ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Quantum3D Sentiris 4110 CV00* at our website: *Click HERE*



Sentiris™ 4110 CV PMC Installation Manual

Part Number: 700-6001-03

Quantum3D, Inc.
6330 San Ignacio Ave
San Jose CA, 95119 USA

General: http://www.quantum3d.com
Support: http://www.quantum3d.com/support

Copyright © 2003 Quantum3D, Inc. All rights reserved.
All trademarks are the property of their respective owners.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Copyright

These materials are the copyrighted works of Quantum3D, Inc. Copyright © 2003 by Quantum3D, Inc. All rights reserved.

Trademarks

Quantum3D, Sentiris, the Quantum3D logo, and other Quantum3D product names are trademarks, and in some jurisdictions may be registered trademarks, of Quantum3D or its affiliated companies. NVIDIA, Quadro4, lightning memory architecture, nView, PowerMizer and nfiniteFX are trademarks, and in some jurisdictions may be registered trademarks, of NVIDIA, Inc. or its affiliated companies. Other trademarks are the property of their respective owners.

Warranty

Hardware Products

Quantum3D warrants that, for the twelve (12) month period after purchase and shipment from Quantum3D, the Hardware will, when delivered and properly installed according to its specifications, substantially function in the operating environment specified in the applicable product specification in effect at the time of delivery by Quantum3D to Buyer. In the event of a defective Product, Quantum3D may, at its election, repair or replace the Product, or reimburse to Buyer the purchase price paid for the Product

Commencement of Warranty

The warranty commences on the date of shipment by Quantum3D. If it appears that any Product or part thereof contains a defect in materials or workmanship, and Buyer notifies Quantum3D promptly within said warranty period, Quantum3D shall, at its option and expense, repair such defective Product or part, deliver to Buyer an equivalent Product or part to replace such defective item, or if neither of the foregoing is feasible, refund to Buyer the purchase price paid for the defective Product. The repaired or replaced item will be shipped to Buyer not later than thirty (30) days after Quantum3D receives the defective Product, except that batch returns of more than thirty (30) units may be subject to a turnaround time greater than thirty (30) days. Upon request, expedited service (twenty-four (24) hour turnaround) will be provided to Buyer if available, at a specified charge

Returns

At Quantum3D's request and after issuance of a Return Material Authorization ("RMA") number, Buyer shall return such defective Product or part to Quantum3D at a receiving point designated by Quantum3D. Quantum3D will reject shipping cartons that are not marked with appropriate RMA numbers. Buyer will pay the transportation charges for all Products and parts returned to Quantum3D under warranty. Quantum3D will be responsible for transportation charges involved in the return of warranted Products and parts to Buyer

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Current RMA process and product support information can be found on the Quantum3D technical support web site:

http://www.quantum3d.com/support

Software Products

Quantum3D warrants that Quantum3D Software products will perform in substantial conformance to the stated specifications thereof, during the warranty period. Quantum3D warrants the media containing Software against failure during the warranty period. The warranty period applicable to Software is thirty (30) days. The warranty commences on the date of shipment by Quantum3D. Quantum3D's sole obligation with respect to this express warranty shall be (at Quantum3D's discretion) to refund the purchase price paid by Buyer for any defective Software, or to replace any defective media with Software which substantially conforms to Quantum3D's applicable published specifications. Quantum3D makes no warranty or representation that its Software will work in combination with any hardware or software products provided by third parties, that the operation of the Software will be uninterrupted or error free, or that all defects in the Software will be corrected. For any third party products listed in the Quantum3D Software documentation or specifications as being compatible, Quantum3D will make reasonable efforts to provide compatibility, except where the non-compatibility is caused by a "bug" or defect in the third party's product.

Warranties Exclusive

TO THE FULL EXTENT ALLOWED BY LAW, THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES, TERMS, OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES, TERMS, OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. QUANTUM3D'S WARRANTIES HEREIN RUN ONLY TO BUYER AND ARE NOT EXTENDED TO ANY THIRD PARTIES. QUANTUM3D NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALES, INSTALLATION, MAINTENANCE OR USE OF ITS PRODUCTS.

Actions of Others

QUANTUM3D SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSES THAT THE ALLEGED DEFECT IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY BUYER'S OR END CUSTOMER'S OR ANY THIRD PERSON'S MISUSE, NEGLECT, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO REPAIR OR MODIFY, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING OR OTHER HAZARD**.**

Definitive Warranty Agreement.

The specific warranty agreement is available for viewing or download from Quantum3D technical support web site http://www.quantum3d.com/support and supercedes any terms of foregoing Warranty statements.

Regulatory Approvals

FCC Class A, CE Class A, & UL

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Contents

Copyright i

Trademarks i

Warranty i

- Hardware Products i
- Commencement of Warranty i
- Returns i
- Software Products ii
- Warranties Exclusive ii
- Actions of Others ii
- Definitive Warranty Agreement ii

Regulatory Approvals iii

- FCC Class A, CE Class A, & UL iii

Contents iv

- Introduction 1
- Documentation Conventions 1

Sentiris 4110 CV PMC Overview 2

- Support for Windows, VxWorks and Linux 2
- Flexible Graphics and Video I/O Capabilities 2
- Designed for Technology Insertion and Open Architecture Applications 2
- Contacting Quantum3D Technical Support 3

Installing Your Sentiris 4110 CV PMC 4

- Unpacking and Inspecting the Shipment 4
- Sentiris 4110 CV PMC Configurations 5
- Physical Installation 7
- External Connections and Cabling 8

Software Installation and Configuration 10

- Software/Driver Installation 10
- Setup/Configuration 20

Software Development 45

- Windows 2000 / XP Support 45
- RedHat Linux 7.X Distribution 46
- Wind River's VxWorks 5.4 (under Tornado 2.0) 47

Appendix A: Sentiris Specifications 49

Appendix B: Sentiris Connector Details 52

Appendix C: Retrofitting Display EDIDs 57

- Why isn't my CRT / DFP recognized? 57

Appendix D: Acronyms 59

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Introduction

This introductory chapter describes the conventions used within this document and provides an overview of the Sentiris™ 4110 CV PMC high-performance COTS graphics sub-system.

Also discussed is the way in which users can contact Quantum3D technical support and access the online problem reporting and tracking system.

Documentation Conventions

Icons



- The information icon is used to indicate important information.



- The exclamation icon is used to indicate cautionary information.

Fonts

- The ***bold-italics*** font type denotes menus or buttons.
- The **bold-underlined** font type denotes important files.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Sentiris 4110 CV PMC Overview

The Sentiris 4110 CV PMC is the most advanced COTS graphics subsystem ever developed for the embedded visual computing world.

- The CV annotation indicates that this Sentiris subsystem is **c**on**v**ection-cooled.
- The PMC annotation indicates that this Sentiris subsystem is an IEEE 1386.1-compliant **P**CI **M**ezzanine **C**ard.

Created by Quantum3D – the exclusive supplier of NVIDIA®-based technologies for the embedded visual computing market – the Sentiris 4110 CV PMC brings the power of the NVIDIA Quadro™4 Embedded Graphics Processing Unit (GPU) to realtime military and commercial embedded visual computing applications.

The Sentiris 4110 CV PMC is the ideal solution for applications requiring the combination of high-performance, high-resolution multi-channel 2D and 3D graphics, advanced video input/output, low power consumption, and extended or mil-spec environmental capabilities.

Support for Windows, VxWorks and Linux

The Sentiris 4110 CV PMC supports the Windows® 2000 and Windows XP operating systems from Microsoft® (www.microsoft.com), VxWorks® from WindRiver® (www.windriver.com) and Linux® from Red Hat® (www.redhat.com).

VxWorks is the most widely adopted realtime operating system (RTOS) in the embedded industry. Note that working with VxWorks is very different from working with a Windows-type operating system. For example, VxWorks is compiled with the application on a development machine to form a single run-time executable that is subsequently downloaded to the target platform (such an application is typically booted from Flash memory or a CD-ROM). Furthermore, there is no concept of running driver configuration applets such as those used with Windows. Instead, all configuration tasks are performed under application control.

Flexible Graphics and Video I/O Capabilities

For integration applications where multiple channel outputs are essential, each Sentiris 4110 CV PMC subsystem can be used to implement a 2-channel display system. With support for dual, independent analog and digital RGB (DVI/TMDS and LVDS) outputs, with analog resolutions up to 2048 x 1536 and digital resolutions up to 1600 x 1200, Sentiris 4110 CV PMC is ready for next-generation display applications today.

In the case of outputting to legacy vehicle displays and flat panels, Sentiris 4110 CV PMC also supports popular video output formats including NTSC, PAL, RS-170, RS-170A and S-Video. For sensor, television or other video input requirements, Sentiris 4110 CV PMC supports video input for the same composite and S-Video formats, which may be mapped to any output, either directly into the frame buffer or via video texturing.

Designed for Technology Insertion and Open Architecture Applications

Compliant with the IEEE 1386.1 PCI Mezzanine Card standard, the Sentiris 4110 CV PMC is compatible with VME, Compact PCI, PC-104+ and other embedded form factor single board computers equipped with either 33 MHz or 66 MHz PMC slots (3.3 or 5V), which makes the Sentiris 4110 CV PMC perfect for P3I applications where technology insertion or preservation of the installed

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

base infrastructure is important.

Sentiris 4110 CV PMC supports Microsoft Windows 2000, Windows XP, OpenGL® 1.2 (or Earlier) and DirectX® 8.0 on Intel® IA32™ Architecture Systems. Sentiris also supports OpenGL® 1.3 under Linux and popular Real Time Operating Systems, including WindRiver VxWorks on both IA32 and PowerPC ™ architecture systems. With this level of hardware and software compatibility, new applications, as well as existing applications can take advantage of Sentiris' performance and image quality without requiring a major software effort.

Contacting Quantum3D Technical Support

Quantum3D technical support provides a web-based online problem tracking and reporting system. Please remember that hardware products – 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 the warranty documentation that accompanied your graphics subsystem and be prepared to provide proof of warranty coverage to Quantum3D upon request.

Any Quantum3D customer or authorized representative may visit our online support system at:

http://www.quantum3d.com/support

This web location contains a link to our online problem reporting and tracking system. This system allows you to create your own customer account(s) as well as create and manage support-related incidents online.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Installing Your Sentiris 4110 CV PMC

Follow the instructions in this chapter to physically install your Sentiris 4110 CV PMC.

Unpacking and Inspecting the Shipment

Sentiris graphics subsystems are packaged to withstand the roughest of treatment during shipping. The box, packaging material, and anti-static bag should be stored safely away in case you need to ship the subsystem for any reason in the future. Inspect the cardboard box the subsystem arrived in. If there is any unusual damage to the box, make note of the damage on the delivery form and contact Quantum3D support (www.quantum3d.com/support).

Open the Box and Confirm Its Contents

Carefully open the box and examine its contents:

- Documentation
  - One Sentiris 4110 CV PMC Installation Manual
- Hardware
  - One Sentiris 4110 CV PMC graphics subsystem in an antistatic bag cradled in waffle foam.
  - One single-use anti-static strap.
  - Two video input/output cables
- Software (single CD)
  - Windows 2000 / Windows XP driver

If you have also ordered the optional VxWorks kit, your shipment will contain an additional box containing the following items:

- Documentation
  - On-line documentation in HTML format (programmers reference) and PDF format (online publication)
- VxWorks Software CD-ROM
  - VxWorks driver
  - VxWorks OpenGL® 1.2 implementation
  - VxWorks GLX 1.3
  - VxWorks Q3deg library

If you have also ordered the optional Linux kit, your shipment will contain an additional box containing the following item:

- Linux Software CD-ROM
  - Linux drivers
  - Linux GLX 1.2
  - X Windows configuration program
  - Installation script

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Confirm that all of these items are present and ensure that each part is free of damage.

