



PC-IG User Guide

Operating and Using your AAIchemy PC Image Generator (PC-IG)

Part Number: 700-0841-01

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3. Documentation Conventions

3.1. Icons



Information Icon is used to annotate important information.



Exclamation Icon is used to annotate cautionary information.

3.2. Fonts

Bold-Italics font type denotes Menus or Buttons.

Bold-underlined font type denotes important files.



4. AAIchemy PC-IG System

4.1. Overview

AAIchemy™ is a PC based real-time image generator (PC-IG). AAIchemy includes a 4U 19" rack mountable PC subsystem with one or two AA5 3D graphics subsystems. The AA5 is also designed and manufactured by Quantum3D™. All AAIchemy PC-IG systems include a Heavy Metal™ 2 (HM2) chassis manufactured by Quantum3D.

The AA5 graphics subsystem utilizes the 3dfx® VSA-100 graphics chipset and delivers hardware implemented full-scene anti-aliasing with industry leading 3D graphics performance. The AA5 graphics subsystem is configured either as a single PCI board with eight VSA-100 chips, or as two interconnected PCI boards with a total of sixteen VSA-100 chips.

AAIchemy provides real-time 3D rendering of complex synthetic environments at real-time frame rates (e.g., 60 Hz) without distracting visual artifacts. AAIchemy also supports Quantum3D's SwapLock™ channel synchronization technologies for multi-channel, wide field-of-view applications and optional Q-Link™ and SwapLock to provide Genlock and swapbuffer synchronization for double buffered applications.

This manual describes the following models for the AAIchemy, specifically:

AAIchemy TX Built around the Tyan Thunder 2500 server mainboard, the TX configuration is most common in systems manufactured before June 2001. The TX configuration supports the single board and dual board AA5 configurations and includes support for dual slot one Pentium III processors with speeds up to 1GHz on the latest models. TX systems primarily ship with a minimum of dual 800 MHz CPUs. The TX platform is currently the only configuration that supports the special purpose sensor post processor (SPP) available from Quantum3D. Systems are equipped with either AV3 or AV4 power supplies. The AV3 is suitable for single board AA5 graphics subsystems only. The AV4 power supplies are required for systems equipped with dual board AA5 or systems equipped with SPP.

For more information on installation, operation and BIOS for the Thunder 2500 system board please see the following references:

Thunder 2500 S1867 Motherboard Users Manual
http://www.tyan.com/products/html/thunder2500_p.html

AAIchemy GX Built around the Intel L440 GX+ server mainboard, AAIchemy GX is principally used in systems that have Mercury graphics but which are being upgraded to AA5. These systems include an AV3 power supply as well as a single board AA5 graphics subsystem. The AAIchemy GX configuration supports dual slot one Pentium III processors with speeds up to 800 MHz, but only on the latest mainboard models from Intel (revision 8 or greater). Most GX systems that were upgraded from Mercury are equipped with dual 500 MHz or dual 600 MHz CPUs.

For more information on installation, operation and BIOS for the Intel L440 GX+ serverboard please see the following references:

Intel L440GX+ Server Board documentation
<http://support.intel.com/support/motherboards/server/L440GX/>



AAIchemy QX Built around the Tyan Tiger 100 mainboard; AAIchemy QX was used for some systems manufactured before January 2001. The AAIchemy QX configuration supports the single board AA5 subsystem configuration only and includes support for dual slot one Pentium III processors with speeds up to 800 MHz. Most QX systems were shipped with dual 800 MHz CPUs. The QX platform uses the Intel BX motherboard chipset. The QX platform was retired because the mainboard was no longer available after January 2001.

For more information on the Tiger 100 mainboard, please see the following references:

Tiger 100 Motherboard Users Manual
ftp://ftp.tyan.com/manuals/thunder/m_s1836_230.pdf

AAIchemy SX Built around the Tyan Thunder 2567 server mainboard, the SX configuration will replace the TX mainboard as the TX is going out of production in the June 2001 timeframe. The AAIchemy SX configuration is very similar to the TX and supports both the single board and dual board AA5 system configurations. Unlike TX, the SX mainboard includes support for dual socket 370 Pentium III processors with speeds up to 1.2 GHz on the first models. As with TX, the SX platform will also support the special purpose sensor post processor (SPP) hardware from Quantum3D. SX systems normally come equipped with the AV4 power supply. The AV4 power supplies are required for systems equipped with dual board AA5 or systems equipped with SPP.

For more information on installation, operation and BIOS for the Thunder 2567 system board please see the following references:

Thunder 2567 Motherboard Users Manual
http://www.tyan.com/products/html/thunderhe_p.html



4.2. AAIchemy Configurations

AAIchemy includes both a general-purpose PC subsystem and a 3D graphics subsystem. The 3D graphics subsystem consists of an AA5 configured using one of the following combinations:

- One AA5 graphics card (one PCI slot required) for use as a single display channel
- Two AA5 graphics cards (two PCI slots required) for use as 2 independent display channels
- Two AA5 dual board graphics cards (two PCI slots required) configured for use as a single display channel

An optional Sensor Post Processing (SPP) subsystem may also be configured to operate with AA5 series graphics accelerators.

AA5 graphics boards manufactured before May 2001 are typically referred to as Rev9x boards. Boards manufactured after May 2001 are generally Rev-01 or Rev-02 graphics boards (sometimes just referred to as Rev0x boards). You can tell which graphics board type you have by looking at the Timing Controller revision level in the AA5 display property sheet under "Driver Info". A timing controller revision level of 4 or lower is a Rev9x board. A board with revision 8 or higher is a Rev0x board.

4.2.1. TX and SX

An AAIchemy TX and SX PC subsystem includes:

- Dual-Processor Pentium III CPUs (typically 700 or 800 MHz on TX, typically 933 MHz or faster on the SX model)
- Microsoft Windows NT4 Operating System standard
- Windows 2000 support planned for late 2001
- On TX, up to 6 GB system RAM (133 MHz SDRAM); typical systems have 256MB RAM
- On SX, up to 4 GB system RAM (133 MHz SDRAM); typical systems have 256MB RAM
- 100/133 MHz frontside bus
- Dual PCI busses
- Integrated Intel 10/100 Ethernet Network Interface on mainboard
- AGP slot; systems normally come equipped with NVIDIA Vanta card; optional GeForce2 or Geforce3 graphics boards are also available and supported
- AV3 or AV4 power supply
- Supports single board AA5 graphics configurations with AV3 (Rev 9x board only; AV4 required for Rev-01 and beyond boards)
- Supports dual board AA5 graphics configurations with AV4
- Optional support for Sensor Post Processor (SPP) hardware for systems equipped with an AV4 power supply



4.2.2. GX

An AAlchemy GX PC subsystem includes:

- Dual-Processor Pentium III CPUs (typically 500 MHz)
- Microsoft Windows NT4 Operating System standard
- Up to 1 GB system RAM (100 MHz SDRAM); typical systems have 128MB RAM
- 66/100 MHz frontside bus
- Dual PCI busses
- Integrated Intel 10/100 Ethernet Network Interface on mainboard
- Built-in 2D VGA Graphics chipset on mainboard (Cirrus Logic)
- AV3 power supply for Rev9x AA5 boards (AV4 required for Rev0x boards)
- Support for single board AA5 configurations only
- No AGP slot is available

4.2.3. QX

An AAlchemy QX PC subsystem includes:

- Dual-Processor Pentium III CPUs (typically 800 MHz)
- Microsoft Windows NT4 Operating System standard
- Up to 4 GB system RAM (100 MHz SDRAM); typical systems have 256MB RAM
- 66/100 MHz frontside bus
- Single PCI bus
- AGP slot: systems normally come equipped with NVIDIA Vanta card; optional GeForce2 graphics boards are also available and supported
- AV3 Power Supply for Rev9x AA5 boards, and AV4 for Rev0x boards
- PCI network interface card (10/100)
- Support for single board AA5 configurations only

4.3. AA5 3D Graphics Subsystem Capabilities

An AA5 3D graphics subsystem is included in all AAlchemy PC-IG systems and is available in two basic versions:

- Performance Trilinear (PT) Available
- No Performance Trilinear Available

Performance Trilinear is a special purpose hardware feature unique to Quantum3D's AA5. PT can double the pixel fill-rate performance of your application when its feature set is enabled and you are rendering with 22-bpp color. This is possible because a PT enabled board can output two pixels per clock instead of just one.

AA5 graphics boards manufactured after April 2001 are normally equipped with PT hardware. You can easily tell if your board is PT enabled or not. A PT enabled board is reported as a 82xxSB in the display property sheet where xx refers to the number of megabytes of memory found on the board (32 or 64). A board without PT is reported as 81xxDB in the display property sheet.



Both PT and non-PT AA5 graphics board include:

- A PCI graphics card with eight (8) VSA-100 Chips
- 32 or 64 MB unified memory on-board (shared frame buffer and texture memory)
- Independent 3D-only output (using a standard DB15 VGA connector)
- Hardware implemented, automatic full-scene, subpixel anti-aliasing (4 or 8 sub-samples per pixel available).
- T-Buffer for Depth-of-field, depth-of-focus, soft shadows and other effects.
- Anisotropic Texture Filtering
- Up to 1 Gigapixels per second sustained trilinear texture fill rate with full scene anti-aliasing enabled, Gouraud shading, dynamic lighting, depth buffer enabled, alpha enabled, and per-pixel fog effects enabled
- Texture paging rates of up to 528 M texels/sec—peak.
- Triangle throughput in excess 1.4M textured independent triangles per second—peak, with on-chip triangle set-up engine.
- Programmable video resolution and refresh rates.
- 16-bit (5-6-5), 22-bit (7-8-7), and 30-bit (10-10-10) color settings available
- Hardware floating point Z-buffer (16-bit when color resolution is set to 16- or 22-bpp color, and 22-bit resolution when color resolution is set to 30-bpp color)
- Support for single, double and triple buffering (frame buffer)
- Transparency and chroma-key support, including screen-door transparency support
- Hardware support for non-linear fog table
- Per-pixel atmospheric effects (OpenGL compliant)
- OpenGL-compliant alpha blending
- Texture map resolutions up to 2048 x 2048 texels per map
- Analog RGB output supports non-interlaced video
- Hardware implemented 4-bpt 3dfx™ FXT1 texture compression
- Software implemented S3CT texture compression
- Perspective correct bilinear and trilinear texture filtering with per-pixel LOD MIP mapping with support for Gouraud, detailed and projected texture mapping
- Support for SwapLock™ (swap buffer sync and genlock)
- Support for QLink™ Genlock I/O option (external genlock)

AA5 3D Subsystem	Memory on Board	# PCI slots (boards)	# Pixels per Clock	#Graphics Chips	Perf. Trilinear Avail
8132SB	32MB	1	1	8	no
8232SB	32MB	1	2	8	yes
8164SB	64MB	1	1	8	no
8264SB	64MB	1	2	8	yes
8232DB	32MB	2	2	16	no
8432DB	32MB	2	4	16	yes
8264DB	64MB	2	2	16	no
8464DB	64MB	2	4	16	yes



4.3.1. Available Texture Memory at Display Resolutions

AAIchemy employs unified memory architecture. This means that the graphics frame buffer and texture memory are shared in the AA5 subsystem. The figure below shows the approximate amount of texture memory available at various frame buffer resolutions.

