDE is the ability to have the disk controller as an integral component of the disk drive itself.

ISA: Industry Standard Architecture: standard originating for the IBM XT (8-bit) and the IBM AT (16-bit) bus designs.

J

Jaggies: The stair step effect of drawing lines on a 2D display device. Jaggies are the result of discrete samples of where the line is on the screen.

K

Kill: To kill a process means to locate the process or application in the task manager, select the process and click End Task or End Process. This will terminate the application immediately.

L

LAN: Local area network. You local corporate network is a dedicated LAN as is the dedicated network used in Distributed Channels.

M

Mip Mapping: This is a form of texture antialiasing used to reduce the flickering effect of many texels fighting for the same portion of the display. This happens when a 256x256 texture is mapped to an area that covers less that 256x256 on the display. Mipmapping uses reduced resolutions of textures to best match the number of pixels in texture map to the number of pixels covered on the display. Typically Mipmaps are created by the application automatically. If you have an application using a 256x256 texture image the application will automatically create downsampled texture maps that are 2^0 to 2^{n-1} where n=8 for a 256x256 texture map, N is called the mipmap level. Because of mipmaps the texture memory needed to draw this texture is X*Y*BYTE_PER_PIXEL*1.3.

Memory Parity Error: When writing and reading memory a difference in the values means that you have a parity error.

Multi-channel: More than a single channel. A channel is a single graphical representation of a world. Typically a channel can be thought of as a single display device, i.e. accelerator and a channels task is to draw a 3D scene on a projector or monitor.

N

NIC: Network interface card. This is the card that is connected to the network and provides essential layers of networking protocol to communicate on you LAN.

NMI: Non Maskable Interrupt

O

Obsidian2 Display Properties: The window that is Displayed to control the Quantum3D, Obsidian2 Display Adapter Control panel. To get to the **Obsidian Display Properties**: Use StartMenu/Settings/Control Panels. Double click the Display Icon. When the Display Properties window is shown, choose the Obsidian2 Tab.

OpenGL: A general purpose 3D rendering API used for Animation, CAD, Film and Video.

P
PCI: Peripheral Component Interface, the 32-bit bus architecture (64-bit with multiplexing), developed by DEC, IBM and Intel for Pentium class PCs. The PCI bus provides a high-bandwidth data channel between system board components such as the CPU and devices such as video adaptors, Audio boards, NICs and secondary display devices.

PERR: Parity Error

Pixel: A pixel is one unit of an image or one unit of the frame buffer that represents a single display color.

Point Sampling: Texels always have the exact same color as the texture that they were mapped from. For example if you are zoomed in very close to a texture mapped polygon that has two texels mapped that are red and white, you will see a sharp line or "hard edge" between the two texels.

POST: Power On Self Test. The POST is first process when starting a Quantum3D, system. The POST is in NVRAM so does not require that you have operating media. POST Requires and active Motherboard, CPU, Memory, Keyboard, Mouse and that they are operating correctly.

Primary Display Device: The primary video accelerator card and the computer display used to interface with the Operating System and application software. On a Quantum3D system, this is typically AGP Video accelerator and monitor.

Q
R
S

SCSI: Small Computer System Interface: An ANSI standard interface between the computer and peripheral controllers. SCSI excels at handling large hard The original standard, SCSI-1, is now obsolete and references to SCSI generally mean SCSI-2.

Secondary Display Device: Quantum3D Obsidian2 200Sbi and Mercury. These devices are used as dedicated 3D graphics accelerators that are typically output to projection systems or large monitors.

Shared Channel: Some PCs drive more that one visual channel. The visual channels "share" the PCs resources (PCI Bus, Memory and CPU resources).

SID: System ID, A unique number that Identifies your PC.

SimGL: A implementation of OpenGL specifically designed for use with full screen 3D applications that require realtime3D graphics.

Single Channel: A channel is one frame buffer, one monitor or one graphics accelerator. You can also think of all three of these making up a single channel. A single channel is one part of a multi-channel system or can operate as a single channel system.

SLI: Scan Line Interleaving. Using 2 raster processors in parallel to process every other scan line in the frame buffer. Using this technique enables the to perform the rasterization process with twice as much speed. Many times this will double fill rate performance.

Stand Alone: Not requiring another computer to operate.

Sub-pixel: Smaller then one pixel.

System ID: Your system ID is a uniques number that identifies your PC. If you reformat your hard drive this will be a new number and any software that uses the System ID for licensing will require a new unlock code.

T
3dfx: Founded in 1995, 3dfx has been the leader in realtime 3D Graphics chipsets and is the manufacture of the Voodoo, Voodoo2 and Voodoo3 chipsets used in Quantum3D graphics products.