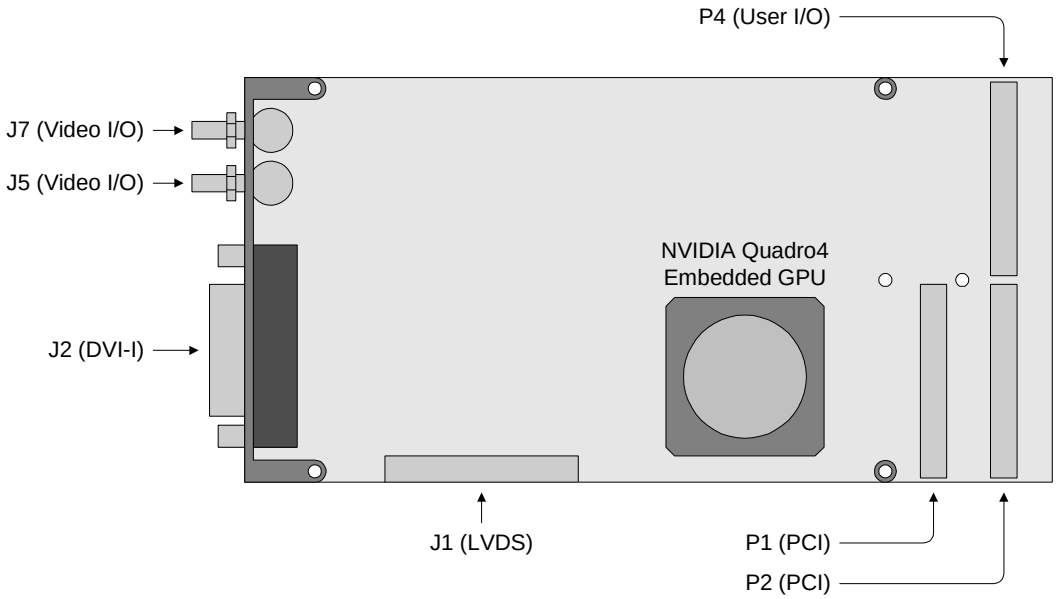
Storing Shipping Materials

The shipping box and associated materials (i.e. the antistatic bag and waffle foam) are specifically designed for shipping Sentiris 4110 CV PMC graphics subsystems and should be retained for future use.

Sentiris 4110 CV PMC Configurations

External Connector Types and Names

Sentiris 4110 CV PMC graphics subsystems come equipped with a number of connectors that support a variety of different input/output formats:



- The J1 *low voltage differential signaling (LVDS)* connector is based on the *standard panel working group (SPWG)* specification (www.displaysearch.com/SPWG).
- The J2 (DVI-I) uses *transition minimized differential signaling (TMDS)* to provide digital outputs via its DVI-D pins and analog outputs via its DVI-A pins. One or the other of these outputs may be active through J2.
- Depending on the particular type of card you have (see below), the J5 and J7 (Video I/O) *Subminiature B (SMB)* connectors can be programmed to support S-Video and/or Composite video.
- The combination of the P1 and P2 (PCI) connectors and the P4 (User I/O) connector meet the IEEE 1386.1 PCI Mezzanine Card (PMC) specification. Note that the P4 (User I/O) connector is actually used by the Sentiris 4110 CV03 and CV04 PMC subsystems.

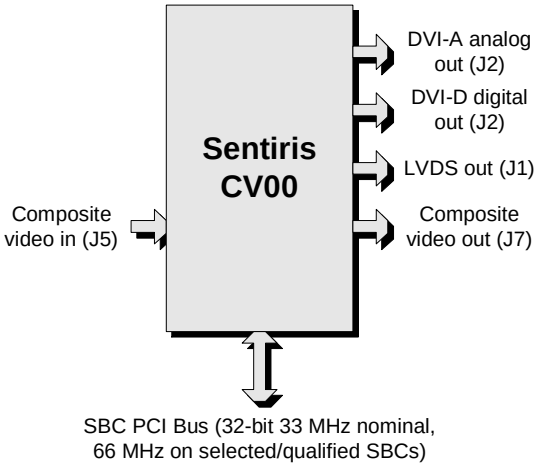
Which Card Do You Have?

There are five types of Sentiris 4110 CV PMC graphics subsystem. If you look on the non-connector side of the board, you will see a serial number that includes the legend CV00, CV01, CV02, CV03, or

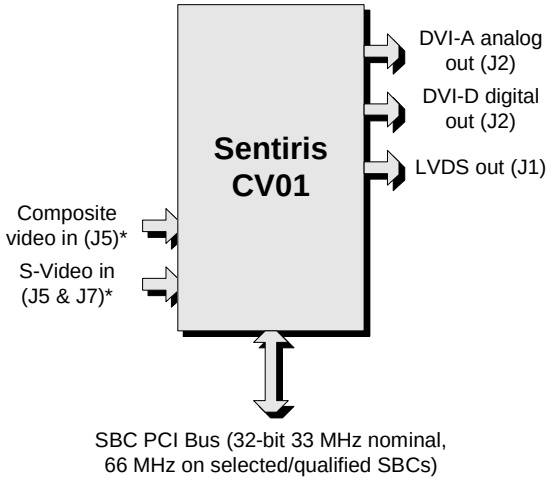
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com
Title Block.Number:770-0006-03 Rev:00 Title Block.Lifecycle Phase:Production

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

CV04. CV00-CV02 all provide the same DVI-A analog, DVI-D digital, and LVDS outputs. However, each differs in its S-Video and/or Composite video capabilities as illustrated below. CV03 and CV04 move some or all I/O to the PMC P4 connector.



I/Os (Two may be active simultaneously)	
DVI-A analog RGB out 2048 x 1536 max. res. with 16 bpp or 1920 x 1440 max. res. with 32 bpp	Via J2 DVI-A pins
DVI-D digital RGB out 1280 x 1024 max. resolution with 24 bpp	Via J2 DVI-D pins
LVDS out 1600 x 1200 max. resolution with 18 bpp	Via J1 LVDS connector
Composite video out (RS-170/RS170A, NTSC/PAL)	Via J7
Composite video in (RS-170/RS170A, NTSC/PAL)	Via J5

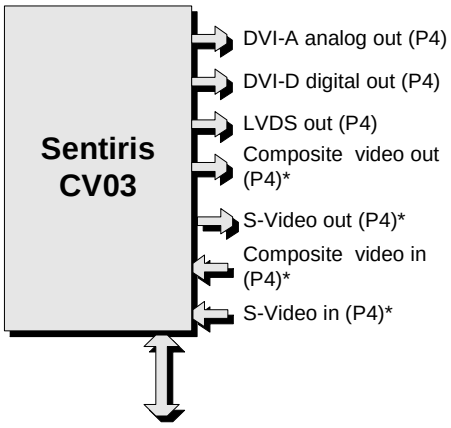


I/Os (Two may be active simultaneously)	
DVI-A analog RGB out 2048 x 1536 max. res. with 16 bpp or 1920 x 1440 max. res. with 32 bpp	Via J2 DVI-A pins
DVI-D digital RGB out 1280 x 1024 max. resolution with 24 bpp	Via J2 DVI-D pins
LVDS out 1600 x 1200 max. resolution with 18 bpp	Via J1 LVDS connector
Composite video in* (RS-170/RS170A, NTSC/PAL)	Via J5
S-Video in*	CHR via J5
	LUM via J7

*Either Composite video or S-Video in, but not both.

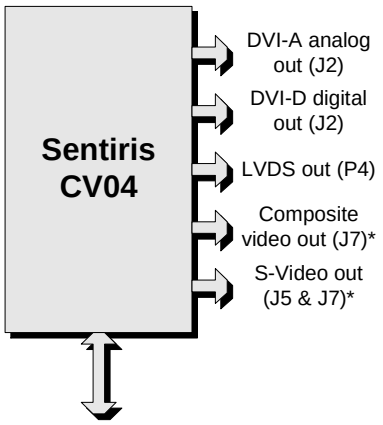
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



Outputs (Two may be active simultaneously)	
RGB out	P4
TMDS out	P4
RGB out *or*	P4
TMDS out	P4
LVDS out	P4
Composite Video out(*)	P4
S-Video out(*)	P4
Inputs (One may be active simultaneously)	
Composite Video In(*)	P4
S-Video In(*)	P4

*Either Composite video or S-Video out, but not both.



I/Os (Two may be active simultaneously)	
DVI-A analog RGB out 2048 x 1536 max. res. with 16 bpp or 1920 x 1440 max. res. with 32 bpp	Via J2 DVI-A pins
DVI-D digital RGB out 1280 x 1024 max. resolution with 24 bpp	Via J2 DVI-D pins
LVDS out 1600 x 1200 max. resolution with 18 bpp	Via P4
Composite video out* (RS-170/RS170A, NTSC/PAL)	Via J5
S-Video out*	CHR via J5
	LUM via J7

*Either Composite video or S-Video out, but not both.

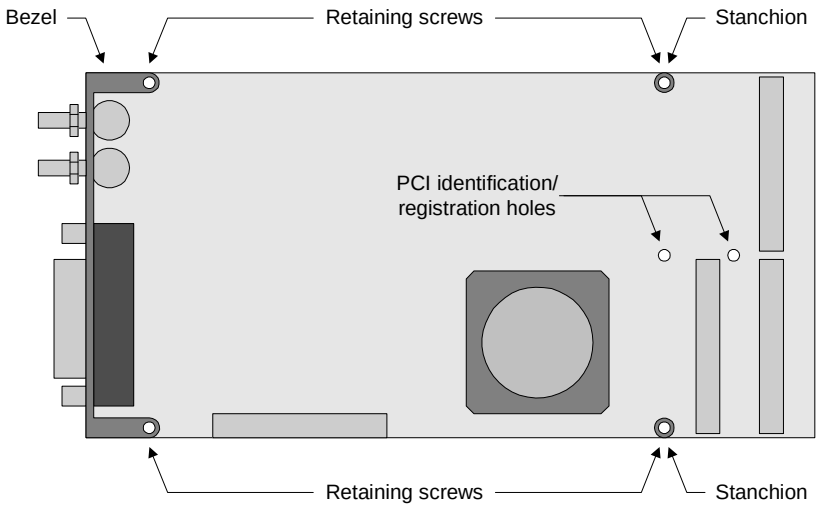
Physical Installation

Your Sentiris 4110 CV PMC subsystem is intended for use with a *single board computer (SBC)* that is IEEE 1386.1 *PCI Mezzanine Card (PMC)* compliant. In order to physically install the Sentiris card into your SBC you should perform the following steps:

1. Remove power from the SBC.
2. Open the case.
3. Put on the one-time-use anti-static strap provided with the Sentiris and connect the other end to the chassis. Wear this strap at all times and take standard anti-static precautions while handling the Sentiris.
4. Remove the Sentiris card from its anti-static bag.
5. Check to see if there are any metal clips attached to the PI and P2 (PCI) or P4 (User I/O) connectors obscuring some of the pins. If any such clips are present, remove them carefully using only your fingers.
6. There are four retaining screws attached to the Sentiris: two on the main bezel and two on spacing stanchions:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



Remove all four retaining screws, invert the Sentiris over the docking site on the motherboard, gently but firmly attach the Sentiris to the motherboard, and then insert the retaining screws from the back of the motherboard.

Note the two PCI identification/registration holes on the Sentiris, which match corresponding pillars on the motherboard. Some SBCs (typically legacy systems) only support 5V PCI busses, while others support 3.3V busses. The PCI identification/registration holes are used to ensure that subsystem cards cannot be mated to an incompatible motherboard. The Sentiris has both holes because it supports both standards.

External Connections and Cabling

Depending on the type of your Sentiris (as discussed above) and on how you configure it (as discussed in the *Installing the Software* section later in this manual), you may chose to use any two of the supported input and output formats.

- **For DVI-A analog output** you will require an appropriate DVI-I to DVI-A cable. Connect the DVI-I end of this cable to the J2 connector on the Sentiris, and then connect the DVI-A end of the cable to a suitable display device.

  The Sentiris graphics subsystem is capable of driving resolutions up to 2048 x 1536 at 60 Hz via its DVI-A output. Ensure your display settings are compatible with whatever display device you intend to use.

  Note that if you are using a fixed-frequency monitor or display device, it is necessary to configure your Sentiris graphics subsystem prior to testing the display. See the list of supported video resolutions and refresh rates in Appendix A. 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.

- **For DVI-D digital output** you will require an appropriate DVI-I to DVI-D cable. Connect the DVI-I end of this cable to the J2 connector on the Sentiris, and then connect the DVI-D end of the cable to a suitable display device.

  The Sentiris graphics subsystem is capable of driving resolutions up to 1280 x 1024 at 60 Hz via its DVI-D output. Ensure your display settings are compatible with whatever display device you intend to use.

  Note that if you are using a fixed-frequency monitor or display device, it is necessary to configure your Sentiris graphics subsystem prior to testing the display. See the list of supported video

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

resolutions and refresh rates in Appendix A. 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.

- **For LVDS output** you will require an appropriate *standard panel working group (SPWG)* cable and connector. Connect one end of this cable to the J1 connector on the Sentiris, and then connect the other end of the cable to a suitable display device.