Graphics	On Board Memory	Texture Space Available @800x600	Texture Space Available @1024x768	Texture Space Available @1280x1024	Texture Space Available @1600x1200
8x32	32 MB	26MB	22 MB	16 MB	9 MB
8x64	64 MB	58 MB	54 MB	48 MB	41 MB

4.4. AA5 Specifications

4.4.1. Chipset

- 4 or 8 3dfx Interactive™ VSA-100 Chipsets

4.4.2. Memory Configuration

- 32MB or 64MB SGRAM dedicated graphics memory dynamically configured between frame buffer and texture memory

4.4.3. Minimum System Requirements

- PCI 2.1 compliant system for AAIchemy QX PCI
- Pentium® II class or faster processor
- Available PCI expansion slot
- Microsoft Windows® NT 4.0 with Service Pack 4 (or later)
- VGA, multi-frequency compatible monitor

4.4.4. VESA Support

- VESA VBE 3.0 compliant
- DDC (Display Data Channel) 2b compliant
- VESA DPMS support
- Up to 1280x1024 video resolution on Rev9x AA5 graphics subsystems
- Up to 1600x1200 video resolution on Rev0x AA5 graphics subsystems

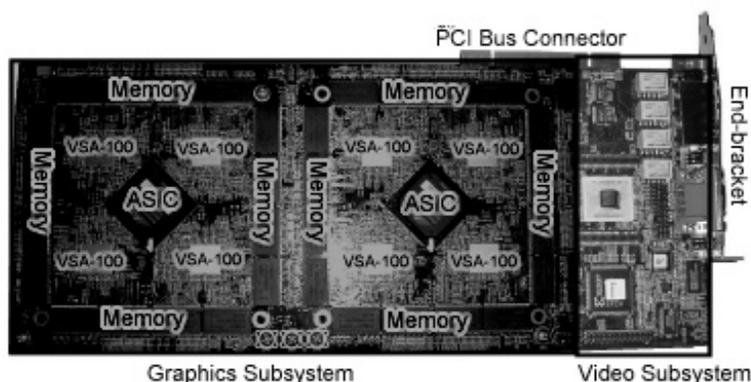
4.5. AA5 Architecture

AA5 architecture is comprised of memory, graphics and video subsystems. The graphics subsystem is comprised of 8 3Dfx VSA-100 Chipsets and 2 Quantum3D AA5 ASICs (Application Specific Integrated Circuit). The primary purpose of the graphics subsystem is texel fill, texel filtering, rasterization and anti-aliasing. Graphics processing capability is scaled when additional boards and VSA-100 chipsets are added to the system.

Memory is attached to the VSA-100 and the AA5 ASIC. Graphics memory is unified, meaning that it is used for frame buffer, Z-buffer and texture memory.

The video subsystem performs digital to analog conversion and interfaces to digital and analog external display devices. One of the most important features of the video subsystem GenLock and SwapLock is to synchronize the vertical and horizontal refresh intervals of the display. The video subsystem can also interconnect via a proprietary digital bus with another AA5 8xxx Series board.

In a dual board AA5 configuration, the two boards are combined together to provide double the pixel fill rate.

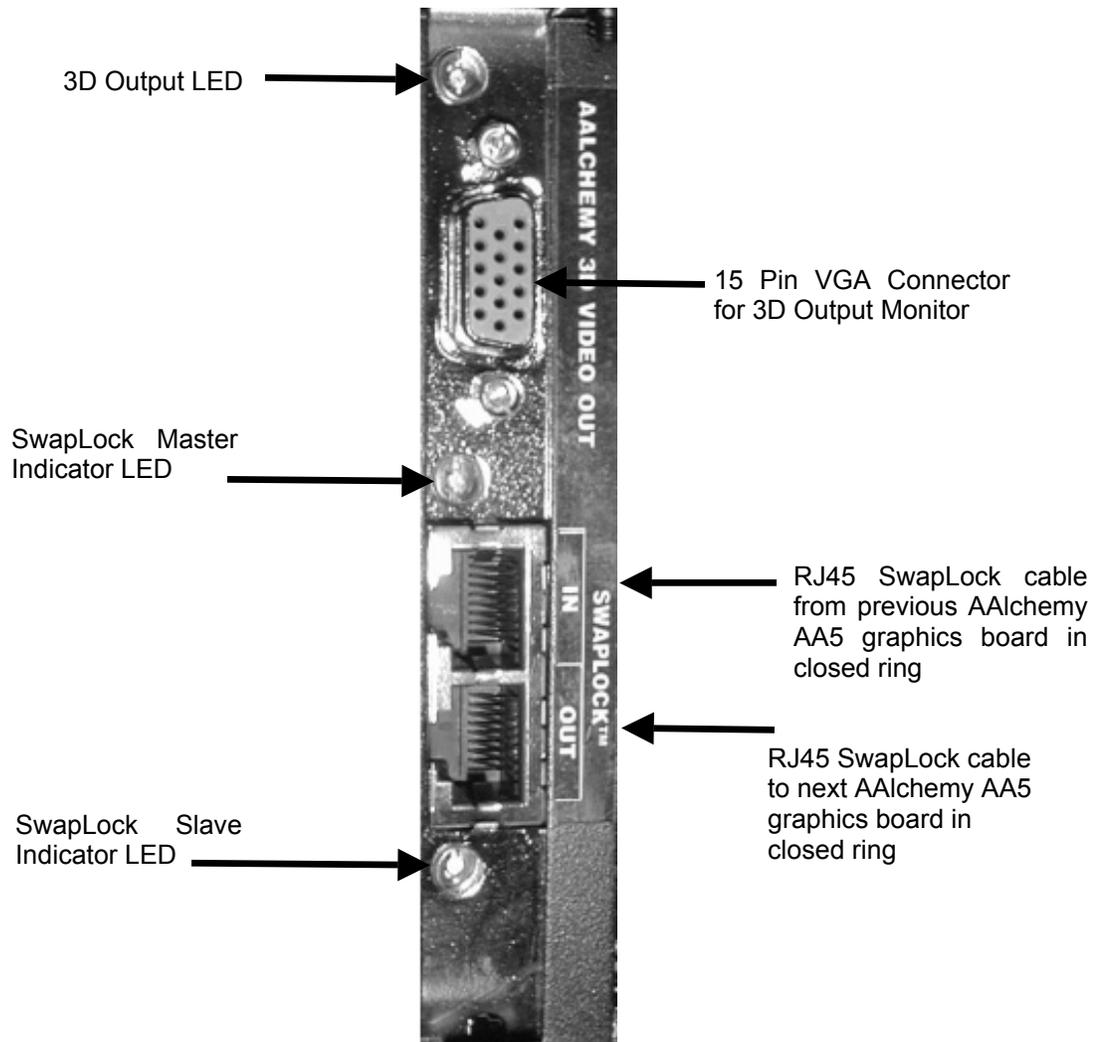


4.6. AA5 Connectors

The AA5 end bracket is labeled and contains LEDs for ease of use. The DB15 connector is connected to a standard VGA monitor cable. Quantum3D recommends that this cable be triple shielded and contains transducers.

If a dual AA5 board is configured in your system, you should connect your monitor (display) to the card that has the 3D Output LED ON (see the figure below). If you have two AA5 boards in your system which are not joined together to represent a single unit (such as an 8464DB), then each card's output LED will be lighted and you can use each card as an independent channel.

Specifying the Master or Slave operation for Swaplock in the AA5 8xxx Display Properties will turn the appropriate SwapLock indicator on or off. See section 12.5.2 for information on the SwapLock connectors.



4.7. Regulatory Approvals

EMI & Safety: FCC A, ETL and CE Approved.

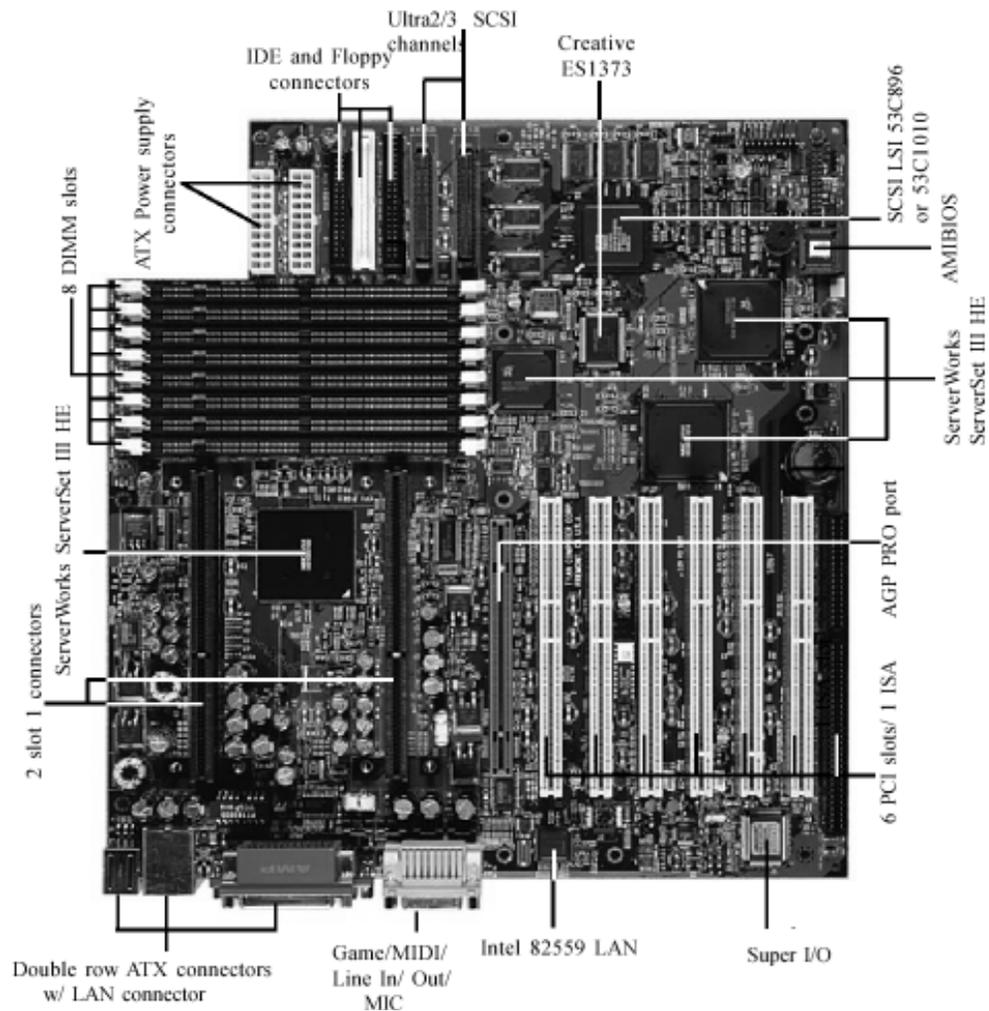
4.8. Proceed with Caution



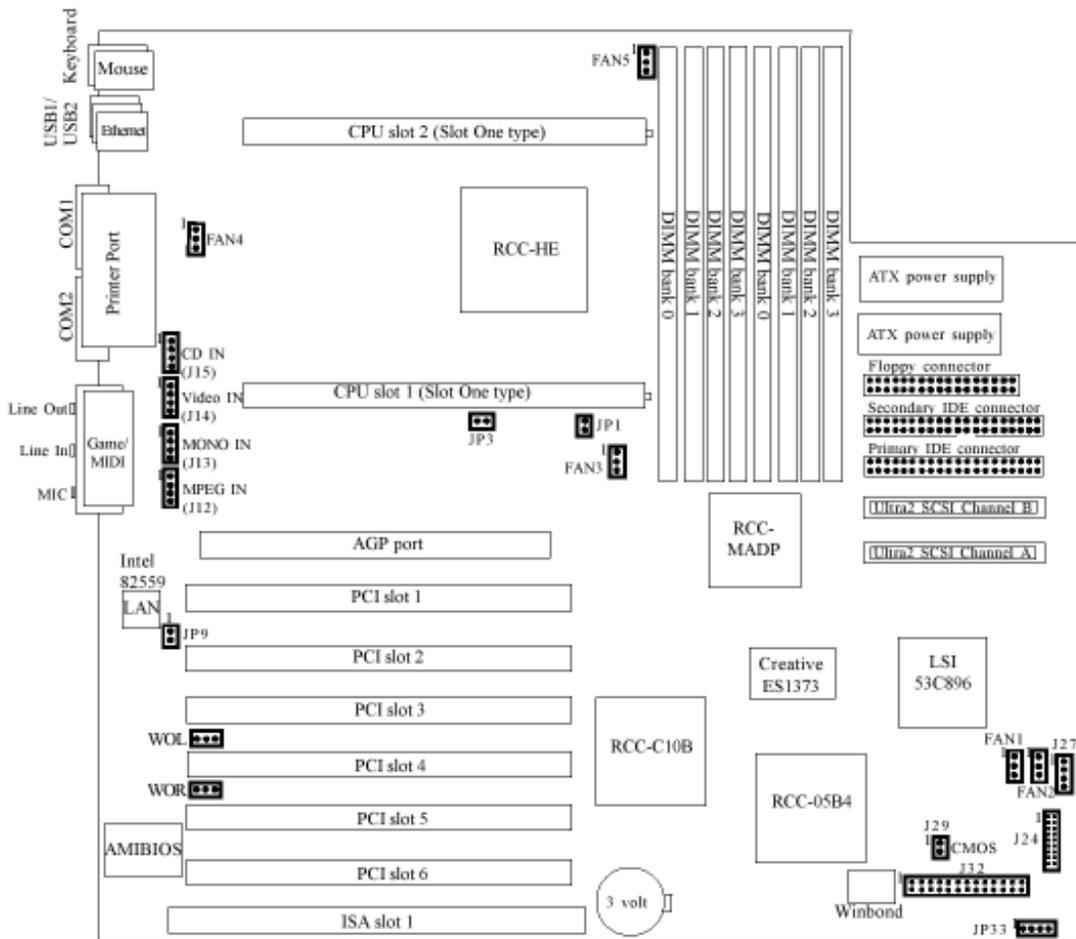
CAUTION: A lithium battery is included with the AAlchemy system. There is a danger of explosion if this battery is incorrectly replaced. Replace only with the same or equivalent type recommended by manufacturer. Dispose of used batteries according to manufacturer instructions.