Task Manager: The Task manager will allow you to monitor the status of applications and switch between applications. You can also monitor and terminate the processes associated with the applications. You can also monitor CPU and memory usage.

Texel: The area of the screen that represents one pixel of the texture map. When zoomed in close to a texture mapped polygon a texel covers many pixels on the display surface. When zoomed out far away from a texture mapped polygon many pixels of the source texture map may lie on the same pixel on the display surface.
TMU: This is the Texture Management Unit or Texture Processing Unit.

Texture Memory: The area where texture is stored. In the VoodooX architecture Texture Memory is connected to the TMU.

Trilinear Blending: Trilinear blending interpolates between the mipmap levels. This reduces the discrete line that appears when textures are viewed at small angles and are viewed over large distances.   Trilinear, Mipmapped texture anti-aliasing is the best form of texture anti-aliasing available on most high-performance graphics systems. Trilinear Mipmapping does not cost any performance on Quantum3D hardware.

U
V
Voodoo, Voodoo2 and Voodoo3: The names of the latest chipsets from 3dfx. In Voodoo and Voodoo2 1 FBI chip and 2 TMU chips are used to represent a chipset.   In Voodoo3 this functionality is on a single chip.

W
X
Y
Z

16.2. Functions Defined by SimGL

OpenGL has approximately 334 functions (including wgl functions). There are 267 functions in this list including the 5 redundant *EXT function names. See the other appendices for any limitations on SimGL functions. SimGL V4.3-build161 defines the following functions. The file q3dsimgl.txt that is delivered with SimGL has the most up-to-date list.

glAlphaFunc	glColor4sv	glGetString
glAreTexturesResident	glColor4ub	glGetTexGendv
glAreTexturesResidentEXT	glColor4ubv	glGetTexGenfv
glBegin	glColor4ui	glGetTexGeniv
glBindTexture	glColor4uiv	glHint
glBindTextureEXT	glColor4us	glIsEnabled
glBitmap	glColor4usv	glIsList
glBlendFunc	glColorMask	glIsTexture
glCallList	glColorMaterial	glIsTextureEXT
glCallLists	glCullFace	glLightModelf
glClear	glDeleteLists	glLightModelfv
glClearColor	glDeleteTextures	glLightModeli
glClearDepth	glDeleteTexturesEXT	glLightModeliv
glColor3b	glDepthFunc	glLightf
glColor3bv	glDepthMask	glLightfv
glColor3d	glDepthRange	glLighti
glColor3dv	glDisable	glLightiv
glColor3f	glDrawBuffer	glLineStipple
glColor3fv	glEnable	glLineWidth
glColor3i	glEnd	glListBase
glColor3iv	glEndList	glLoadIdentity
glColor3s	glFinish	glLoadMatrixd
glColor3sv	glFlush	glLoadMatrixf
glColor3ub	glFogf	glMaterialf
glColor3ubv	glFogfv	glMaterialfv
glColor3ui	glFogi	glMateriali
glColor3uiv	glFogiv	glMaterialiv
glColor3us	glFrontFace	glMatrixMode
glColor3usv	glFrustum	glMultMatrixd
glColor4b	glGenLists	glMultMatrixf
glColor4bv	glGenTextures	glNewList
glColor4d	glGenTexturesEXT	glNormal3b
glColor4dv	glGetBooleanv	glNormal3bv
glColor4f	glGetDoublev	glNormal3d
glColor4fv	glGetError	glNormal3dv
glColor4i	glGetFloatv	glNormal3f
glColor4iv	glGetIntegerv	glNormal3fv
glColor4s	glGetMaterialfv	glNormal3i
	glGetMaterialiv	glNormal3iv