  The Sentiris graphics subsystem is capable of driving resolutions up to 1600 x 1200 at 60 Hz via its LVDS output. Ensure your display settings are compatible with whatever display device you intend to use.

  Failure to configure display properties so that they match the display device can result in permanent damage to the display device. Note that driving a new digital flat panel (DFP) display usually requires an integration effort by knowledgeable experts. For this reason, it is strongly recommended that you contact Quantum3D support at www.quantum3d.com/support for the most current list of supported DFPs.

- **For SMB Composite video output** (available on CV00 and CV02 Sentiris cards only), connect one of the *Subminiature B (SMB)* cables supplied with your Sentiris to the J7 connector on the Sentiris, and then connect the other end of the cable to a suitable display device.

- **For SMB Composite video input** (available on CV00 and CV01 Sentiris cards only), connect one of the *Subminiature B (SMB)* cables supplied with your Sentiris to the J5 connector on the Sentiris, and then connect the other end of the cable to a suitable video source.

- **For SMB S-Video output** (available on CV02 Sentiris cards only), connect the two *Subminiature B (SMB)* cables supplied with your Sentiris to the J5 (CHR) and J7 (LUM) connectors on the Sentiris, and then connect the other ends of the cables to a suitable display device.

- **For SMB S-Video input** (available on CV01 Sentiris cards only), connect the two *Subminiature B (SMB)* cables supplied with your Sentiris to the J5 (CHR) and J7 (LUM) connectors on the Sentiris, and then connect the other ends of the cables to a suitable video source.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Software Installation and Configuration

Software/Driver Installation

Windows 2000/Windows XP Software/Driver Installation

1. The best driver to install depends on the intended usage of the Sentiris 4110 CVxx graphics adapter. To find the best SETUP.EXE, go to the media sub-directory indicated below.

Win2KnXP	Driver install recommended for Sentiris users not connecting an LVDS digital flat panel display.
Win2KnXPLVDS	Driver install required for Sentiris users connecting an LVDS digital flat panel display. Does not require that LVDS panel have EDID support for it to work (although some work with Quantum3D Engineering group may be required to support such displays.) If a CRT is connected, it takes precedence as the boot display.
WDM (post driver version 30.20)	Found on media for drivers versioned higher than 30.20. Installs the Sentiris 4110 video capture drivers for Windows 2000 and Windows XP. (In driver version 30.20, WDM installation was integral to the above SETUPs.)

2. If re-installing or updating the driver installation, the best course of action is to uninstall the Sentiris driver before installing the new version.
   a. [Start] → [Control Panel] → [Add or Remove Programs]
   b. Select NVIDIA Windows 2000 / XP Display Drivers.
   c. Click the resulting [Change / Remove] button.
   d. Allow the system to reboot, if prompted.
3. The first time you power up the system with the Sentiris card installed, the Hardware Wizard may start automatically:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



4. Select ***Cancel*** to cancel the Hardware Wizard.

5. Locate the Windows driver installation media for the Sentiris 4110 driver. A CD-ROM should have accompanied the commercial product, but the latest version of the driver can also be found at http://www.quantum3d.com/support.

6. Run the applicable SETUP by double clicking on the executable or click the START button on the desktop, select RUN, and then browse to the SETUP executable. Follow the resulting on-screen instructions.

7. Driver installations of ***version 30.20 and earlier*** automatically installed Sentiris video capture support, the WDM device drivers, in a single step. See special directions for this phase of the software installation in the following sections

8. Subsequent driver media supplies the WDM installation as a separate executable in a neighboring WDM directory. After installing the driver for the graphics proper, run the WDM SETUP, following the on-screen directions.

WDM Software Installation (Driver Version 30.20)

With Windows 2000 / XP drivers versions 30.20 and earlier, WDM device support gets installed along with the graphics drivers proper. For later revisions of the driver, look for a separate WDM device installation SETUP file.

1. Run the SETUP.EXE file in the WDM directory of the install media (not required in driver 30.20 or earlier.)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Whether installed with the graphics driver, or in separate step, the WDM modules on the system will cause the "discovery" of, and auto-configuration of, WDM driver support for four additional devices:

- nVidia™ WDM Video Capture (Universal)
- nVidia™ WDM TVTuner
- nVIdia™ WDM TVAudio Crossbar
- nVidia™ WDM A/V Crossbar

Configuration of these devices is automatic, requiring the user to simply click through a succession of dialogs making default choices, but the sudden appearance of the dialogs could be disconcerting if unexpected.

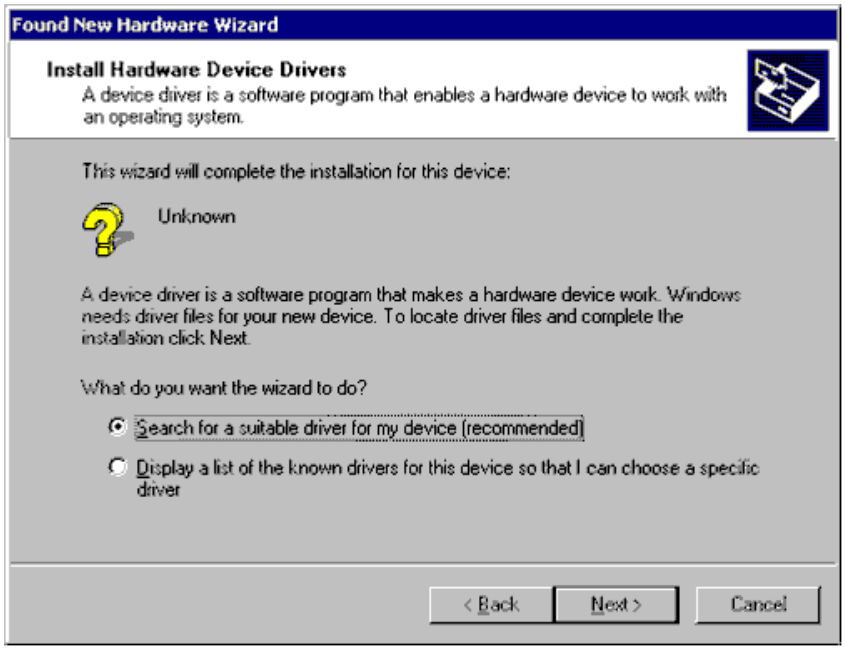
Interestingly, these dialogs could appear during the period where the driver SETUP is running, or after the system reboot, or could split themselves between these periods. Rest assured, however, that they will arrive in due course and when advanced through appropriately, will yield healthy video input and preview under the supported Windows OSes.

The same driver binaries are installed for Windows 2000 and Windows XP, but the dialogs presented to the user, during WDM auto-installs, are somewhat different. Each is described in turn below.

Windows 2000 WMD Video Devices Install (Driver Version 30.20)

1. With the Sentiris driver installed, and the seeds of WDM Video Capture support in place, there only remains to acknowledge Windows 2000's activities as it "discovers" and installs support for WDM devices, of which it's become newly aware. When the following dialog arrives (whether before or after the driver install and/or subsequent system reboot) click **Next>**

   If this is the first installation of Sentiris software on the platform, the OS "discovery" of WDM video components will first be reported as device type "unknown".

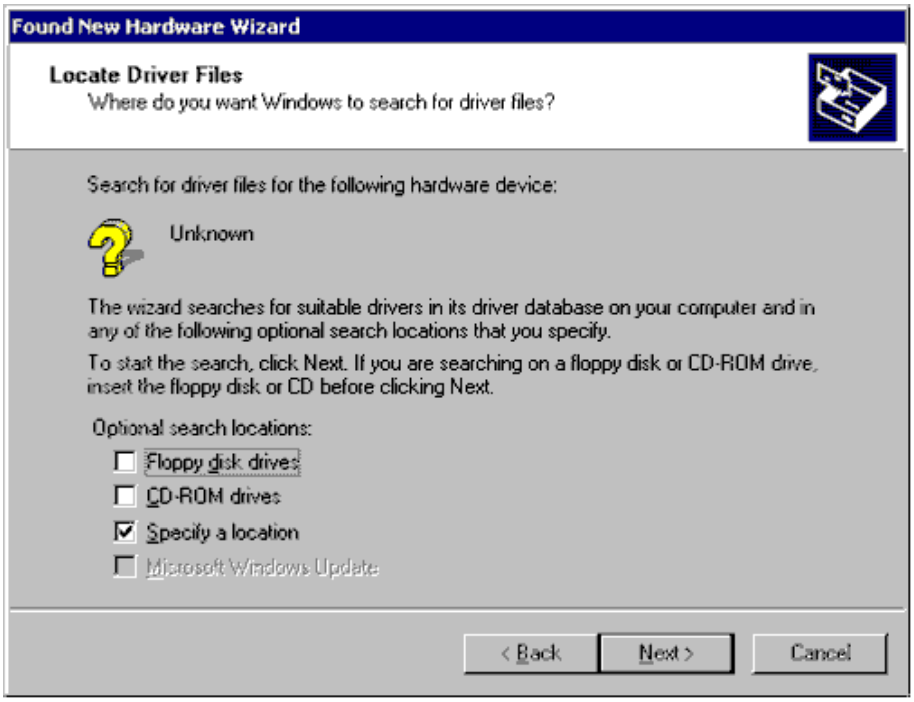


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

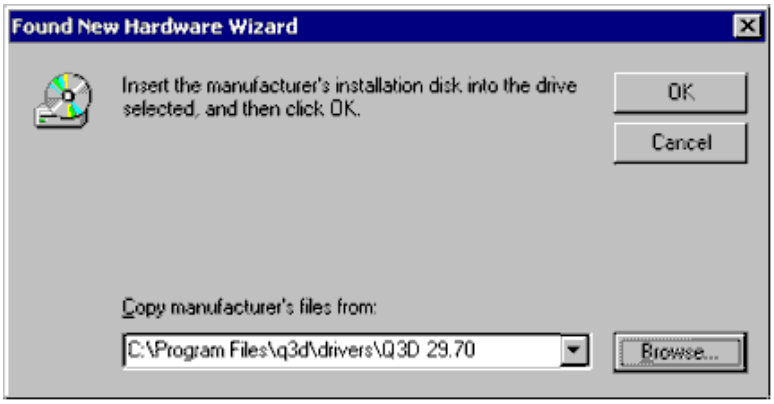
Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

If ever previously installed, the device will instead be identified by name. Select **Search for a suitable display driver for my device**. and then click **Next>**.

2. In the **Locate Driver Files** dialog, make **Specify a location** be the only checked box and then click **Next>**.



3. In the resulting prompt, indicate where the Sentiris driver installation media is found (on the CD media or location to which it was downloaded.) The path can other be typed, or browsed to by clicking the **Browse** button. Once the path is correct, hit click **OK**.



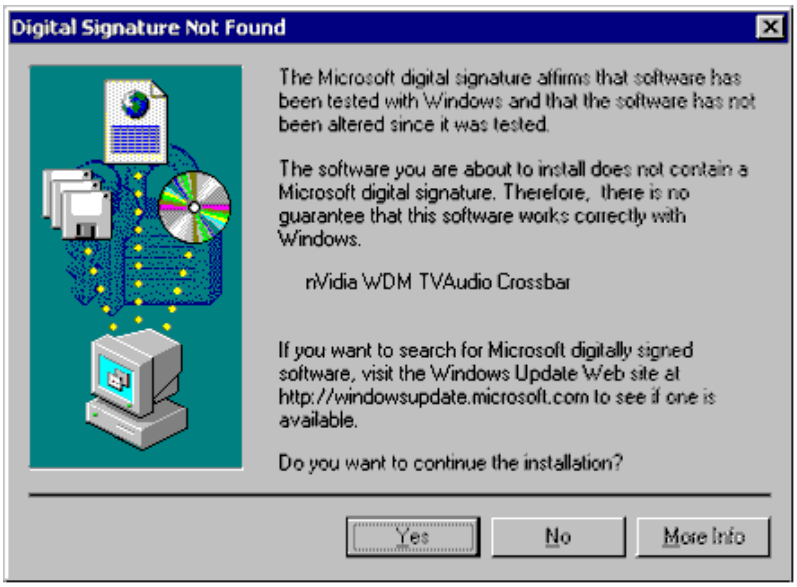
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

4. You should be rewarded with a Driver Files Search Results dialog, affirming that the required driver was found in the specified directory. In case of error, the **<Back** button allows for a second effort.