This battery is used for the Real Time Clock circuit. The expected life time of the battery is approximately 2 years. For AAlchemy TX with the Tyan Thunder 2500 a 3V lithium battery is required (CR2032).

5. Motherboard Layout



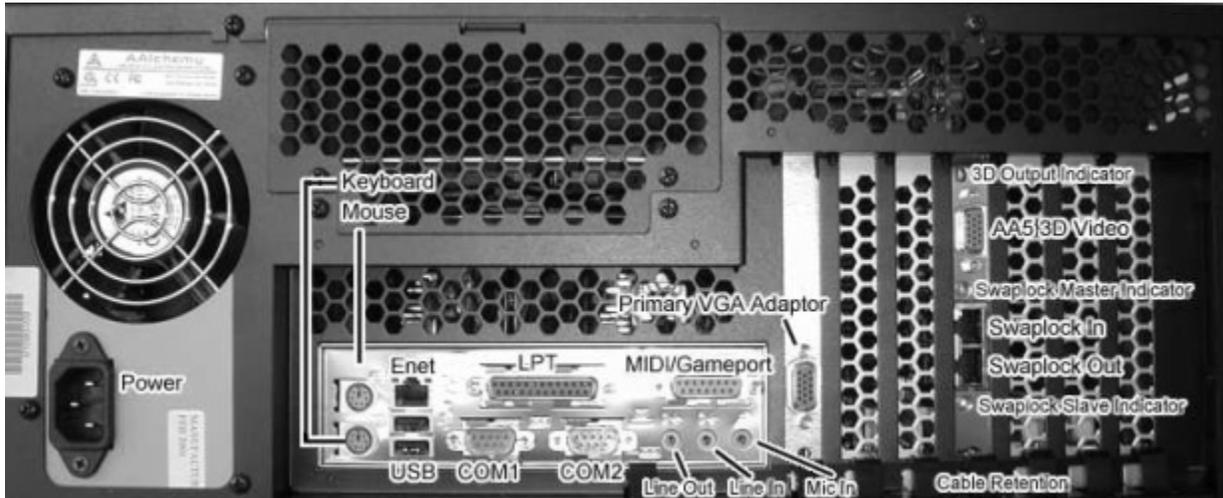
The picture above is a TX motherboard without any memory, PCI or ISA cards installed. The SX has a similar layout but with socket 370 CPUs and only four DIMM memory slots. This image is courtesy of Tyan Computer.



The picture above is a TX motherboard without any PCI or ISA cards installed. The SX has a similar layout but with two Socket 370 CPUs and 4 memory DIMM slots (not 6). On the TX, memory should be added starting with the low banks (starting with DIMM slot 0). Some PCI card manufacturers recommend a specific PCI slot for certain boards (the AA5 graphics card should generally be installed in PCI slot 4 in the TX for example). This image is courtesy of Tyan Computer.

5.1. TX Mainboard Connectors at Back of System

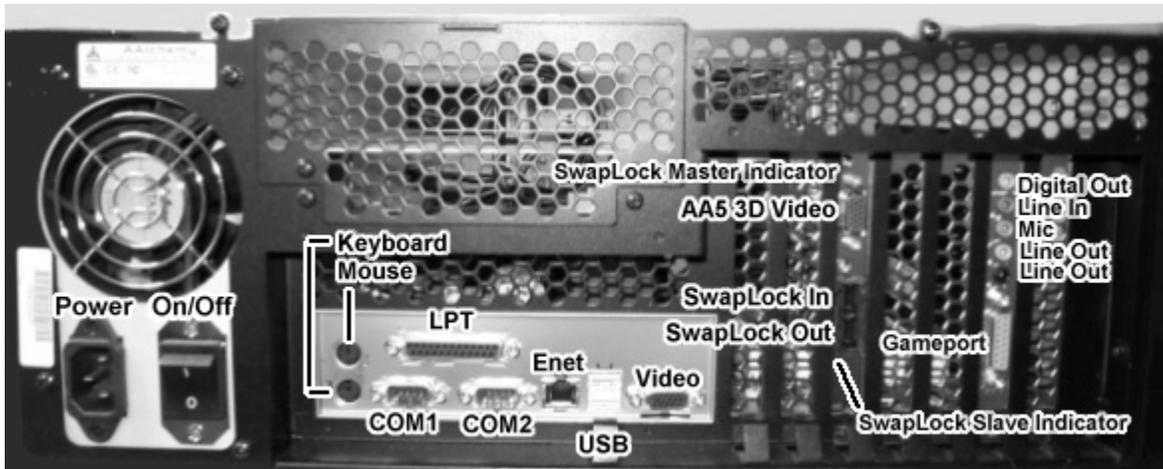
You can tell if you have an AAlchemy TX system by simply looking at the back of the AAlchemy unit. The picture below shows the mainboard connectors at the back of your AAlchemy TX system:



The system above has a single board AA5 graphics card and an AV4 power supply. The AV4 power supply has a power connector as shown above on the left side, but does *not* have a toggle switch there. The AV3 power supply always has a toggle switch on the back of the unit near the power connector (see the AAlchemy GX back panel below which does have an AV3 power supply). The AV4 is required for AA5 Rev0x graphics boards.

5.2. GX Mainboard Connectors at Back of System

You can identify an AAlchemy GX system by simply looking at the back of the AAlchemy unit. The picture below shows the mainboard connectors at the back of your AAlchemy GX system:



The AAlchemy GX is primarily used for customers upgrading from Mercury. The same mainboard is used as part of the upgrade (Intel GX+).

Note that the On/Off switch on the back of this particular unit identifies the AV3 power supply easily. If you have a Rev0x AA5 graphics board in your system, you will have an AV4 power supply (and no On/Off power switch on the back of the unit). This unit is also equipped with an optional sound card and is typically in the 2nd slot from the right as show. The AA5 graphics subsystem is installed in its normal slot position as well (5th slot from the right or 3rd slot from the left).

For more information you can also refer to the Heavy Metal GX+ users guide for more information on the Intel GX+ mainboard.

6. Unpacking Your AAIchemy System

6.1. Inspect the Shipment

AAIchemy 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 for any reason. In the packaging you will find an accessory box, this documentation and warranty information.

When you receive the AAIchemy system you should perform a first time inspection to ensure the newly delivered AAIchemy product is operating at 100%. Monitored shipping tags have been placed on each box to ensure a safe delivery. Tip and Tell and Shock Watch 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 an AAIchemy system. If you are unable to lift this weight safely, you should obtain assistance with the first few steps of unpacking the system. The following tools are needed.

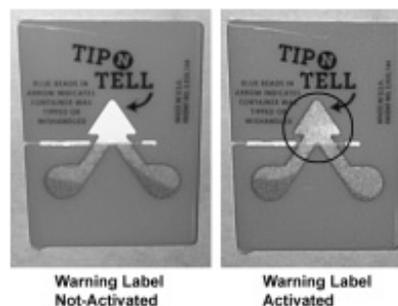
A Small Knife to cut packing tape

#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.

6.2. Check the Tip and Tell

Although the shipping container with AAIchemy is very rugged, many times people request that additional measures be taken in order to avoid damage and decrease liability for damage. Tip and tell help determine if the system has been tipped on its side, upside down 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 18 for information on contacting technical support.



6.3. Check the Shock Watch

Another damage measurement and prevention device is Shock Watch. Shock Watch 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 18 for information on contacting technical support.



6.4. Open the box

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

6.5. 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.

6.6. 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. Remove the top portion of foam protecting the computer system. 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, take the system out of the box and place it on the cleared area. Even better, have two people lift the unit (one on each side). Remove the plastic static/dust guard from the system and place it back in the box, along with the top foam insert.



6.7. Open the smaller Accessory Box

Carefully cut the tape that holds the Accessory Box closed and open the box.

6.8. Locate the packing list and confirm contents

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

6.8.1. AAchemy TX Contents

- | | |
|--|------------------------------------|
| 1. Windows NT License and CDROM | 10. Keys and Screw Driver |
| 2. Motherboard User's Manual and Driver CDROM | 11. IDE Cable (preinstalled) |
| 3. Removable Drive Enclosure User's Guide | 12. CPU Terminator Card (optional) |
| 4. AAchemy System Image Recovery CD | 13. Keyboard (optional/not shown) |
| 5. Pentium III Processor Certificate of Authenticity | 14. Mouse (optional/not shown) |
| 6. Disk Drive Installation and Reference Manual | |
| 7. Power Cable | |
| 8. SCSI Cable (optional) | |
| 9. SCSI Cable (optional) | |



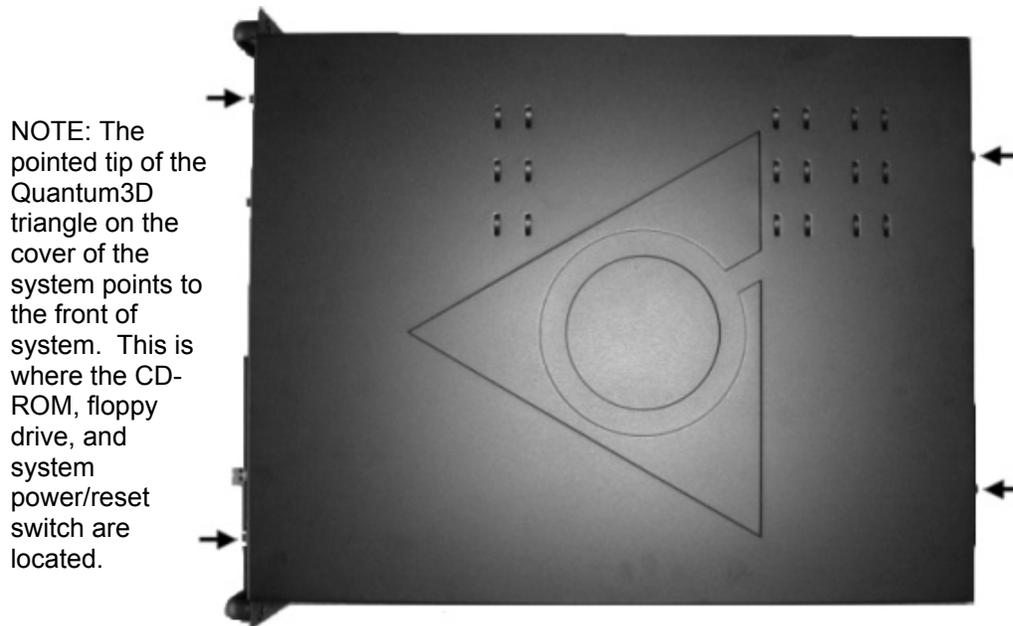
After you have inspected and confirmed the contents, place the empty accessory box back in the main packing for future use.

7. First Time Inspection

7.1. Open the Chassis

If this is the first time you are inspecting the system and it has just been removed from its original packaging, the system should not be plugged in. However, if your system has already been set up, make sure to remove power before continuing.

Place the system on a flat surface. Use a screwdriver to remove the screws that secure the lid to the system chassis.



NOTE: The pointed tip of the Quantum3D triangle on the cover of the system points to the front of system. This is where the CD-ROM, floppy drive, and system power/reset switch are located.

Shown above are the locations of the lid screws on Heavy Metal 2 systems. To remove the lid you can loosen the screws or if you want, remove them completely. Temporarily store the screws and locking washers in a safe place so that they may be used when replacing the lid.



When repairing, replacing or coming in contact with sensitive computer equipment wear appropriate grounding strap, anti-static pad and touch part of the computer chassis in order to discharge any built up static electricity. Please do not repair or replace anything inside your AAIchemy PC-IG system without the explicit approval of Quantum3D support or you may void your system warranty.