glNormal3s	glTexCoord2dv	glVertex4i
glNormal3sv	glTexCoord2f	glVertex4iv
glOrtho	glTexCoord2fv	glVertex4s
glPixelStoref	glTexCoord2i	glVertex4sv
glPixelStorei	glTexCoord2iv	glViewport
glPointSize	glTexCoord2s	wglChoosePixelFormat
glPolygonMode	glTexCoord2sv	wglCopyContext
glPopAttrib	glTexCoord3d	wglCreateContext
glPopMatrix	glTexCoord3dv	wglCreateLayerContext
glPushAttrib	glTexCoord3f	wglDeleteContext
glPushMatrix	glTexCoord3fv	wglDescribeLayerPlane
glRasterPos2d	glTexCoord3i	wglDescribePixelFormat
glRasterPos2dv	glTexCoord3iv	wglGetCurrentContext
glRasterPos2f	glTexCoord3s	wglGetCurrentDC
glRasterPos2fv	glTexCoord3sv	wglGetDefaultProcAddress
glRasterPos2i	glTexCoord4d	wglGetLayerPaletteEntries
glRasterPos2iv	glTexCoord4dv	wglGetPixelFormat
glRasterPos2s	glTexCoord4f	wglGetProcAddress
glRasterPos2sv	glTexCoord4fv	wglMakeCurrent
glRasterPos3d	glTexCoord4i	wglRealizeLayerPalette
glRasterPos3dv	glTexCoord4iv	wglSetLayerPaletteEntries
glRasterPos3f	glTexCoord4s	wglSetPixelFormat
glRasterPos3fv	glTexCoord4sv	wglShareLists
glRasterPos3i	glTexEnvf	wglSwapBuffers
glRasterPos3iv	glTexEnvfv	wglSwapLayerBuffers
glRasterPos3s	glTexEnvi	wglUseFontBitmapsA
glRasterPos3sv	glTexEnviv	wglUseFontBitmapsW
glRasterPos4d	glTexGend	wglUseFontOutlinesA
glRasterPos4dv	glTexGendv	wglUseFontOutlinesW
glRasterPos4f	glTexGenf	
glRasterPos4fv	glTexGenfv	
glRasterPos4i	glTexGeni	
glRasterPos4iv	glTexGeniv	
glRasterPos4s	glTexImage2D	
glRasterPos4sv	glTexParameterf	
glReadBuffer	glTexParameterfv	
glReadPixels	glTexParameteri	
glRectd	glTexParameteriv	
glRectdv	glTexSubImage2D	
glRectf	glTranslated	
glRectfv	glTranslatef	
glRecti	glVertex2d	
glRectiv	glVertex2dv	
glRects	glVertex2f	
glRectsv	glVertex2fv	
glRenderMode	glVertex2i	
glRotated	glVertex2iv	
glRotatef	glVertex2s	
glScaled	glVertex2sv	
glScalef	glVertex3d	
glScissor	glVertex3dv	
glShadeModel	glVertex3f	
glTexCoord1d	glVertex3fv	
glTexCoord1dv	glVertex3i	
glTexCoord1f	glVertex3iv	
glTexCoord1fv	glVertex3s	
glTexCoord1i	glVertex3sv	
glTexCoord1iv	glVertex4d	
glTexCoord1s	glVertex4dv	
glTexCoord1sv	glVertex4f	
glTexCoord2d	glVertex4fv	

16.3. **SimGL Function Stubs**

The following functions are present as stubs and have no functionality. When these functions are called the GL error status is set to GL_INVALID_OPERATION. The first time that any particular one of these functions is called, a warning message is sent to stderr. The file q3dsimgl.txt that is delivered with SimGL has the most up-to-date list.

glAccum	glIndexf
glArrayElement	glIndexfv
glClearAccum	glIndexi
glClipPlane	glIndexiv
glColorPointer	glIndexs
glCopyPixels	glIndexsv
glCopyTexImage1D	glIndexub
glCopyTexImage2D	glIndexubv
glCopyTexSubImage1D	glInitNames
glCopyTexSubImage2D	glInterleavedArrays
glDebugEntry	glLineStipple
glDisableClientState	glLoadName
glDrawArrays	glLogicOp
glDrawElements	glMap1d
glDrawPixels	glMap2d
glEdgeFlag	glMapGrid1d
glEdgeFlagPointer	glMapGrid2f
glEdgeFlagv	glNormalPointer
glEnableClientState	glPassThrough
glEvalCoord1d	glPixelMapfv
glEvalCoord1dv	glPixelMapuiv
glEvalCoord1fv	glPixelMapusv
glEvalCoord2d	glPixelTransferf
glEvalCoord2dv	glPixelTransferi
glEvalCoord2fv	glPixelZoom
glEvalPoint1	glPolygonOffset
glFeedbackBuffer	glPolygonStipple
glGetClipPlane	glPopClientAttrib
glGetLightfv	glPopName
glGetLightiv	glPrioritizeTextures
glGetMapdv	glPushClientAttrib
glGetMapfv	glPushName
glGetMapiv	glSelectBuffer
glGetPixelMapfv	glTexCoordPointer
glGetPixelMapuiv	glTexSubImage1D
glGetPixelMapusv	glVertexPointer
glGetPointerv	wglCopyContext
glGetPolygonStipple	wglDescribeLayerPlane
glGetTexEnvfv	wglGetDefaultProcAddress
glGetTexEnviv	wglGetLayerPaletteEntries
glGetTexImage	wglRealizeLayerPalette
glGetTexLevelParameterfv	wglSetLayerPaletteEntries
glGetTexLevelParameteriv	wglShareLists
glGetTexParameterfv	wglUseFontBitmapsW
glGetTexParameteriv	wglUseFontOutlinesA
glIndexMask	wglUseFontOutline
glIndexPointer	
glIndexd	
glIndexdv	