5. You may get a cautionary message advising that driver does not include a digital signature. Indicate you would still like to proceed with the installation, by clicking the **Yes** button.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

6. You'll get confirmation that the driver installed correctly in a dialog that appears like this the following. Click **Finish**.



7. The system will take you through steps 4 – 9 above *three additional times*, installing a total of four WDM video driver components.

8. After the last of the components is installed, a **restart** of the system is a wise precaution, to insure all the latest modules are running.

Windows XP WMD Video Devices Install (Driver Version 30.20)

1. Install the applicable device driver as above in **NVIDIA Driver Installation**.

2. There only remains to acknowledge Windows XP's activities as it "discovers" and installs support for WDM devices, of which it's become newly aware.

   When the following dialog arrives (before or after reboot) click **Next>** (Note that the hardware for which support is being installed may or may not be clearly named at this point., i.e. may bear the name **Unknown** at first.)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



3. This may yield the dialog, if so, click **Continue Anyway.**



4. and then **Finish**.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



5. Repeat this two or three dialog sequence, as necessary, for nVidia WDM TV Tuner…



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

6. Repeat this two or three dialog sequence, as necessary, for nVidia™ WDM A/V Crossbar



7. Repeat this two or three dialog sequence, as necessary, for nVidia™ WDM TVAudio Crossbar…



8. When the pop-up installation dialogs stop arriving (a total of four brief interactions) you're successfully installed the WDM support.

9. **Reboot** (restart) the system to insure all the newest modules are started.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

VxWorks Software/Driver Installation

In the case of VxWorks, there is no concept of installing software/drivers such as those used with Windows. Instead, all such tasks are performed under application control. Consult the documentation accompanying the **Sentiris SDK for VxWorks** product.

Linux Software/Driver Installation

The Linux driver is a driver for X Windows. The base X Windows packages should be installed. During the installation, the text console should be used instead of an X Windows console. The driver installation may fail if the installation is done while X Windows is running. The driver is supported on Red Hat 7.3, 7.2 and, 7.1 on single processor and multiprocessor Intel x86.

1. Install Red Hat 7.X workstation.
2. Log into Linux using the console.
3. Switch to root

```
$ su root
$ <root password >
```

4. Load the Software CD into the CD drive.
5. Mount the CD to the filesystem. The actual cdrom device may be different from /dev/cdrom if your system has multiple cdrom drives.

```
# mount /dev/cdrom /mnt/cdrom
```

6. Run the install script.

```
#  /mnt/cdrom/install
```

Linux Software/Driver Uninstall

To uninstall the driver, repeat the install steps to mount the software CD. The uninstall script must be run in the text console and X Windows should not be running. If X Windows has been configured for the Linux driver, it will need to be reconfigured.

1. Run the uninstall script.

```
# /mnt/cdrom/uninstall
```

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

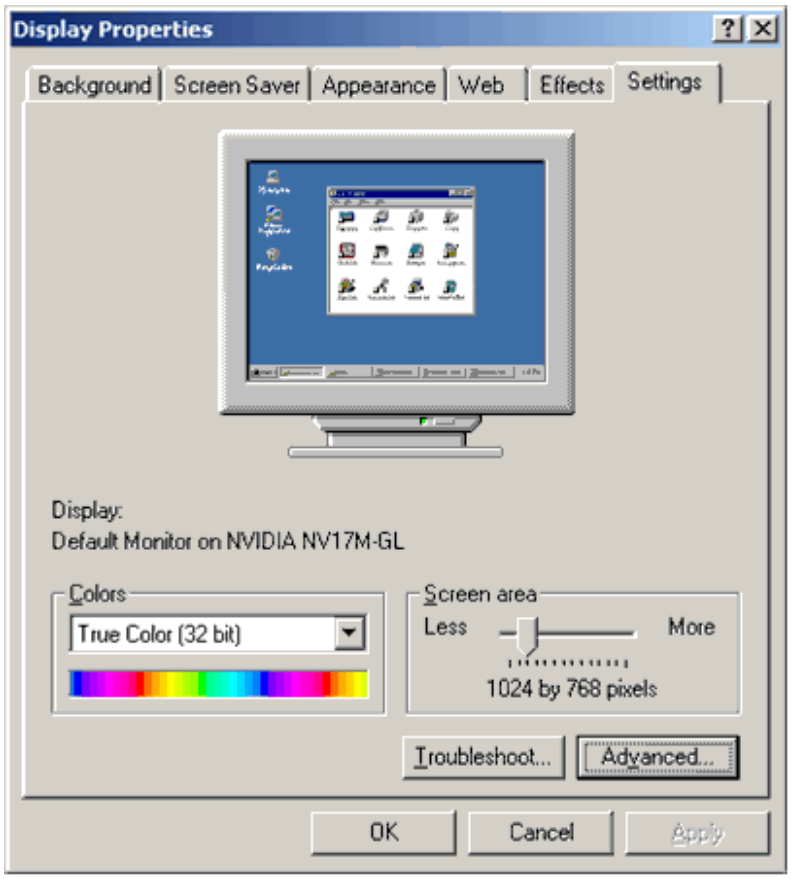
Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Setup/Configuration

Windows 2000 Setup/Configuration

Changing the Color and/or Resolution

In order to change the color or resolution, use ***Start > Settings > Control Panel > Display*** (or right-mouse-click on your Desktop and select the ***Properties*** item from the resulting pop-up menu) and then select the ***Settings*** tab on the resulting form:



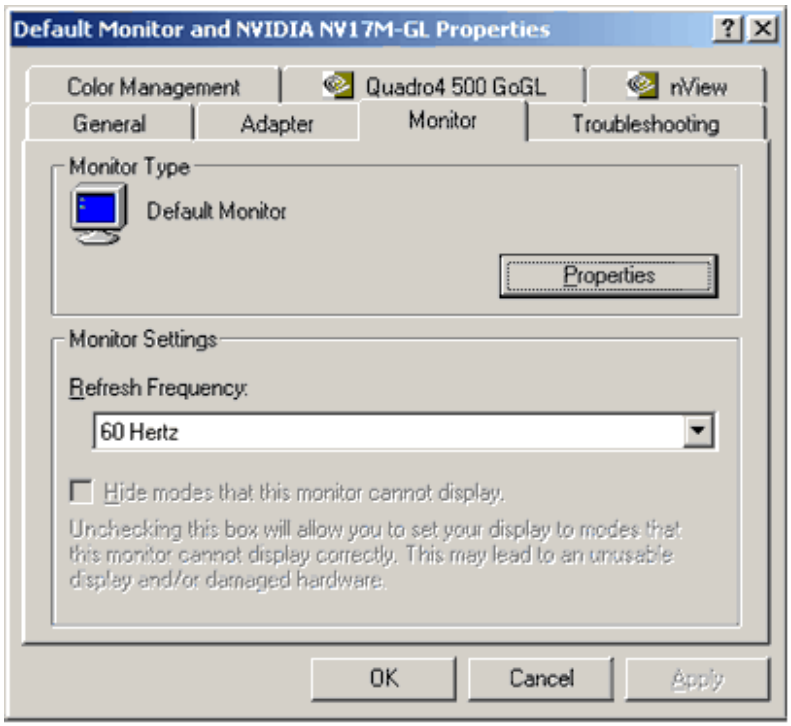
1. Select the required color depth in the ***Colors*** pull-down menu.
2. Select the resolution with the slider in the ***Screen area*** portion of the dialog.
3. Click the ***Apply*** button to apply these changes.
4. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***OK*** button to apply these settings.
5. The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

Changing the Monitor Frequency

In order to change the monitor frequency, use ***Start > Settings > Control Panel > Display*** (or right-mouse-click on your Desktop and select the ***Properties*** item from the resulting pop-up menu), then select the ***Settings*** tab, then click the ***Advanced*** button, then click the ***Monitor*** tab:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



Note: The tab marked **Quadro4 500 GoGL** shown in the screenshot above will have a different, but analogous legend when viewed on your screen (the exact text will depend on your particular model of Sentiris PMC).

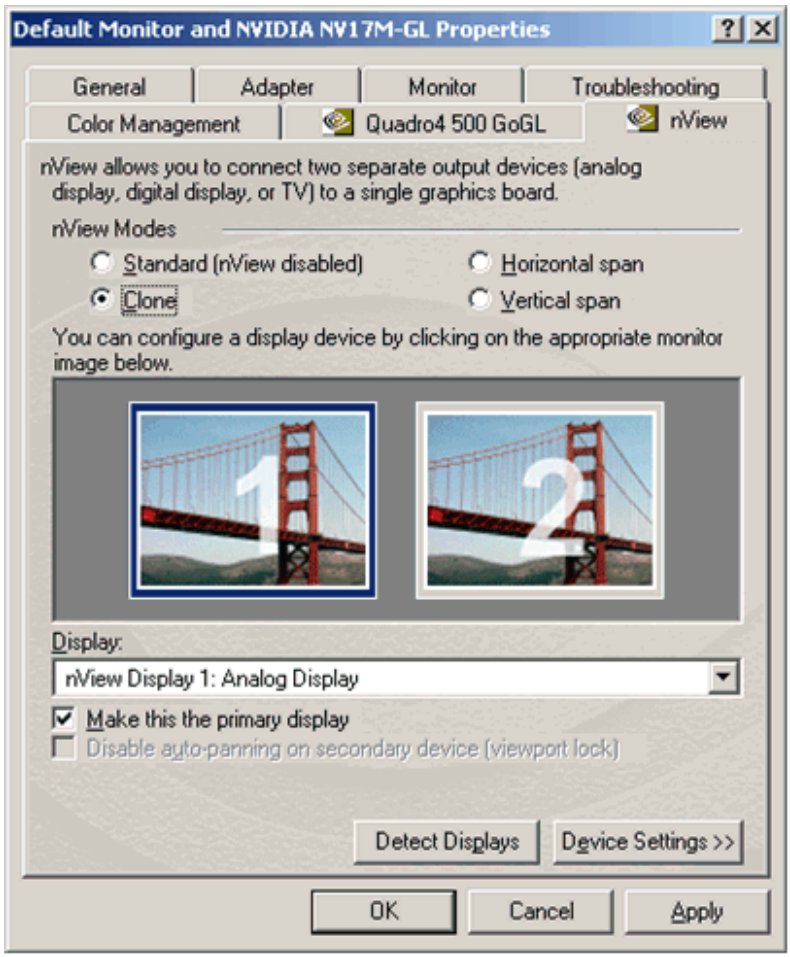
- Select the ***Monitor*** tab.
- Select the desired frequency in the ***Refresh Frequency*** pull-down menu.
- Click the ***Apply*** button to apply these changes.
- A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***OK*** button to apply these settings.
- The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

1. **Connecting and Configuring an Additional Display Device**

In order to connect and configure an additional display device, use ***Start > Settings > Control Panel > Display*** (or right-mouse-click on your Desktop and select the ***Properties*** item from the resulting pop-up menu), then select the ***Settings*** tab, then click the ***Advanced*** button, then click the ***nView*** tab:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



The additional display device must already be connected to the Sentiris board to utilize nView™, otherwise the selections will be grayed out.