7.2. AAIchemy TX Chassis Tour

The front right side of the AAIchemy chassis houses the Media Bays. The thumbscrew on the front of the media bay is used to open the media bay door. Access to the **Power** and **Reset** switches is through the Media Bay door as well as access to the CDROM, Removable Disk Drive, CDROM and an expansion bay. The floppy disk is located on-edge on the left of the bay. Typically the removable disk drive is on bottom and CDROM on top. In addition an optional expansion drive on top is configurable.

On the rear side of the AAIchemy chassis is the power supply. Both the AV3 and AV4 power supplies provide power directly to the AA5 graphics card as well as the motherboard, media devices and fans. An AV4 power supply has three separate connectors going to the AA5 graphics board; an AV3 has two connectors. The AV4 has no On/Off switch on the back of the unit, only the front. The AV3 has a power supply switch on the back of the unit and a soft power rocker switch on the front panel.

Another *optional* expansion bay is next to the power supply and accessed through the rear of the chassis. Memory and CPUs can be accessed through this expansion bay. To remove or add processors, this expansion bay must be removed.

The left side of the chassis contains the AGP primary video card, AA5 graphics accelerator and any other optional expansion cards. The picture below shows the system equipped with a single PCI AA5 graphics subsystem. The front left of the chassis contains fans and ducted airflow designed to help regulate heat within the chassis. The maximum number of free expansion slots in AAIchemy TX is 2 PCI and 1 shared PCI/ISA.

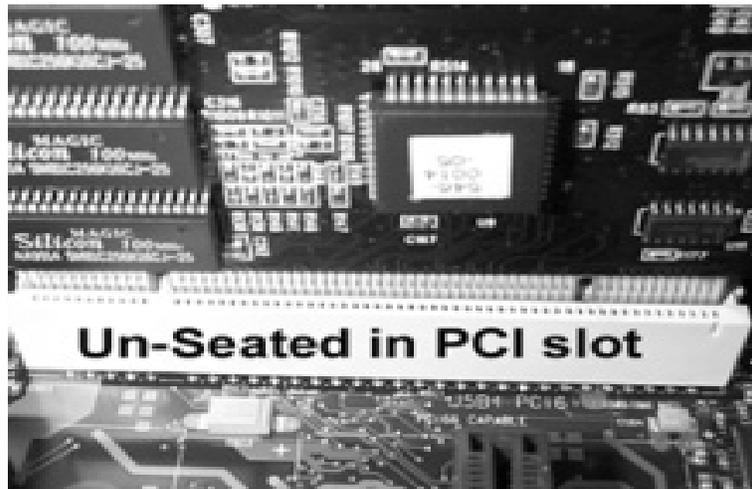


7.3. Confirm Components are Seated Properly

Look for loose cables, hardware expansion cards unsecured or loose in their slots and floating nuts and bolts inside the system. Please report any quality faults such as missing bolts or floating nuts (if any are found) to Quantum3D technical support at your earliest convenience. A problem tracking system where you can enter a new incident report is located at <http://www.quantum3d.com/support>.

7.3.1. Confirm Installation of Expansion Cards

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



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.

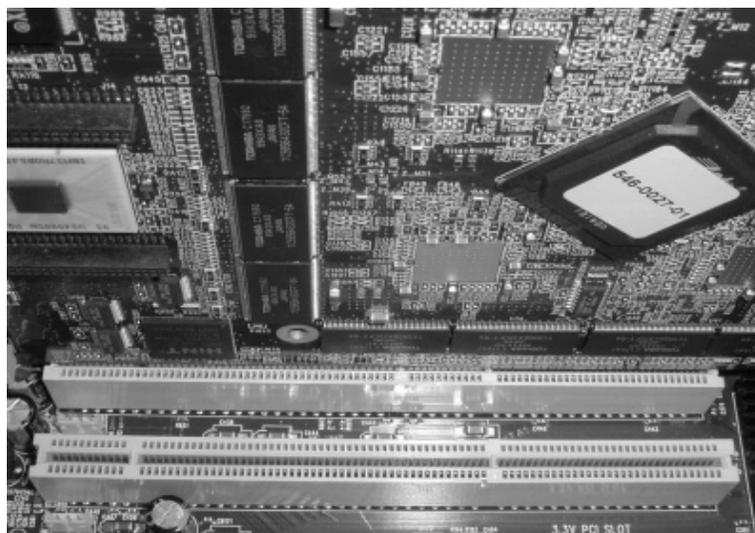


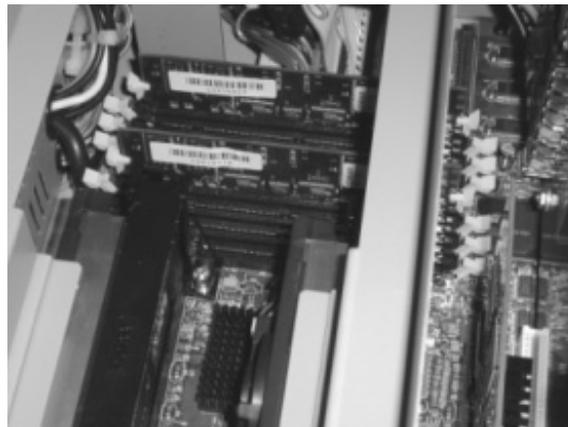


Figure 7-1 The AA5 card above is seated properly in the PCI slot. Note that it is difficult to see the pins in the slot as well as the notch. The card is level in the slot.

7.3.2. Confirm that the CPU and RAM are properly seated



Above is a picture of properly seated CPUs. For complete CPU installation instructions please refer to the motherboard User's Manual. On the TX, the large metal bracket is used to keep the CPUs in their slots during shipment.



RAM clips are properly holding the DIMMS in place. In the picture above, the DIMM retention clips on empty memory slots are pushed out. This illustrates the proper installation of the first two DIMMs.

For a complete description of memory installation and specifications, please refer to the motherboard user's guide. For information and recommendations on compatible memory contact Quantum3D or refer to the Tyan website (www.tyan.com). Please note that memory is installed in banks 0-0,1-1,2-2,3-3 on the Tyan 2500 mainboard.

7.3.3. Confirm that the cables are attached properly to the floppy, CDROM, and hard disk.



Above is a picture of properly connected Floppy, CDROM and Disk Drive cables. If they appear not to be seated, then press them firmly onto their connector to ensure a good connection. Never *force* connectors together.

7.4. Confirm the Bill of Materials

The BOM (Bill of Materials) specifies the configuration of your system. It is the specification of individual components in the system. In order to confirm 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 that was shipped with your system.

- PCI, AGP and ISA cards
- CPU Type and Clock Speed
- Amount and Type of RAM
- Hard Disk Size and Type

8. System Requirements

8.1. Quantum3D Supported Systems



AA5 8xxx Series graphics accelerators are supported in Quantum3D AAIchemy systems with the Heavy Metal or Heavy Metal 2 system chassis. AA5 8xxx series boards require that the system be configured with an AV3 or AV4 power supply.

8.2. Processors

Quantum3D uses genuine Intel Pentium III processors.

8.3. Busses

Each AA5 graphics board requires a PCI bus connector. Normally, the center PCI-66 slot is used for single board AA5 systems.

8.4. Operating Systems

- Windows NT4 with service pack revision SP6A.

8.5. Supported Rendering API's

- Quantum3D SimGL
- 3dfx Glide

8.6. Supported Scene Managers

- Carmel Applied Technology X-IG
- CG²Vtree
- Lockheed Martin SE/View
- MultiGen-Paradigm VegaNT
- Quantum3D OpenGVS
- Reality2 Tiepolo
- Soft Reality SoftVR
- Thales Training & Simulation SPACE Magic



8.7. Support for popular real-time database formats

- MultiGen-Paradigm OpenFlight
- TERREX TerraPage
- 3D Studio

8.8. Power Requirements

AA5 requires approximately 400 Watts for operation. The AV3 and AV4 power supplies are both auto voltage sensing with support for both US (120V) and European (220V) power.

8.9. Power Supply

A Quantum3D AV3 or AV4 Power Supply is required for AA5 3D graphics subsystems. AV4 is required for dual board configurations that include a 2 board AA5 or AA5 and SPP configuration.

8.10. Video Output Resolutions and Refresh Rates

640x480@ 50, 60, 75, 85 Hz.

800x600@ 50, 60, 75, 85 Hz.

960x720@ 60, 75, 85 Hz.

1024x768@ 50, 60, 75, 85 Hz.

1024x1024@ 60, 75, 85 Hz.

1152x864@ 60, 75, 85 Hz

1280x940@ 70 Hz.

1280x960@ 60, 75, 85 Hz

1280x1024@ 60, 75, 85 Hz.

1600x1200@ 60 Hz (for PT enabled boards only)



8.11. Operating Environment

Operating shock: 2G (2ms @ 1/2 sine wave)

Operating vibration: 0.25G (3.5-500 Hz sine sweep, 0 to peak)

Operating temperature: +0° C-+50° C with relative humidity 10-90%; non-condensing

9. Installing an AAIchemy System

9.1. Installation of a single channel stand-alone system



Normally, users should not have to replace or touch the AA5 graphics subsystem. You should only remove / replace the AA5 graphics subsystem if you have been instructed to do so by the factory or technical support and you are comfortable doing so. Users that do not follow this may void their system warranty.

9.1.1. Tools Required

Monitor / Display (multi-sync is recommended) or fixed frequency capable video device with support for 1024x768@60 Hz operation or 1280x1024@60 Hz. Projection systems, HMDs, and large screen monitors / CRTs are all commonly used 3D display devices. If you have specific questions about video compatibility, please check the available resolutions on the AA5 display property sheet once your system has been booted. Alternately, you can request more information using the Quantum3D problem tracking system, which can be accessed at <http://www.quantum3d.com/support>. AA5 supports most VESA compatible video formats.



*Note if you are using a fixed frequency monitor or display device, it is necessary to configure AA5 graphics prior to testing the display. See the list of supported video resolutions and refresh rates in section **Failure to configure display properties so that they match the display device can result in permanent damage to the display device. Please be careful, especially when using older projector systems that are not multi-sync compatible.***

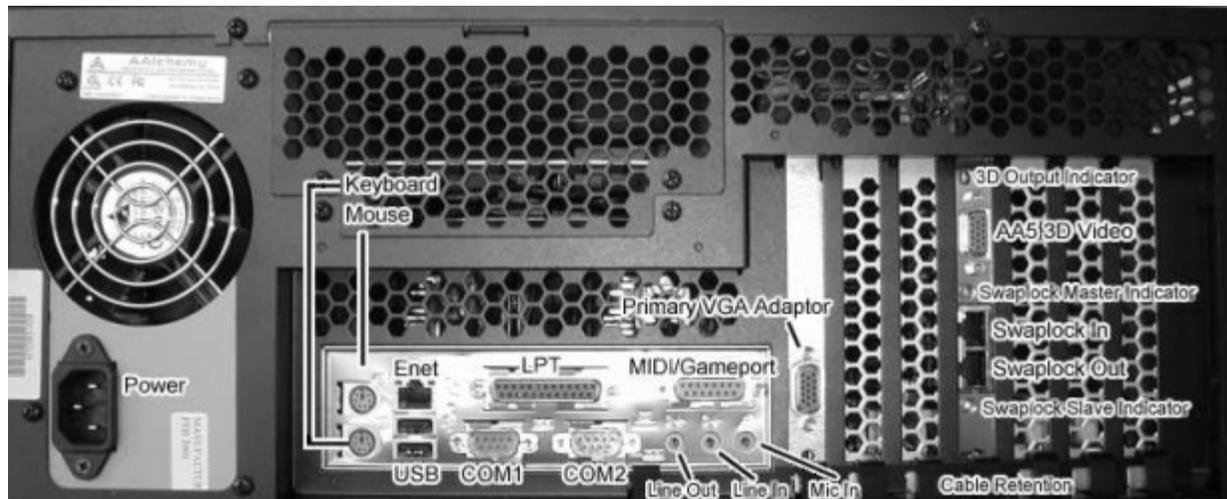
1. Monitor, multi-sync capable of at least 1024x768@60 Hz operation for the primary Windows Display (1280x1024@60 Hz is even better). You may wish to have a high-resolution display if you are using any software that utilizes a GUI for its operation.
2. 15 Pin Video/Monitor Cables (Triple shielding and transducers are highly recommended).
3. CAT5 Network Cable and Operating network connection.
4. Keyboard
5. Mouse
6. Power Cord

9.1.2. 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 consisting of up to 5 AAIchemy PC-IGs have a dedicated 20amp circuit with a clean current for proper operation.