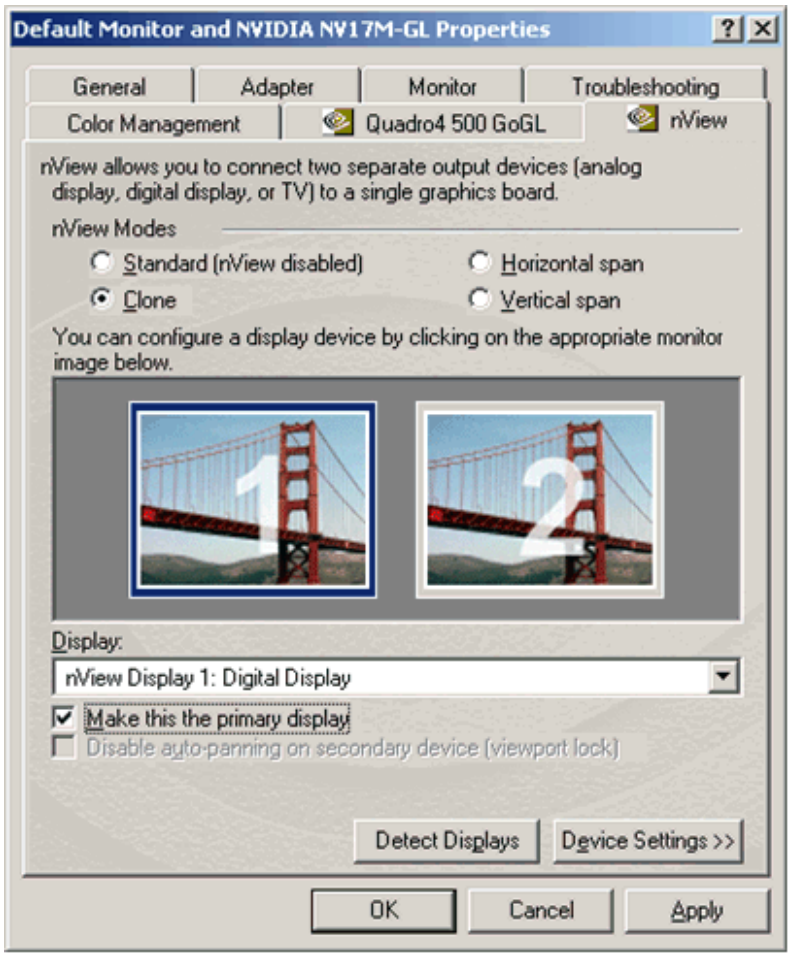
The two display devices will be referred to as ***nView Display 1*** and ***nView Display 2*** in the ***Display*** pull down list, where these numbers correspond to the “1” and “2” superimposed on the thumbnail images of the screens as shown in the illustration above. Distinguishing between the primary and secondary displays is of particular interest when using the Horizontal span and Vertical span modes, because this is how you specify which display is on the left/right or top/bottom, respectively. In order to specify which display device is to be considered to be the primary display:

- Select one of the devices from the ***Display*** pull-down menu.
- Click the ***Make this the primary display*** button (the effect takes place immediately).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

If you wish the secondary device to display the desktop identical to the primary display:

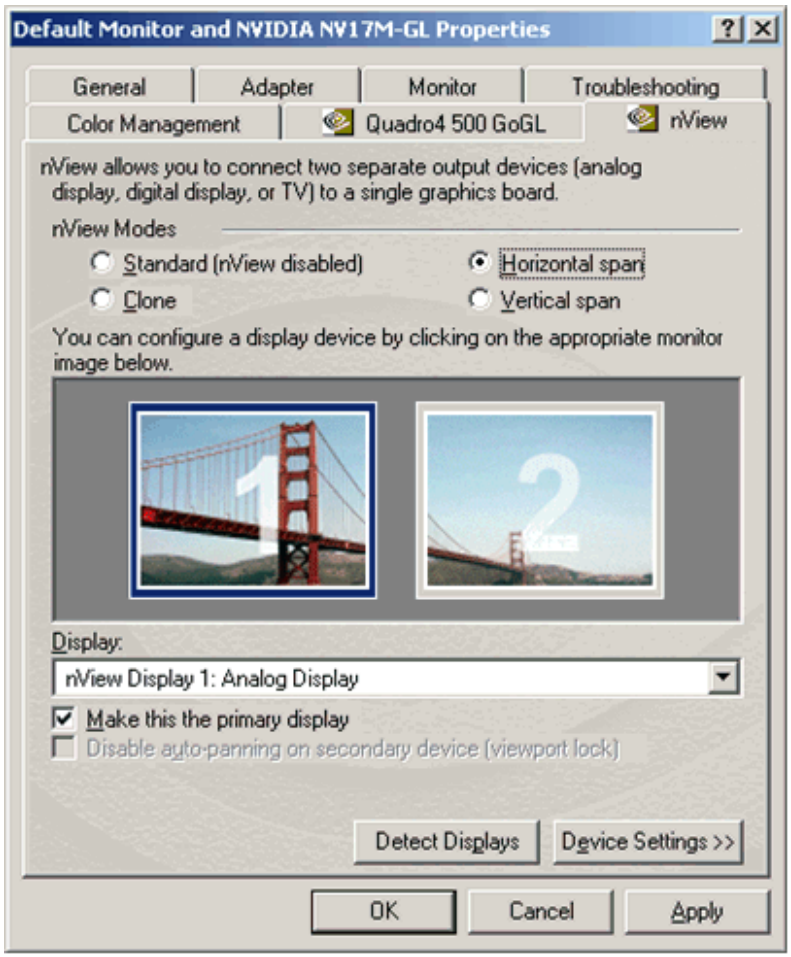


- Select the ***Clone*** option in the **nView Modes** area.
- Click the ***Apply*** button to apply these changes.
- A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***OK*** button to apply these settings.
- The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

If you wish the two display devices to span the desktop horizontally:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

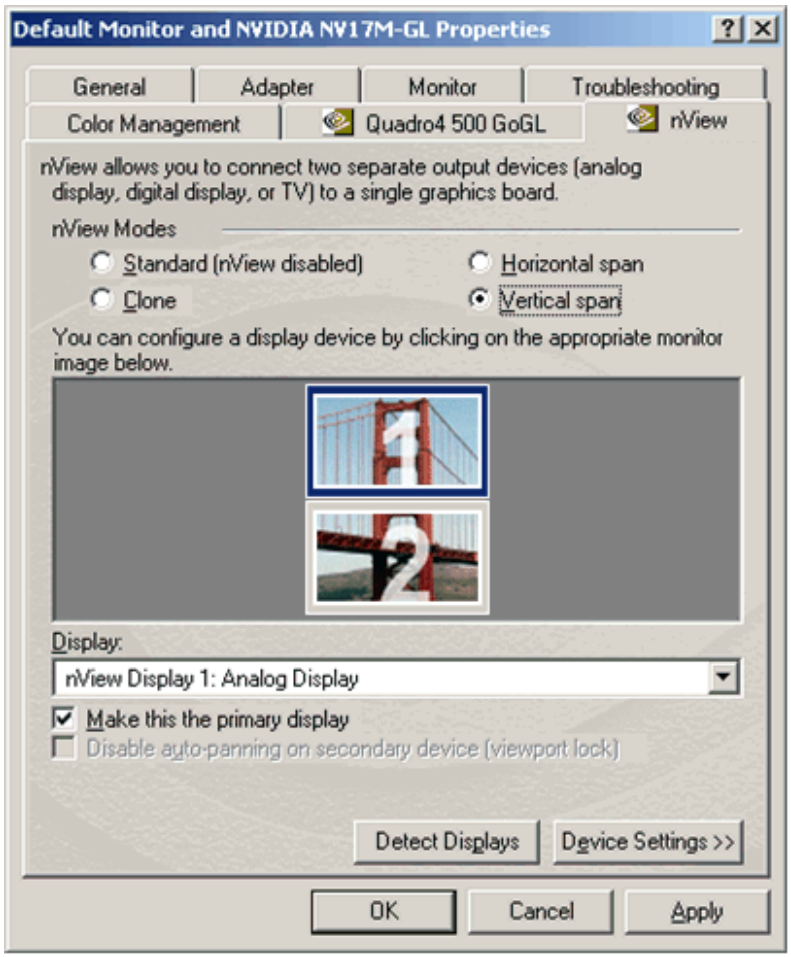


- Select the ***Horizontal span*** option in the **nView Modes** area.
- Click the ***Apply*** button to apply these changes.
- A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***OK*** button to apply these settings.
- The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

If you wish the two display devices to span the desktop vertically:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



- ☐ Select the ***Vertical span*** option in the **nView Modes** area.
- ☐ Click the ***Apply*** button to apply these changes.
- ☐ A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***OK*** button to apply these settings.
- ☐ The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

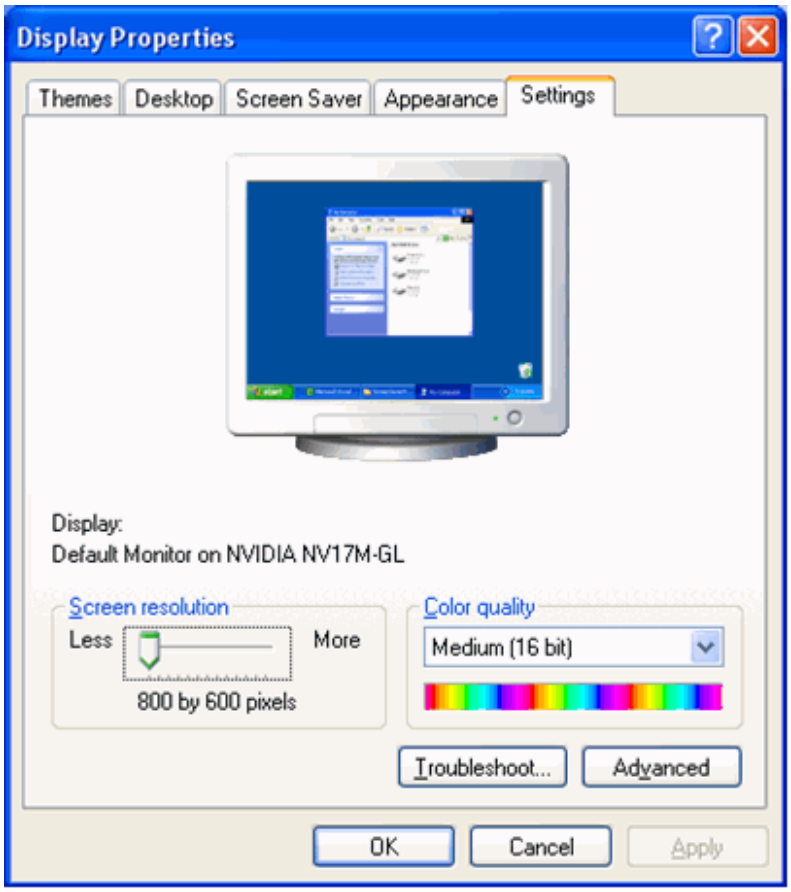
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Windows XP Setup/Configuration

Changing the Color and/or Resolution

In order to change the color or resolution, use ***Start > Control Panel >Appearances and Themes > Display*** (or right-mouse-click on your Desktop and select the ***Properties*** item from the resulting pop-up menu) and then select the ***Settings*** tab on the resulting form:



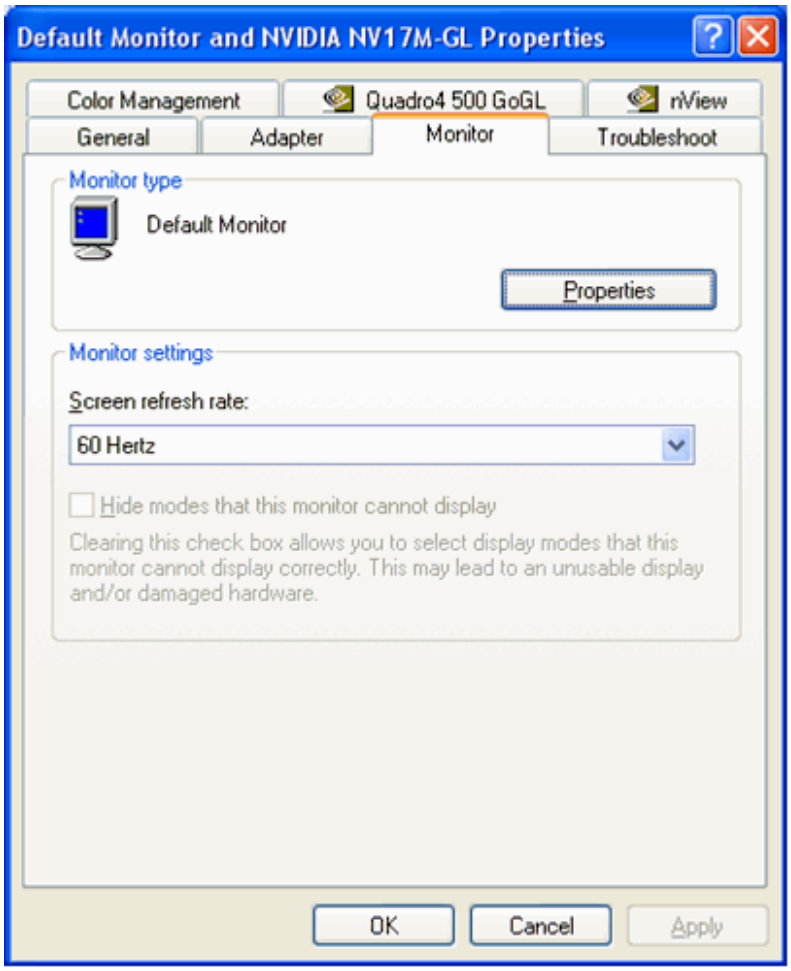
- Select the required color depth in the ***Color quality*** pull-down menu.
- Select the resolution with the slider in the ***Screen resolution*** portion of the dialog.
- Click the ***Apply*** button to apply these changes.
- The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

1. **Changing the Monitor Frequency**

In order to change the color or resolution, use ***Start > Control Panel >Appearances and Themes > Display*** (or right-mouse-click on your Desktop and select the ***Properties*** item from the resulting pop-up menu), then select the ***Settings*** tab on the resulting form, then click the ***Advanced*** button, then click the ***Monitor*** tab:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



Note: The tab marked **Quadro4 500 GoGL** shown in the screenshot above will have a different, but analogous legend when viewed on your screen (the exact text will depend on your particular model of Sentiris PMC).