9.1.3. 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 appears below.



AAIchemy AA5 3D Display and the Primary Display Adapter are located to the right of the main I/O panel and are typically located vertically in AGP and PCI slots. Connect the power cord, keyboard, mouse, and monitor cables to the appropriate connectors. Gently place the network cable in the RJ45 connector until you hear a slight click.

The following connections are required for complete operation of an AAIchemy system

Part	AAIchemy Connector	Purpose
DB15 Monitor Cable	Primary VGA Adaptor	Windows Display Monitor
DB15 Monitor Cable	AA5 3D Video	3D Display Device
PS/2 Keyboard	Keyboard	Windows/Application I/O
2 or 3 Button PS/2 Mouse	Mouse	Windows/Application I/O
Power Cord	Power	120-240VAC 50-60Hz

10. Powering On AAIchemy

Open the front access door of the PC by turning the chrome knob on the top of the panel. This door protects the media devices and power switches. Press and release the bottom black button to the right. This will turn on power to the system. Note that if you have an AV3 power supply, you must also have the On/Off switch at the rear of the unit in the On position as well before you can power up the AAIchemy (with the AV3, the power switch on the front of the unit provides soft power only).



Figure 10-1 The Power Switch is the lowest of the two black switches. The reset switch is the black switch above the power switch.

10.1.1. Confirm that RAM and CPUs are recognized.

As the system boots for the first time, confirm that RAM and CPUs are recognized correctly. The BIOS will report the type of the CPU and the amount of RAM you have on your system. If you miss this during bootup, you can always use the tool "cpuinfo.exe" which is in your path (or under the OpenGVS RealWorld Benchmarks as "Show CPU Information" to identify the number and types of processors you have. Note that all AAIchemy systems come equipped with dual processors.

10.1.2. Log on to the system

The first time the system is brought up a Windows NT configuration wizard will step you through the process of configuring the operating system. If you are configuring your system for network operation, you may need to request network information from your systems administrator.

Login to the system by using the Administrator user and pressing the Enter key for the password (no password). We recommend that you change the password the first time you use the system to provide better security to your system.



11. System Shutdown Procedures

To shutdown an AAIchemy system, you must perform a proper Windows Shutdown. To do this perform the following steps:

- Log on to the system. The system ships with the Administrator account active and the password is empty (undefined).
- Choose Shutdown from the Start Menu.
- Choose the Shutdown Bubble in the Shutdown Computer Window
- Click OK.

Running Windows NT, a window will appear that will display a Restart Button. At this point it is safe to **move the power switch to the off position.**

If you have a system with an AV3 power supply, you will have an On/Off switch at the back of the unit (the front panel power switch is only a soft power switch). If you have an AV4 power supply, there is no On/Off switch at the back of the unit in that case and the front panel switch fully controls power to the system.

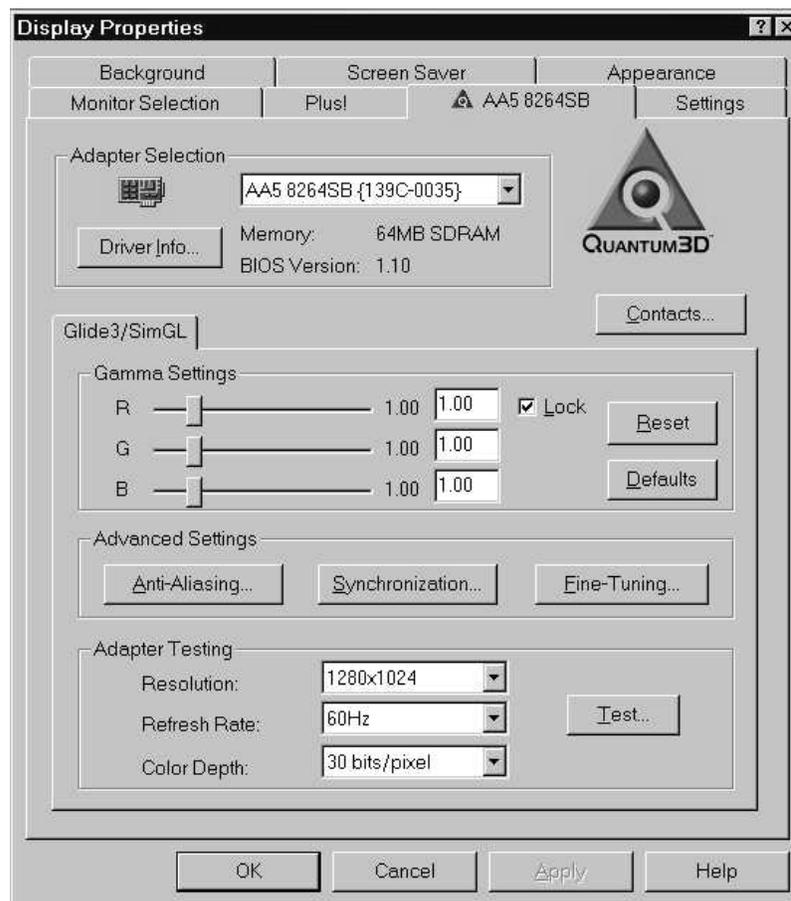
12. AA5 8xxx Series Driver Controls

12.1. Display Properties

AAIchemy configuration controls can be found in the **Display Properties Control Panel**. To access the control panel use the **Start Menu/Settings/Control Panel Menu**. After the control panel window appears, double click the **Display Icon**. An alternative method is to **click right mouse** on the **desktop** and choose **Properties**.

Once the Display Properties window is displayed choose the **AA5 8xxx Tab** to access all AAIchemy Display controls. The 'xxx' part identifies the type of AA5 graphics subsystem that has been detected on your system such as 8264SB as shown below.

Below is a picture of the **AA5 Display Properties**. If more than one AA5 board is installed in the system, then you are able to select the desired board using the Adapter Selection option menu. Below this menu is labeled AA5 8464SB {139C-0035}).



12.2. Driver Information

The **Driver Information** button will display the current driver version information. This will contain versions of drivers installed on the system, including firmware, Glide 3, and SimGL. This information is used primarily to confirm proper installation and revisions of drivers.



Quantum3D technical support will require you to identify what type of AA5 graphics board you have in your system as part of any technical support incident (www.quantum3d.com/support). A TimingCtrl revision of 4 or below indicates you have a Rev9x AA5; a revision number of 8 or higher indicates you have a Rev0x board.

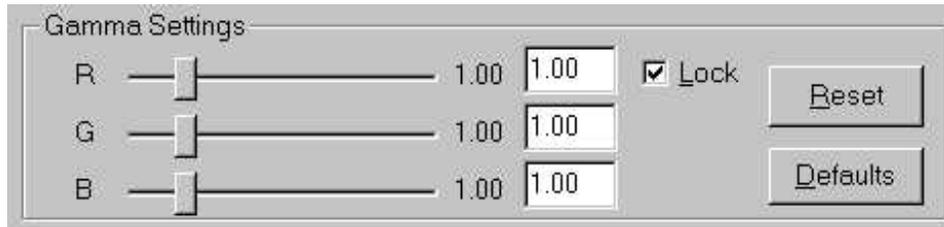


12.3. Contacts

The **Contacts** button displays a window that contains the current URL, email, telephone and fax numbers for Quantum3D Technical Support. All support incidents should be filed online via the link to the online support system at <http://www.quantum3d.com/support>.



12.4. Gamma Controls



The **Gamma RGB** sliders modify the color balance and the overall brightness of the AA5 video output. Moving the sliders to the left decreases brightness and moving the slider right increases brightness. The number represents a scale factor. 1.0 is normal gamma/brightness.

Using the **Lock** check box allows you to increase the brightness of all components of the video output at once. Removing the check box enables you to adjust the brightness of the Red, Green and Blue video components individually.

The **Reset** button resets the gamma values since the last time the AA5 **Display Properties** were applied.

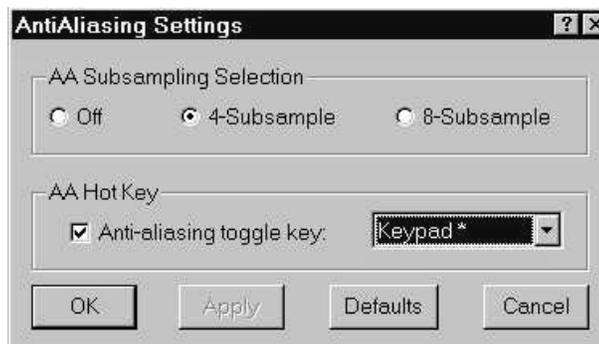
The **Defaults** button returns the settings to their factory default values.

12.5. Advanced Settings

12.5.1. Anti-Aliasing

The Anti-Aliasing Button displays a window that allows you to control the quality of anti-aliasing performed by the AA5 hardware. Anti-Aliasing is the process of removing the visual artifacts produced by sampling a 3D image at discreet pixels. AAIchemy anti-aliasing removes subpixel flicker and jitter as well as jaggies and texture moiré patterns.

The anti-aliasing process used by AAIchemy is used on each and every pixel over the entire screen. This is called full scene anti-aliasing (FSAA). Each pixel is sub sampled either four or eight times. These sub pixels are averaged to produce the resulting pixel on the screen. The more sub-samples used the higher the image quality.



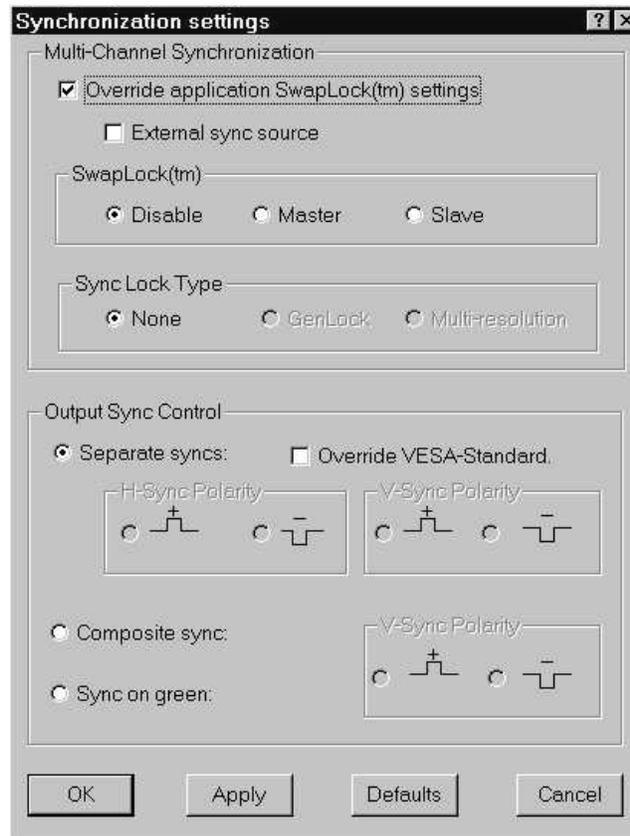


AA Subsampling Section: Choices are **Off** (no antialiasing), 4-, or 8-subsample. The default selection of 4 subsample provides high image quality with excellent pixel fill-rate. The selection of 8 Subsample uses 8 subsamples to determine the resulting color of pixel instead of zero or four subsamples. This setting produces the highest image quality produced by AAlchemy but has a significant performance impact on pixel fill-rate.

Checking the ***Anti-aliasing Toggle Key*** check box enables a hot key that can be used within any application to toggle full scene anti-aliasing on and off. You can select which key is used using the option menu to the right.

12.5.2. Multi-channel Synchronization Settings

The **Multi-channel Synchronization Settings** window provides an interface to AA5's SwapLock, SyncLock and Genlock capabilities. Genlock is synchronizing the horizontal and vertical retrace of multiple graphics systems. Genlock provides pixel level synchronization across multiple graphics systems and video display devices. Multi-resolution provides vertical retrace synchronization. SwapLock provides synchronization of the SwapBuffers.



12.5.3. Override Application SwapLock Settings

Software applications that use the Quantum3D Glide Extensions for SwapLock can be overridden using Override Application SwapLock Settings. This can also be used if SwapLock is required but the application program does not use the Quantum3D Glide Extensions for SwapLock.