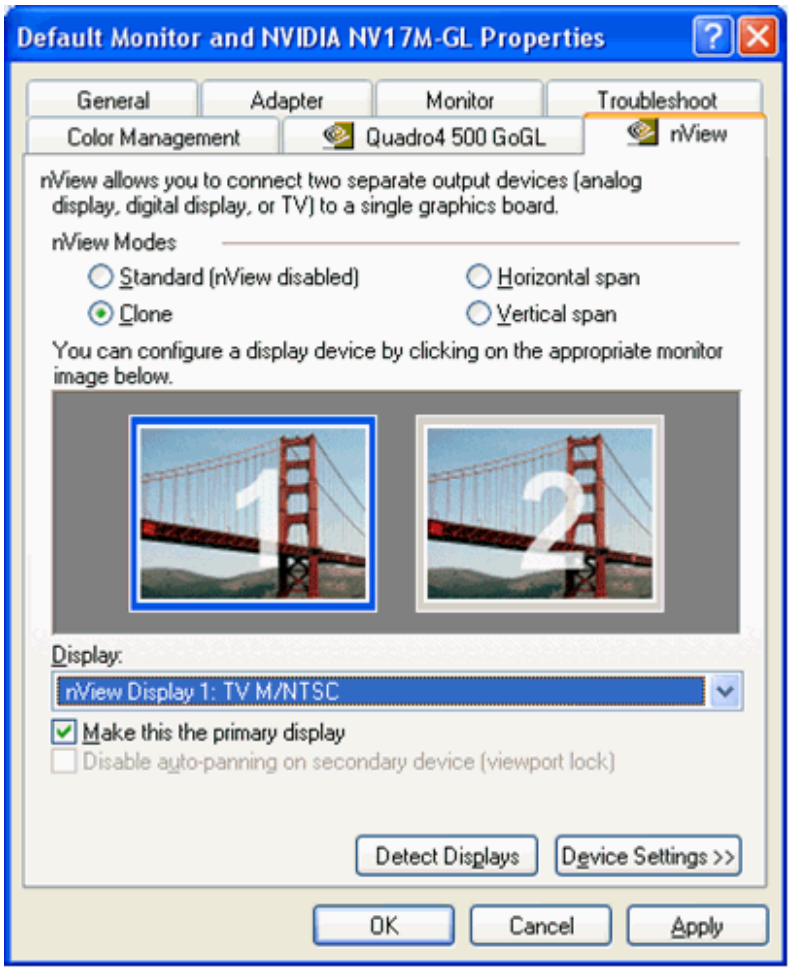
- Select the desired frequency in the ***Screen refresh rate*** pull-down menu.
- Left-mouse click the ***Apply*** button to apply these changes.
- The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Connecting and Configuring an Additional Display Device

In order to connect and configure an additional display device, use ***Start > Control Panel >Appearances and Themes > Display*** (or right-mouse-click on your Desktop and select the ***Properties*** item from the resulting pop-up menu), then select the ***Settings*** tab on the resulting form, then click the ***Advanced*** button, then click the ***nView*** tab:



The additional display device must already be connected to the Sentiris board to utilize nView; otherwise the selections will be grayed out.

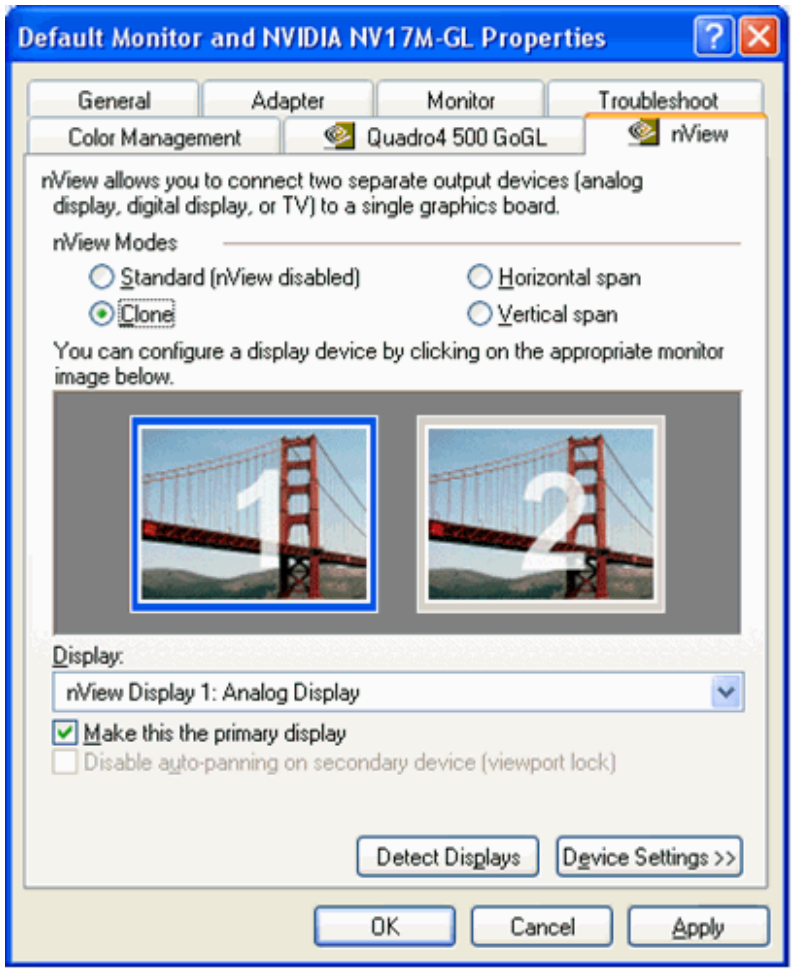
The two display devices will be referred to as ***nView Display 1*** and ***nView Display 2*** in the ***Display*** pull down list, where these numbers correspond to the “1” and “2” superimposed on the thumbnail images of the screens as shown in the illustration above. Distinguishing between the primary and secondary displays is of particular interest when using the Horizontal span and Vertical span modes, because this is how you specify which display is on the left/right or top/bottom, respectively. In order to specify which display device is to be considered to be the primary display:

- Select one of the devices from the ***Display*** pull-down menu.
- Click the ***Make this the primary display*** button (the effect takes place immediately).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

If you wish the secondary device to display the desktop identical to the primary display:

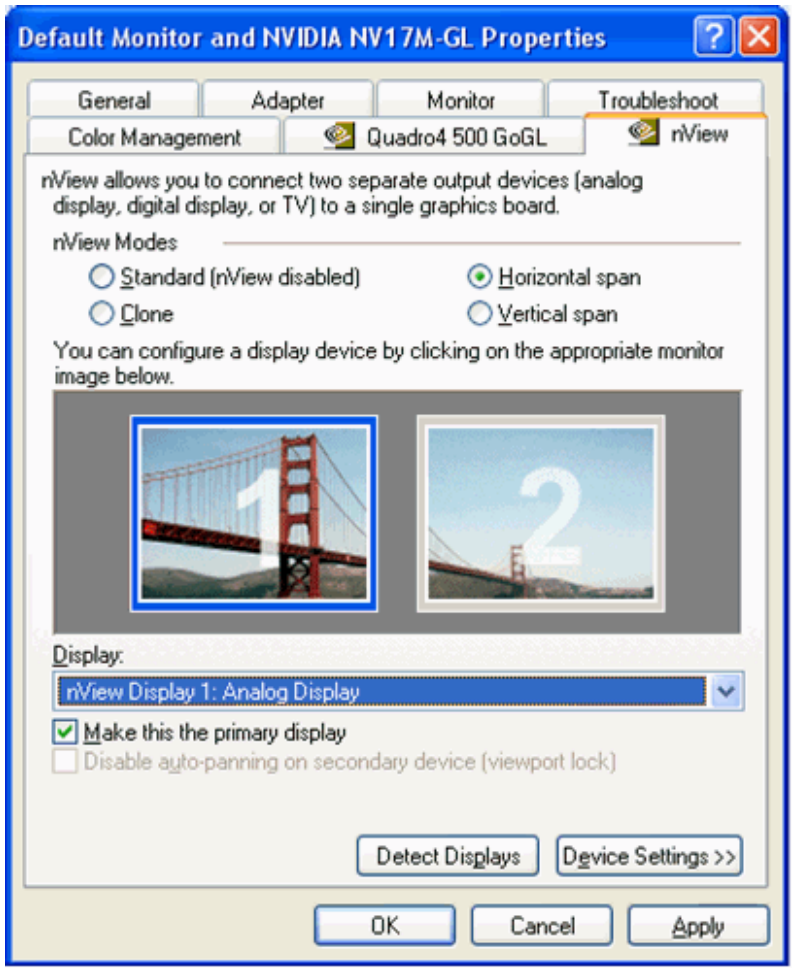


- Select the ***Clone*** option in the **nView Modes** area.
- Click the ***Apply*** button to apply these changes.
- The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

If you wish the two display devices to span the desktop horizontally:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

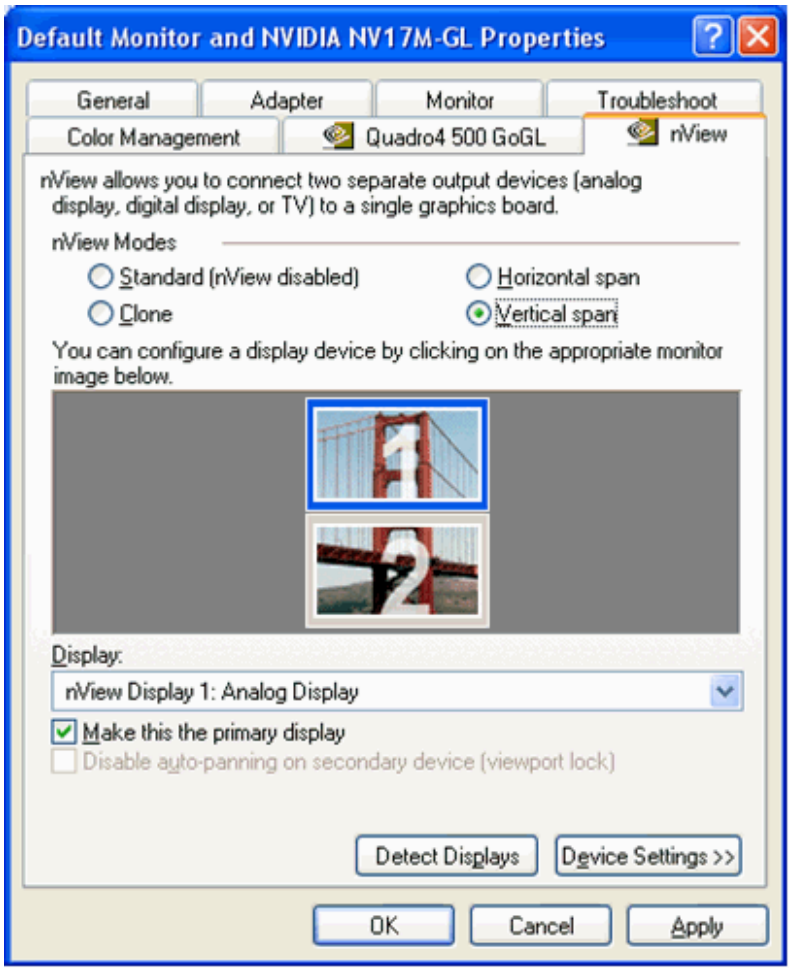


- Select the ***Horizontal span*** option in the **nView Modes** area.
- Click the ***Apply*** button to apply these changes.
- The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

If you wish the two display devices to span the desktop vertically:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



- Select the ***Vertical span*** option in the **nView Modes** area.
- Click the ***Apply*** button to apply these changes.
- The desktop will refresh with the changes applied. A dialog/window will appear prompting you to allow the new settings to be applied. Click the ***Yes*** button to apply these settings.