12.5.4. External Sync Source

If you are using the Q-Link and have an external source connected to the Q-Link module then turn on External Sync Source.



12.5.5. SwapLock

SwapLock synchronizes the SwapBuffer operation between multiple graphics systems. The systems must be physically connected in a ring using shielded CAT5 cable with RJ45 connectors. SwapLock outputs are connected to SwapLock inputs. The SwapLock output of the last in the ring connects to the SwapLock input of the first.

One system in the ring is designated master. All others are slaves. Use **Disable**, **Master** and **Slave** check boxes to specify which graphics systems are master and slave. No systems in a SwapLock ring should be disabled, unless all are disabled.

The **Disable Radio Button** disables master and slave operation. The AA5 adapter will behave like a single-board configuration.

SwapLock Master Radio Button denotes this adapter to be the master in a SwapLock ring. The master adapter will generate SwapLock signals. The system that is accepting Swaplock input from a Q-Link board, must be the master system.

There can be only one SwapLock Master in a SwapLock ring.

The **SwapLock Slave Radio Button** denotes this adapter to be the slave in a SwapLock ring. The slave adapter will receive SwapLock signals from the master.

12.5.6. SyncLock Type

SyncLock Type determines the synchronization of vertical and horizontal retrace. **Genlock** provides both horizontal and vertical retrace synchronization. Genlock is pixel level synchronization across all systems in the SwapLock ring. Genlock requires all graphics systems to be of the same resolution. Because of this all graphics applications using Genlock must be configured to operate using identical resolutions and refresh rate. One method of doing this is via the Glide3 and SimGL Fine Tuning; see sections 12.5.8 and 12.5.9 for more information.

If **Multi-resolution** is chosen, then only the vertical retrace is synchronized, but any resolution may be used on any graphics system, the refresh rate will be determined by the SwapLock Master system. If **None** is chosen, then no synchronization is performed.

12.5.7. Output Sync Control

These controls determine the type of information that is communicated over the SwapLock I/O lines and tell the AA5 board the type of input signal to accept.

Separate Syncs enables communication of both horizontal and vertical sync timing information on SwapLock Masters and Slave.

Override VESA Standard will allow you to adjust the polarity of the horizontal and vertical sync timing information when using **Separate Syncs**.

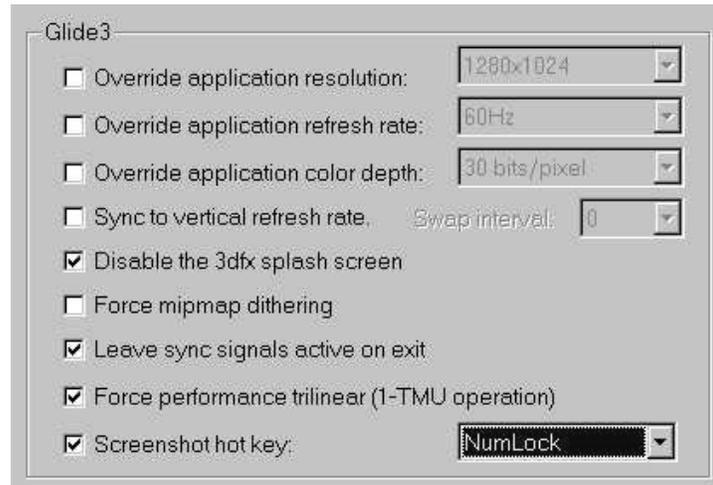
Composite Sync enables communication of composite sync timing information on SwapLock ring
Sync on Green enables sync-on-green timing information on the SwapLock Ring.



12.5.8. Glide 3 Fine Tuning



The following Glide3 Settings will affect any application program that uses the Glide graphics API. If you are using a Glide version of OpenGVS or SimGL, these settings will override those in SimGL Fine Tuning.



Override Application Resolution can be used to specify the desired resolution, independent of the application. This can be useful for choosing the image quality or helping to determine performance. Using a higher resolution can in some cases reduce performance and using a lower resolution can increase performance, this is a common technique used to test if an application has a fill-rate bottleneck.



Overriding the application resolution can conflict with the application operation and can change performance. In some cases it may cause application failure.

Override Application Refresh Rate can be used to specify the desired monitor refresh rate. If the application specifically requests a different refresh rate, it will be ignored in favor of the selected Override Refresh Rate.



Overriding the application refresh rate can conflict with the application operation and performance. In some cases it may cause application failure.

Override Application Color Depth will override any color depth definition in the application. This can be used to tune fill-rate. The lower the bits/pixel, the less information is needed in order to fill the pixels on the screen. If the application is fill-rate limited, then it is possible that this option will increase performance if a lower color depth is used. Lowering the color depth will also reduce the amount of memory used for the frame buffer and also increase the amount of memory available for textures.

This can be used to force higher image quality of an application that uses a low color depth by choosing a higher color depth than that used by the application. It can also be used to conserve frame buffer memory in applications that define a high color depth internally. To do this, choose a low color depth. The higher the color depth the more frame buffer memory is used, and less is available to other resources such as texture.



Overriding the application color depth can conflict with the application operation, performance and look-and-feel. In some cases it may cause application failure.

Sync To Vertical Refresh Rate will synchronize the update rate of the application with the monitor refresh rate. Disabling this feature will cause the application refresh to be independent of the monitor refresh rate. Disabling this feature is the preferred method for benchmarking graphics performance since the graphics update rate is not limited by the monitor refresh rate. Typically when running simulation applications this is left on.

Swap Interval controls how many Vertical Refresh intervals pass before the Swap Buffer command is issued in an application that uses double or Triple buffering. A Swap Interval of 0 means that buffers are not swapped and a Swap Interval of 1 means that front and back buffers are swapped at every vertical refresh. A swap interval of 2 means that front and back buffers are swapped every 2 vertical refresh rate intervals. For more information on Swap Buffers see the OpenGL Programming Guide (Addison-Wesley Publishing Company).

Turn off 3dfx Splash Screen disables the 3dfx logo that is displayed during application initialization.

Force Mipmap Dithering will force Glide to dither mipmaps and can result in higher image quality when textures use few colors and show banding.

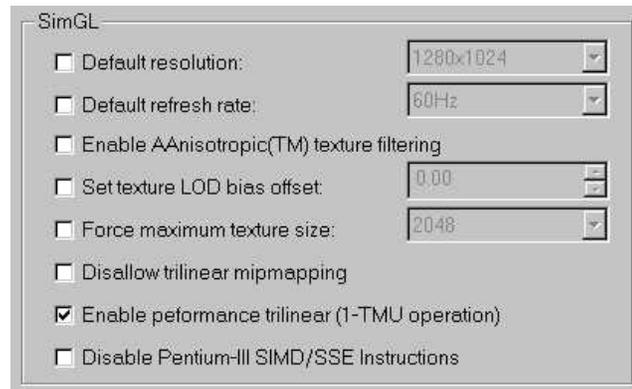
Leave Sync Signals Active on Exit leaves the video sync signals active after graphics has stopped. Without this option enabled the monitor will not have a sync signal after a graphics application program shuts down. If a monitor is being used that requires a constant sync signal turn this option on.

Screen Shot Hotkey specifies which key is used to capture a screen image of AAIchemy's anti-aliased image. Choose which hotkey you would like to use, start up a Glide3 or SimGL application and use this key to capture an image to a file.

12.5.9. SimGL Fine Tuning



The following SimGL Settings will affect any application program that uses SimGL Graphics API. If you are using a Glide3 version of SimGL, the Default resolution and Default refresh rate will be overridden by the corresponding Glide3 Fine Tuning parameters.



Default Resolution can be used to specify the desired resolution, independent of the application. This can be useful for choosing the image quality or helping to determine performance. Using a higher resolution can in some cases reduce performance and using a lower resolution can increase performance. This is especially true of fill-rate limited applications.



Overriding the application resolution can conflict with the application and in some cases can change performance. In some isolated cases it may cause application failure.

Default Refresh Rate can be used to specify the desired monitor refresh rate. If the application specifically requests a different refresh rate, it will be ignored in favor of the selected Override Refresh Rate.



Overriding the application refresh rate can conflict with the application operation and performance. In some cases it may cause application failure.

Enable AAnisotropic Texture Filtering: Enabling AAnisotropic Filtering will give applications the ability to perform the advanced feature of anisotropic texture filtering. Anisotropic filtering can greatly improve the image quality of textures applied to long thin objects. When viewing these objects from an angle (like looking down a road), the blurring effect caused by traditional texture filtering techniques is very noticeably reduced with anisotropic texture filtering turned on.

Set texture LOD Bias offset allows you to control the distance at which mipmap levels are calculated when using texture filtering such as point, bilinear, trilinear and anisotropic. It is typically hard to see the difference between mipmap levels with tri-linear and anisotropic enabled, but is relatively easy to notice when using point or bilinear filters.

Force maximum texture size is used to control the overall amount of texture memory used by an application. Sometimes this feature is used when the application uses more texture memory than that available on your AA5 board. Using a very low number you can determine if an application is paging textures.

Disallow Trilinear Mipmapping will turn off trilinear mipmap filtering. Any application attempting trilinear filtering will be forced to perform bilinear texture filtering. Disallow Trilinear Mipmapping if enabled can increase the texture aliasing, but in some cases can improve visual qualities. One example of this is



viewing a road with a single texture for the width of the road. Disallow Trilinear Mipmapping will reduce the blur of the lines down the road, but might also exhibit more aliasing.

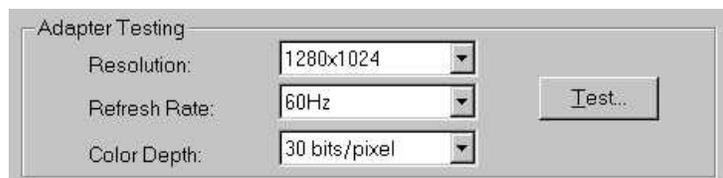
Enable Performance Trilinear uses special hardware functionality which enables rendering 2 pixels per clock rather than just one. This feature is implemented on AA5 adapters manufactured after Feb 15, 2001. This feature is default for any AA5 82xx adapter and is not used on 81xx adapters. Since you are rendering 2 pixels as fast as a single pixel, the result is a double in fill rate.

Using Performance Trilinear fill automatically force the maximum color depth to 22 bits of color using a 7-8-7 format for red, green and blue. Standard color formats are 24 bit and have an additional bit for red and blue. The loss of 1 bit of red and 1 bit of blue may not be noticeable in many applications. Applications that require the maximum fill rate should use this feature.

Disable Pentium-III SIMD/SSE Instructions: Pentium-III SIMD/SSE instructions allow the SimGL driver to perform graphics operations using a Single Instruction Multiple Data technique. Using SIMD improves graphics transformation and lighting performance on any Pentium-III class system.

12.6. Testing AA5 3D Output

To test the operation of AA5 graphics and the connection to a display device use the **Adapter Testing** functions. First choose the desired Resolution, Refresh Rate and Color Depth then click the Test Glide button. Confirm that a Quantum3D logo appears spinning on the display device.



12.7. Multi-channel Synchronization Cabling Instructions

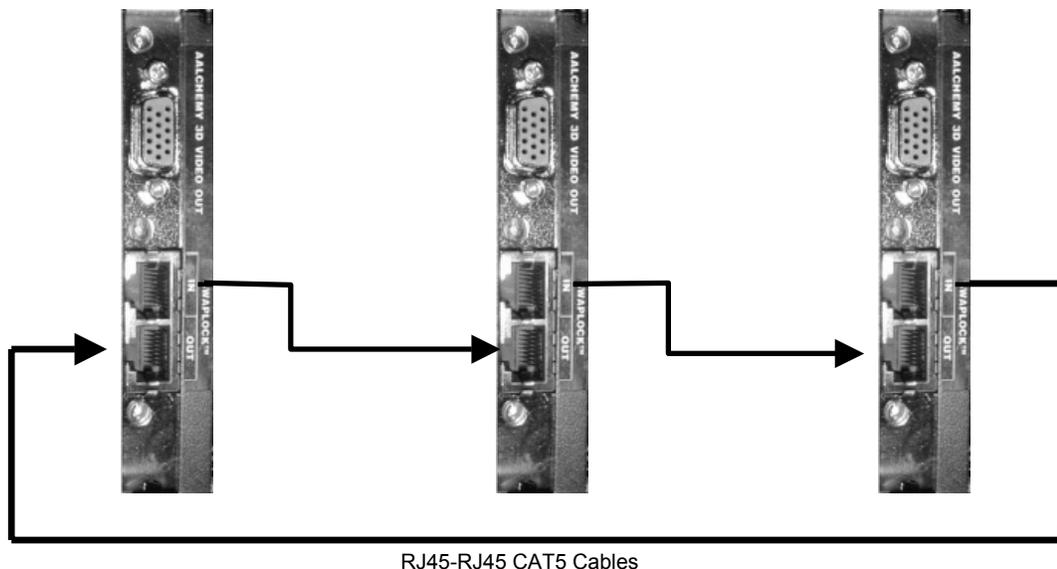
12.7.1. Swaplock Configuration

This section describes configuration options for setting master and slave configurations in multi-channel applications. The settings allow you to control the SwapLock feature of the AA5 adapters.

To cable AAlchemy systems for Multi-channel sync, a shielded RJ45 CAT5 cable (not in excess of five meters) is needed for each AA5 graphics card. The SwapLock In connector is routed to the SwapLock Out connector of the next system. The last system's SwapLock Out is connected back to the first system's SwapLock In.



Only one AA5 adaptor is chosen to be the SwapLock master. All others must be SwapLock slaves.



Configure the one system with the **SwapLock Master** using the **Multi-Channel Synchronization Settings**, the remaining systems should all be configured as **SwapLock Slaves**.

Based on the requirements of your system choose the **SyncLock** type in the **Multi-Channel Synchronization Settings**.

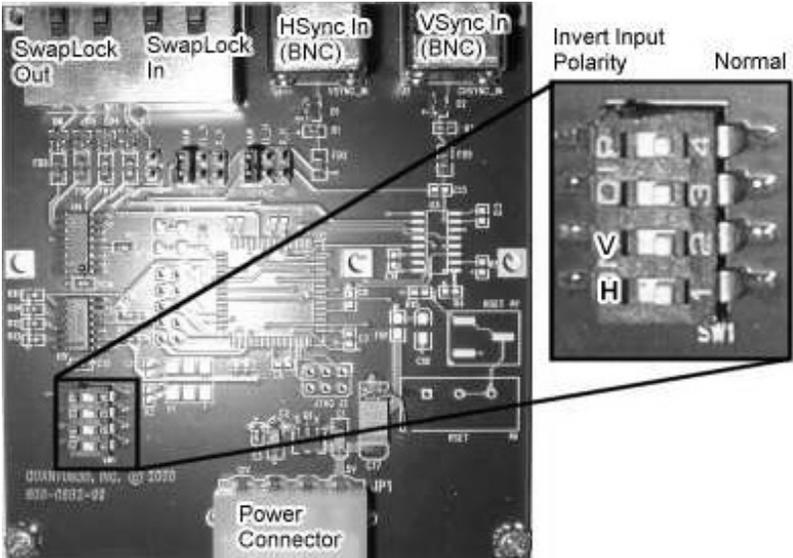
13. Using External Q-Link Synchronization

Q-Link is a Quantum3D product designed to offer Genlock services external display devices. Q-Link is available as an optional device with AAchemy systems. Genlock provides input of external horizontal and vertical refresh signals and output SwapLock signals to AA5 graphics boards. This results in pixel level synchronization of AA5 graphics and the external source. Genlock is typically used in multi-channel 3D graphics systems in order to provide consistent frame rate across all visual channels, reducing the negative impact on operators and trainees.

Q-Link accepts the H- and V-sync information available from externally generated, standard graphics video devices. This video input signal is processed by Q-Link and can be used to Genlock any number of AA5 graphics subsystems.

In order to use your Q-Sync module, you will need the following:

1. Hsync signal source (TTL level, 75 Ω)
2. Vsync signal source (TTL level, 75 Ω)
3. (2) 75 Ω BNC Cables for connecting the Hsync & Vsync sources to Q-Sync
4. Existing, Operating Swaplock Ring or standalone single channel system.



After connecting Q-Link to the H/V Sync source, it is necessary to configure the Multi-channel Synchronization controls in the AA5 Display Properties. Q-Link output must be connected to a system configured as a Swaplock master in the display properties.

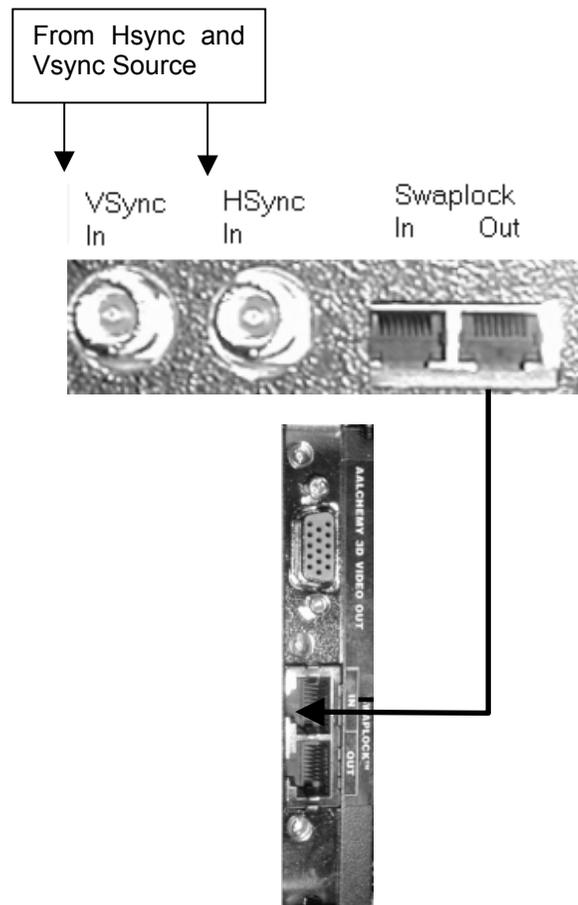
Many times the Hsync and Vsync source are merely from a monitor feed that contains H/V sync. These monitors many times have 5 BNC connectors, one for red, green and blue, a Black BNC for vertical sync and either gray or yellow for horizontal sync. Although these color codes are in general consistent between manufactures, make sure to confirm the specifications of the specific equipment being used.

Genlock output from other video sources including SGI Onyx and Evans & Sutherland ESIG systems may be used as input to Q-Link.

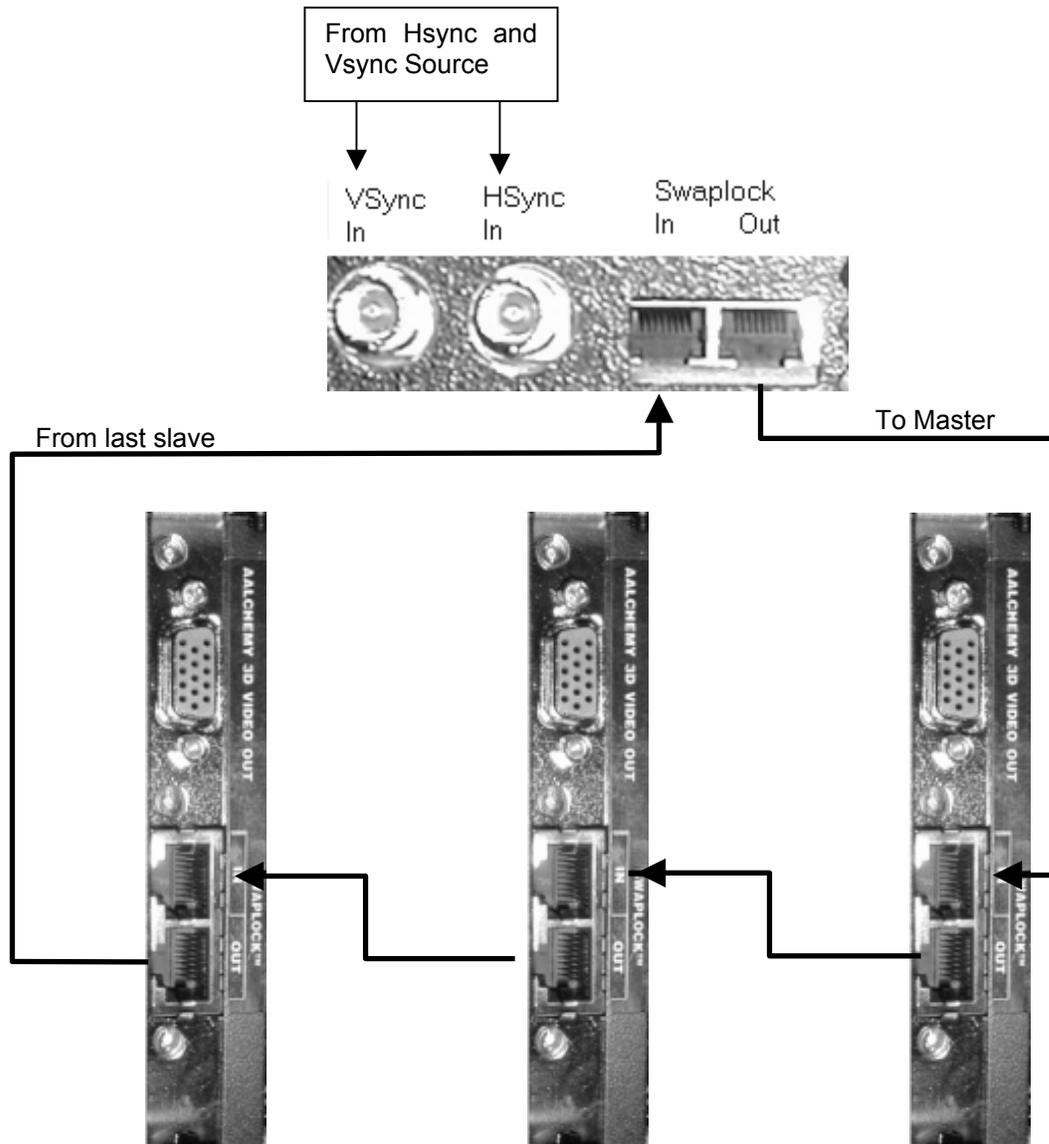


For Q-Link to work properly you must have the system that is cabled to the Q-Link RJ45 output set to receive an external sync source. This is done in the AA5 8xxx Display properties under Multi-channel Synchronization; use the External Sync Source check box. This system is also configured as the SwapLock master. All other systems loop through the SwapLock ring and are specified as Slaves in the Multi-channel Synchronization properties.

13.1. Cabling diagram for a 1-channel Q-Link system.



13.2. Cabling diagram of a 3-channel Q-Link system.



14. Driver Installation and Removal

14.1. Installing AA5 Drivers for Windows NT4



Normally, the AA5 device driver is pre-installed on your AAIchemy TX/QX system. If and when you must upgrade your existing driver, first remove the existing AA5 driver as shown in the next section.

Once you have removed the old driver, install new AAIchemy drivers from <http://www.quantum3d.com> or locate them in `c:\program files\q3d\drivers\aa5`

1. From the **Start Menu** choose **Programs/Windows NT Explorer**
2. Open the folders where the drivers were extracted. Locate the file **AA5.inf**.
3. **Click right mouse** on **AA5.inf** and choose **Install**.
4. From the Start Menu choose **Shutdown**, and then choose the **Restart the Computer** option.

14.2. Removing AA5 Drivers for Windows NT4

Follow the procedure below to remove the AA5 8xxx series device driver from Windows NT4.

1. Log onto the computer with an account that has local Administrator privileges (required for updating the system registry).
2. From the **Start Menu**, select **Settings**, then **Control Panel**.
3. Double-click on **Add/Remove Programs**, then select the **Install/Uninstall** tab.
4. Scroll through the list and select the **Quantum3D AA5** adapter.
5. Click the **Add/Remove** button.
6. When prompted to restart the computer, click the **No** button.
7. From the Start Menu choose **Shutdown**, and then choose the **Restart the Computer** option.



15. Removing/Installing an AA5 Graphics Board

Replacing an AA5 accelerator is identical to replacing any PCI card, with the exception that you must first remove the power connectors and retention bracket.

If you are not immediately replacing the AA5 board, then follow the instructions from section 14.2 to remove the drivers.