VxWorks Setup/Configuration

In the case of VxWorks, there is no concept of running driver setup/configuration applets such as those used with Windows. Instead, all setup/configuration tasks are performed under application control. Consult the documentation that accompanies the **Sentiris SDK for VxWorks** product. .

Linux Setup/Configuration

The setup and configuration of the Linux driver is done by the sentiris_config application that was installed during the driver installation. The Sentiris graphics adapter hardware must be installed. During the configuration, the text console should be used instead of an X Windows console. If X Windows is running during the configuration, it will be impossible to test the configuration.

The sentiris_config application is an enhanced version of the Red Hat X Windows configuration tool Xconfigurator. A series of simple dialogs will be displayed for each of the settable options. The

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

options are navigated by using either the tab or arrow keys. The options are selected by using the space bar. To continue to the next dialog use the ***F12*** key or select the ***OK*** button. To cancel or to go to a previous dialog, select depending on the current dialog, either the ***Cancel*** or ***Back*** button.

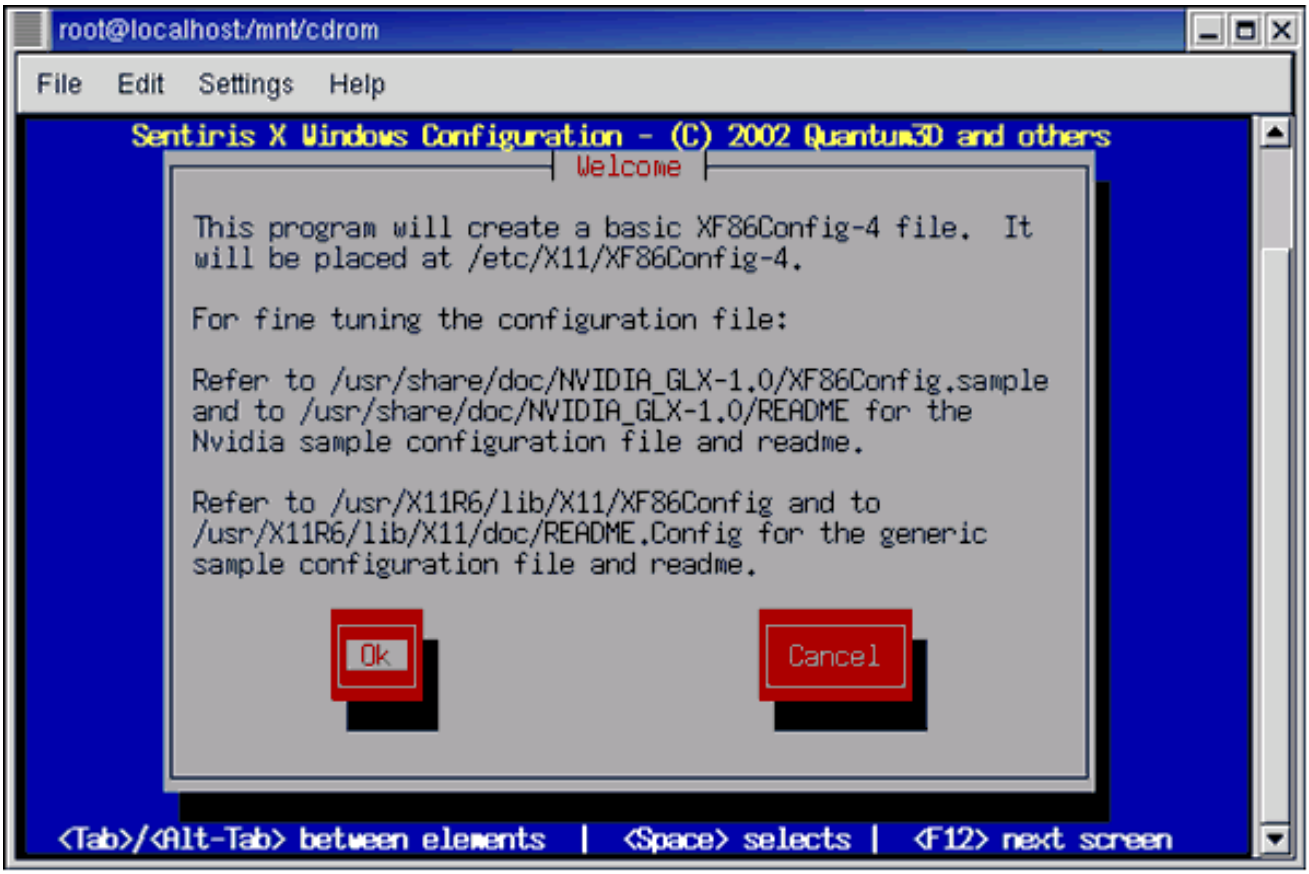
The sentiris_config application outputs an XF86Config-4 file that is used by X Windows to initialize the X server. The document /usr/share/doc/NVIDIA_GLX-1.0/README provides additional information on all of the driver specific options. A sample XF86Config-4 file is located at /usr/share/doc/XF86Config.sample.

Starting sentiris_config

As root start the application.

sentiris_config

The initial dialog is displayed. Select ***OK*** to continue.



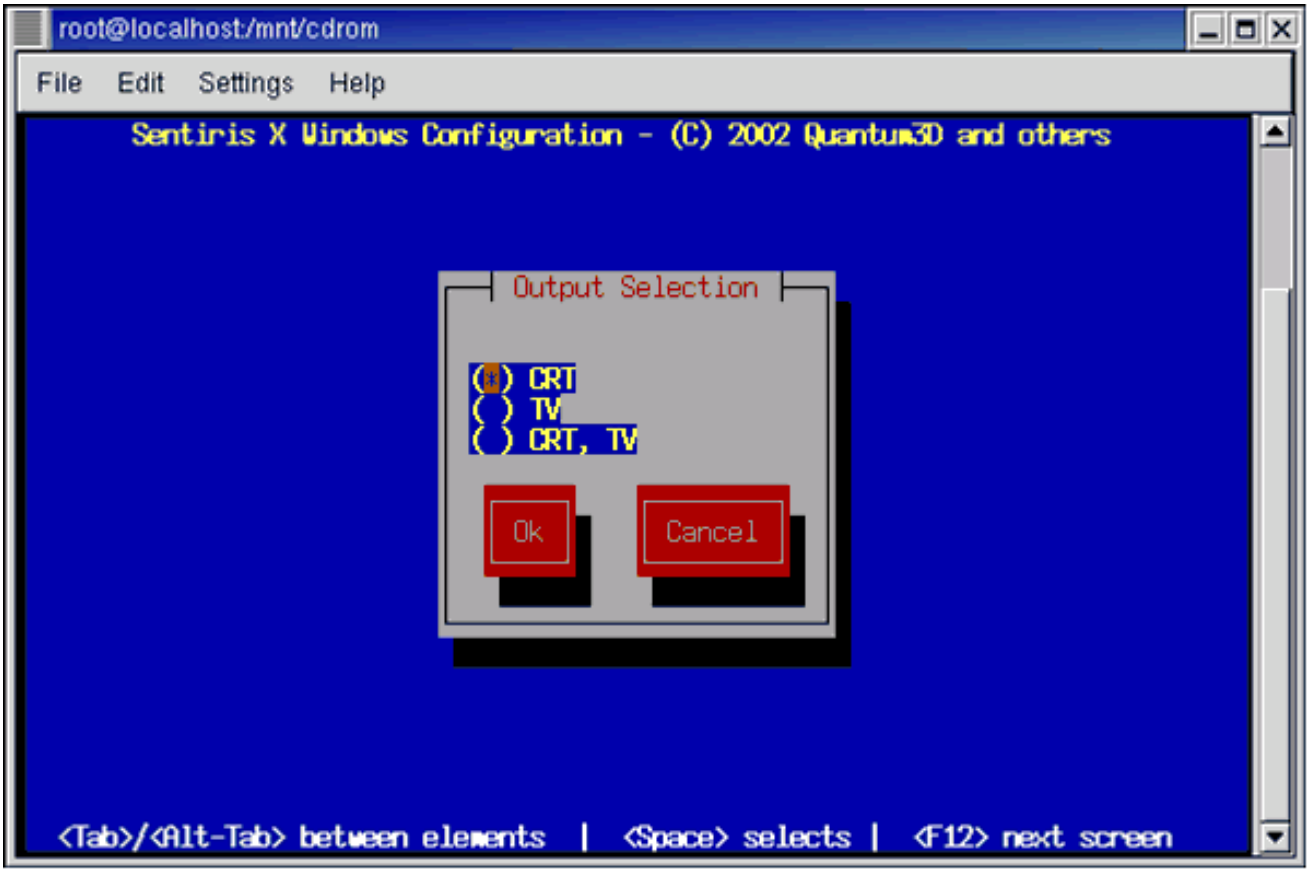
Output Selection

The Linux driver supports CRT, TV and, dual CRT and TV output. The television and TwinView

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

options will be described later. Select ***Cancel*** to exit the program. Select ***Ok*** to continue.



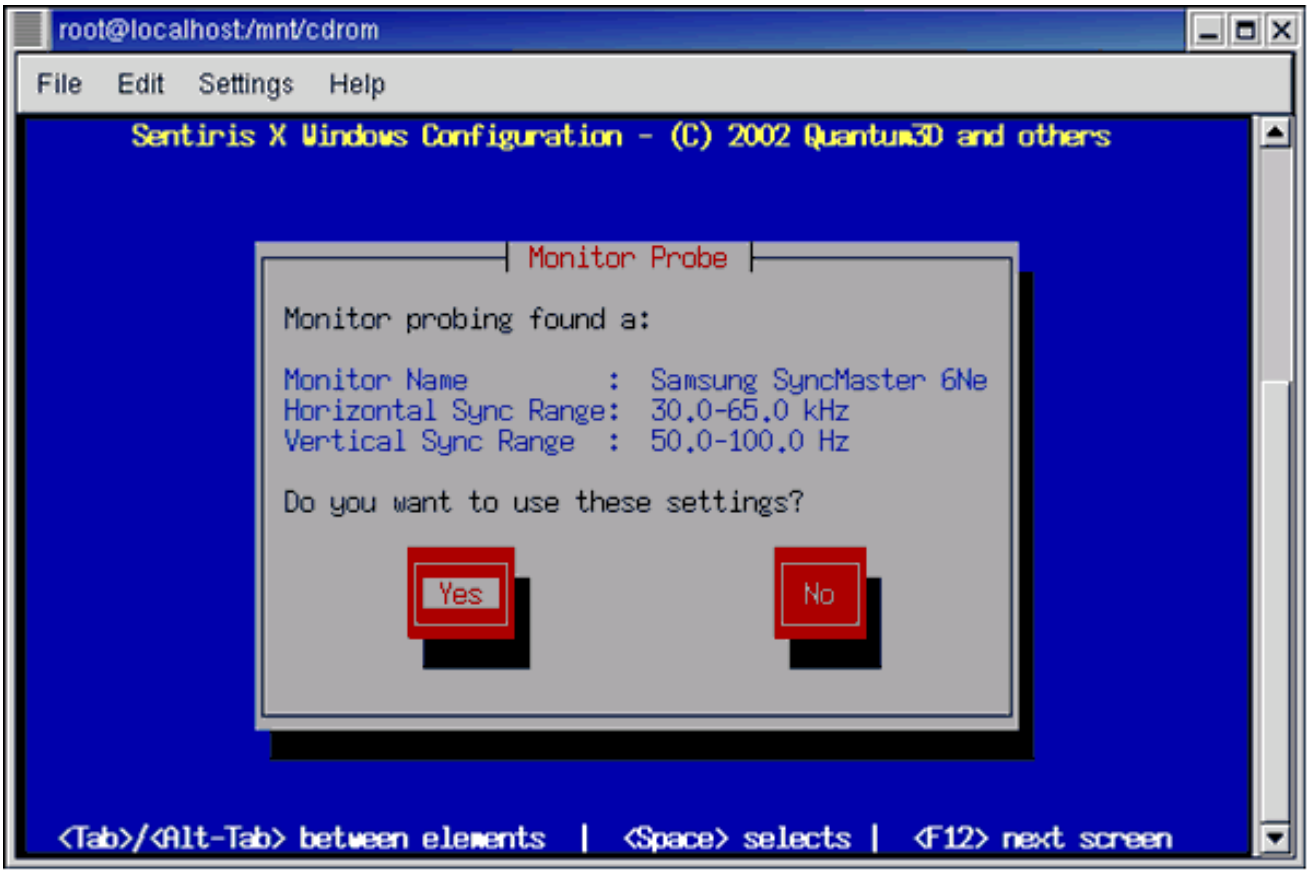
Monitor Selection

In most cases, sentiris_config will automatically detect and configure the monitor attached to the Sentiris graphics adapter. In cases when the monitor identification can not be determined, the user can either select the monitor from a database of known monitors or provide monitor timings. It is important to use the monitor's recommended timings either from the database or the hardware documentation. Failure to follow the recommended timing may harm the monitor.