15.1. Shutdown and Remove Power



1. Prepare to remove the AA5 card by performing a proper shutdown of the computer as described in section 11.
2. Disconnect the power cord from the wall receptacle. This ensures that power is totally off for the system.
3. Make note of or label the source and destination cabling on the AA5 end bracket. This includes any 3D Video Output connected to a display device as well as the SwapLock I/O connectors.
4. Remove any 3D Video and SwapLock cabling from the AA5 board.

15.2. Open the Chassis

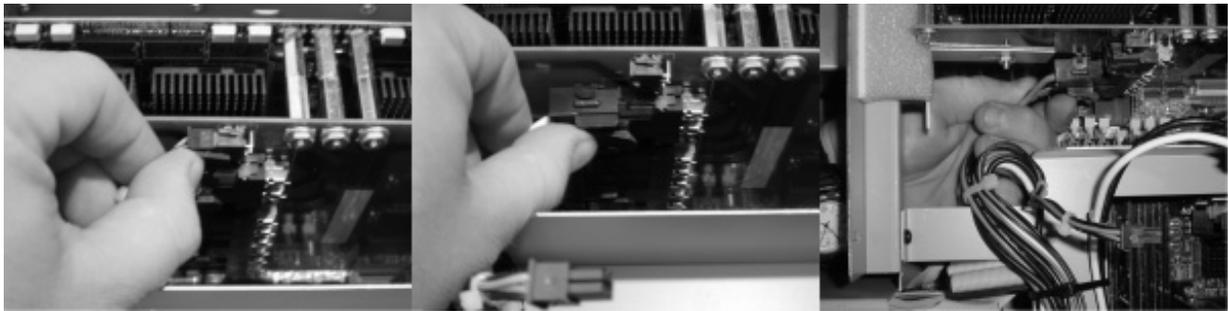
1. Remove the screws holding the top on the chassis (shown in section 7.1), set screws aside.
2. Lift the top off of the system and set aside.

15.3. Removing an AA5 Graphics Accelerator

Use an appropriately grounded anti-static pad and/or anti-static band to prevent a static discharge while replacing any computer peripherals.

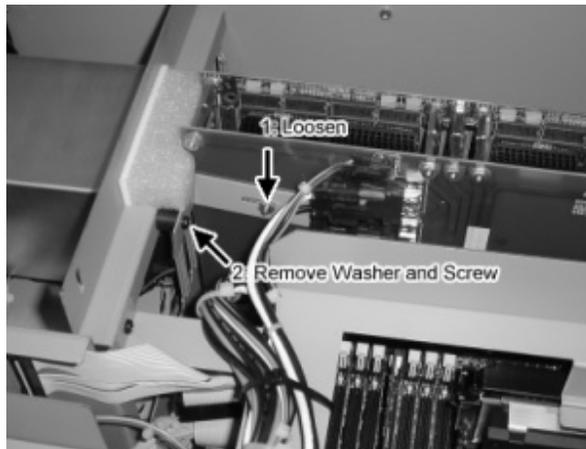
Touch any metal part of the system chassis to discharge any static build up.

Remove the 3 power cables connecting the AA5 board to the power supply as described below (four connectors for an AV4).



There are three individual power connectors to the AA5 board. Gently grasp the clip and press to unlock. The connector will easily pull off without force if the clip is pressed properly. The first two small connectors are best accessed from above. The easiest method to remove the larger connector on the bottom is by reaching in through the airflow area, under the expansion slot as shown in the picture above (far right).

1. Loosen the nut holding the retention bracket to the AA5 Power Board.



2. Remove the screw holding the retention bracket to the PCI board retention point on the chassis.
3. Remove the screw holding the AA5 end-bracket to the rear of the chassis.



4. Being careful not to touch any components on the board, place your left hand on the AA5 end bracket, just below the screw-down for the DB15 connector, at the same time grasp the board coupler at the opposite end of the board with your right hand. Gently remove the board from the

PCI slot. If everything is properly disconnected, you will not need to apply any force to remove the board.



15.4. Installing an AA5 Graphics Accelerator

If the system is not already off, please do the following:

1. Unplug power cord from the wall receptacle.
2. Use an appropriately grounded anti-static pad and anti-static band to prevent a static discharge while replacing any computer peripherals. Touch any metal part of the system chassis to discharge static build up.
3. Hold the AAIchemy board carefully. Avoid touching any of the components on the board and any connector on the card or end bracket. Grasp the board with both hands as was shown in the previous section on removing the board.
4. On a TX system, gently slide the AA5 board in PCI Slot 3; the power board will be over PCI slot 0 which is next to the AGP slot. On a GX, use the single 'long' PCI slot in the center position. Once the board is lined up and partially installed into the slot, firmly seat the card into the slot. Make sure the card is fully seated in the PCI slot
5. Replace the screw holding the retention bracket to the PCI board retention point on the chassis.
6. Tighten the nut holding the retention bracket to the AA5 Power Board.
7. Replace the screw holding the AAIchemy end bracket to the rear of the chassis.
8. Connect the 3 power connectors (bottom-to-top) to the AA5 Power Board, use the photographs in the last section as a guide.
9. Replace the chassis top and tighten down screws.



16. Troubleshooting / Frequently Asked Questions

16.1. AA5 Graphics Board does not produce a picture

Confirm that all cables are connected properly. In order to do so you can refer to Section 9.1.3 and confirm that one end of the monitor cable is properly connected to the AAIchemy system and other is properly connected to the monitor. Make sure that the graphics card seats properly and is screwed down.

Confirm that the display properties are properly set. You may wish to return the **Synchronization Settings** to defaults values (off) if you are not also attempting to troubleshoot SwapLock and/or SyncLock. There is a **Default Button** in the **Synchronization Settings** that will do this. If the system operates with the default values there is either a problem with SwapLock cables or the SwapLock settings in Display Properties.

Confirm that the **Display Properties/Test Button** operates and displays a picture of the Quantum3D logo on the monitor. Note the monitor must be capable of displaying the chosen resolution and refresh rate (default is 1280x1024 at 60 Hz).

If all tests above work, but your own 3D application does not, try the benchmark programs next (under the Start / Programs / OpenGVS Real World Benchmarks section. If those run then the problem is more likely to be in your own applications software. Make sure the video format you are trying to render is actually supported and so on.

16.2. Wrong system DLLs

Sometimes, end user programs may accidentally use incorrect system DLLs for AA5 which may result in system crashes or which cause graphics program exception errors.

Using the Find program under **Start Menu/Find/Files or Folders** search for all the following driver files on your system:

q3dsglg3.dll
qlide3x.dll
glide3xb.dll
glug3.dll
glutg3.dll
opengl32.dll

If you locate any of these files that are NOT located in **c:/winnt/system32** or in **c:/program files/q3d**, then you should delete them, especially any opengl32.dll files which are in the user's local path of execution. You should only use the DLLs above that come pre-installed on your system, or those from an official driver update posted by Quantum3D on the support site.



16.3. Are you using old drivers?

The oldest revision AAchemy driver that should be used is revision 2.0-build 489, 3/15/01. (See **Display Properties/Driver Info**). This driver is available on <http://www.quantum3d.com/support>.

To determine the driver revision and build, use **Driver Info Button** in the Display Properties. The **Build Date** of the driver should not be less than Mar 15, 2001.

16.4. OpenGL output does not show up on AA5 graphics card

SimGL is an API that uses the same calling conventions as OpenGL. In fact the function calls for SimGL are identical to OpenGL including arguments and function names. Because of this you need to either link your application program with SimGL or overload the OpenGL driver. The commentary below describes both methods.

The recommended method of using SimGL is for the application software developers to compile the application using SimGL. This means that the application will reference the file `q3dsdglg3.dll` during the link part of compiling. This allows the application to use SimGL and OpenGL and will allow SimGL and OpenGL applications to coexist without any configuration changes. 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. This is done automatically since the SimGL library is by default located at `c:\winnt\system32\q3dsdglg3.dll`. The same must be done for the GLU utility libraries if they are also being used.

If the application has been linked against the OpenGL library (`opengl32.dll`) and the application is not compiled directly with the SimGL library, then you can overload the OpenGL driver by copying the OpenGL system DLL to your local path (typically the same directory where your `.exe` application resides). Copy SimGL (`q3dsdglg3.dll`) from `c:\winnt\system32` to the desired directory and rename it to `opengl32.dll`, such as:

```
copy c:\winnt\system32\q3dsdglg3.dll opengl32.dll
```

More details are supplied with the SimGL SDK, typically in a file called `q3dsimgl.txt`. This file is delivered with SimGL and the AAchemy drivers.

16.5. How do I determine the revision level of my AA5 hardware?

Using the Driver Info Button in the Display Properties. There is a Timing Controller Revision (TimingCtrlRev) number. A Rev-9x board will have a number of 4 or smaller. A Rev-01 or later board will be an 8 or higher.

16.6. Old OpenGVS Programs do not run properly with AA5

If you have an OpenGVS program built with the V4.3 SDK or earlier, you should consider upgrading your software development environment to OpenGVS V4.4 or later to properly use AA5. This is largely because prior to V4.3, Glide only understood 16-bit color. With the advent of VSA-100, Glide was updated to support True color (24-bit). If you must run an old OpenGVS application on AA5, try forcing the color depth to 22-bpp color. Note: this is only supported for PT enabled graphics boards (22-bpp color override).



16.7. My application hangs or crashes

If the application hangs or freezes completely and does not operate. Determine if it will respond to the Task Manager. Use **Ctrl+Alt+Delete** OR **Right Click** on the **Task Bar** and select **Task Manager**. When looking at the processes in the task manager is the process responding? Normally if you kill an application using task manager, you must reboot your system to successfully use AA5 graphics again.

See section 16.3 above for confirming that the latest version of AA5 and SimGL drivers are installed and that no other driver files are being used.

Are any messages printed to the console window? Are they Glide, SimGL or messages from some other API? Do they present any information that might help troubleshoot the problem?

Does the **Test Button** in **Display Properties** display the Quantum3D logo as expected? If so, this validates that the graphics hardware is at least functional at the surface level.

Do the OpenGVS RealWorld benchmarks (RWB) operate? Use the menu **Start/Programs/OpenGVS RealWorld** to select any Glide3 demo program to see if the Glide3 hardware is operating normally. If Glide3 RWB demos all run normally, the graphics hardware is probably fine and the problem likely resides elsewhere.

Does returning the Synchronization Settings to the default values solve the problem? Try using the Defaults Button in the Multi-channel synchronization settings and rerunning the application. If this eliminates the problem, you have a SwapLock cabling problem or Multi-Channel Sync problem. Refer to the earlier chapter regarding proper SwapLock cabling.

16.8. Reflashing the Hard Drive of your System

Sometimes, a hard disk drive becomes so corrupted, it is easier to 'reflash' the system hard drive to the factory state, and start over. Quantum3D provides a system image recovery CD for this purpose. You can reflash your system hard drive to the factory state by booting off the supplied recovery CD and then using the PowerQuest Drive Image software on this CD to restore the appropriate AAIchemy system image (a **.pqi** file found on the CD which is required to restore to your hard drive). The PowerQuest Drive Image software will startup automatically after you reboot your system.

Note: reflashing your hard drive will totally replace (delete) any user data that is currently on your system, if any, so backup any data you may require before you do this operation.

This is the recommended procedure when users have accidentally destroyed a working system (such as replacing required system files, or accidentally wiping out key system files, and so on). An AAIchemy TX system image PQI file for Windows NT4 is typically called **ATX-NT.pqi**; the system recovery file for an AAIchemy GX is named **AGX-NT.pqi** and so on. You simply select the appropriate system image file and choose the "Restore System Image" option, and answer "yes" to all questions (such as "is it OK to destroy all data on the drive", and warnings about the system not necessarily being bootable once the operation is complete).

Note: you must never use a system image from a different system on your system hardware (e.g., never use a system image from a TX on a GX system, and vice-versa). If you do, catastrophic results should be expected (system won't boot or system is unstable once booted).



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18. Technical Support

Quantum3D Technical Support provides a web based online problem tracking and reporting system. Please remember that hardware (and some software products) are only covered during their warranty period (or maintenance period in the case of software, such as OpenGVS). You may want to review your warranty documentation that accompanied your system and be prepared to provide proof of warranty coverage to Quantum3D upon request.



Any Quantum3D customers or authorized representatives may visit our online support system at:

<http://www.quantum3d.com/support>

There is a link to the online problem reporting and tracking system at this web location. Users can create their own customer account(s) as well as create and manage support related incidents online.