If the detected monitor is correct, select ***Yes*** to continue. Select ***No*** to either pick from the monitor database or to set custom monitor timings.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

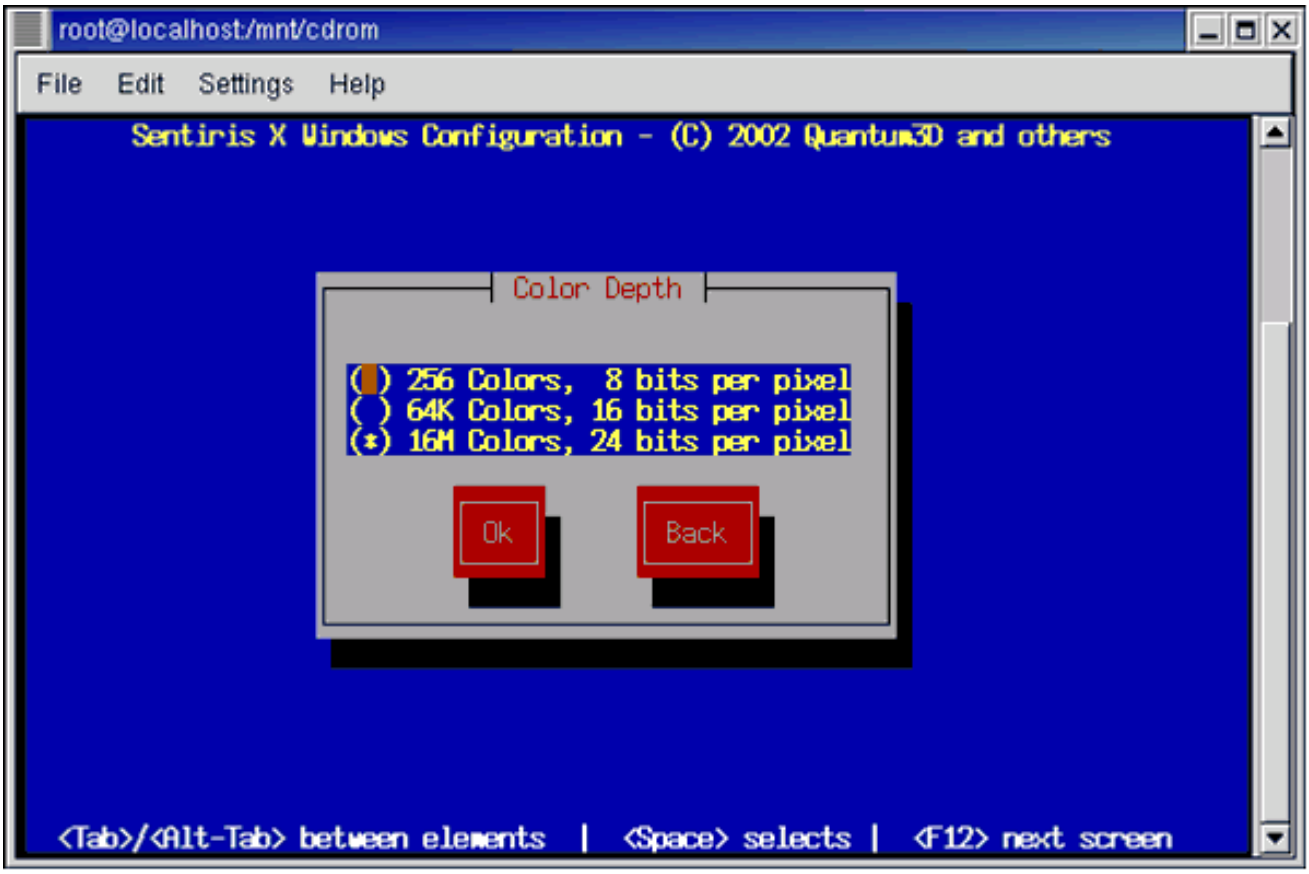


Color Selection

This dialog selects the number of possible colors to be displayed on X Windows. Select ***Back*** to return to the output select dialog. Select ***Ok*** to continue.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

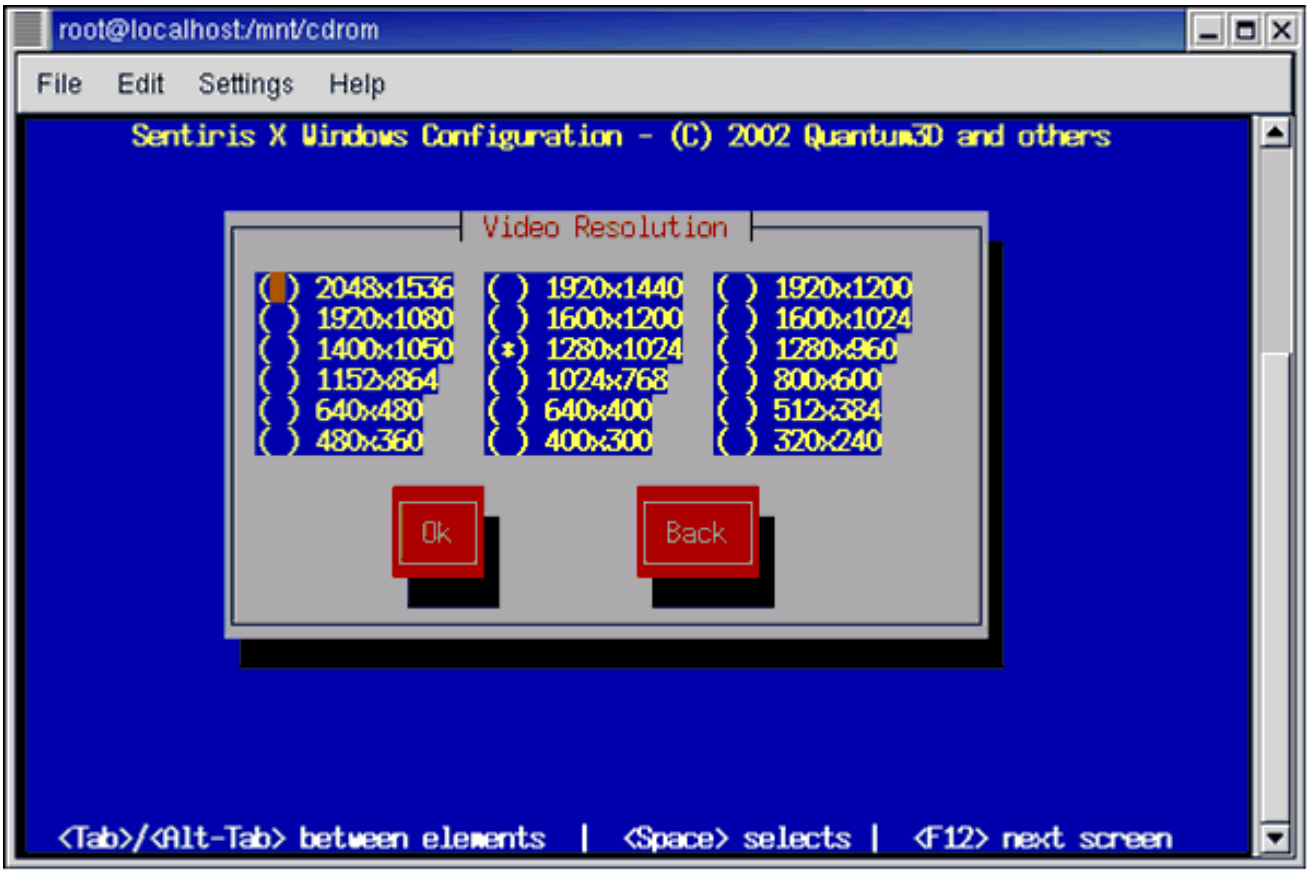


Resolution Selection

The screen resolution is chosen from the displayed list. All of the screen resolutions may not be supported by the connected monitor. It is important to use the X Windows test to verify that the screen resolution chosen is supported. In some cases, if the chosen resolution is not supported the Linux driver may choose a valid resolution. Select ***Back*** to return to the output selection dialog. Select ***Ok*** to continue.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

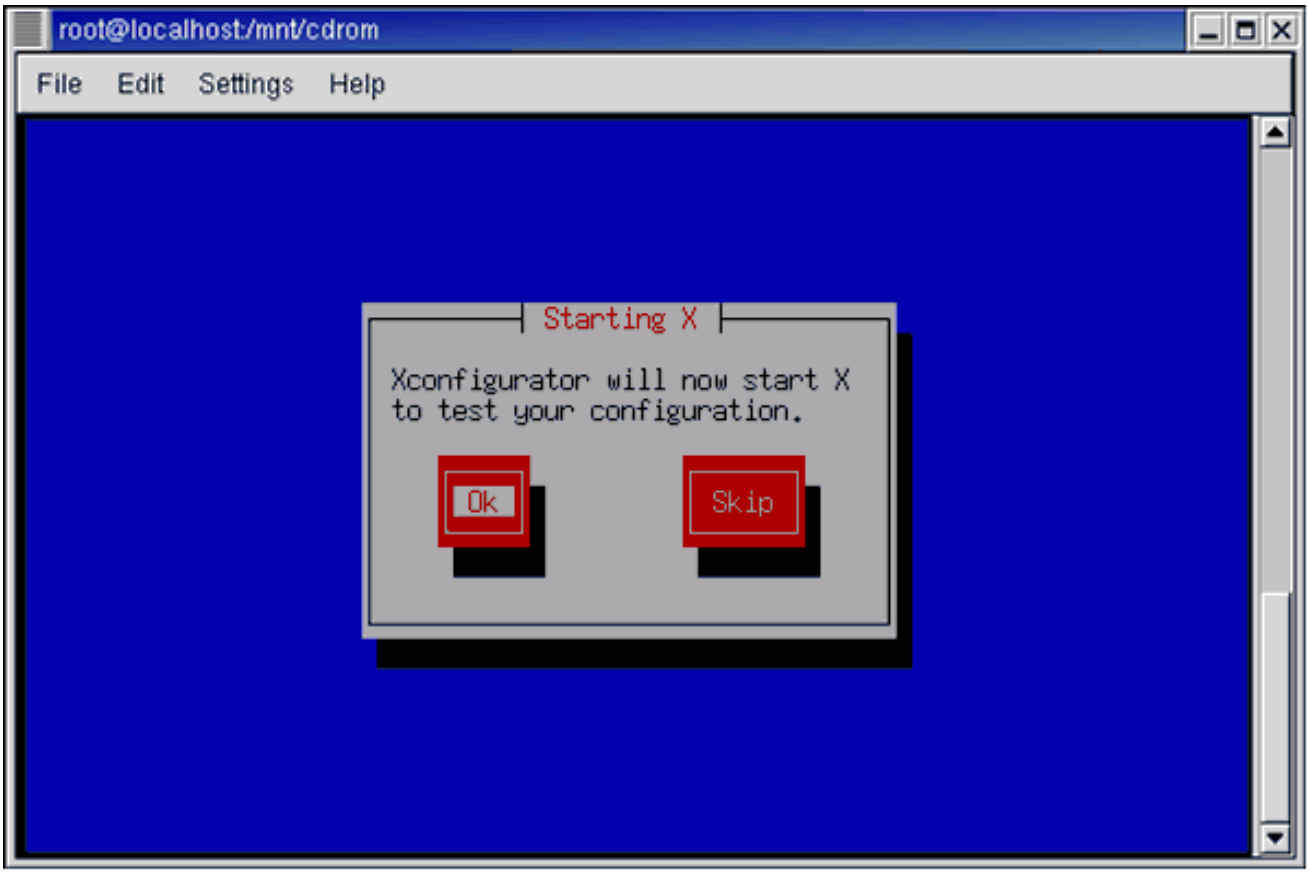


X Windows Test

The X Windows test will attempt to start the X server with the options selected. The X server is started and a dialog is shown with the screen resolution. If the screen resolution does match what was selected, the resolution chosen is unsupported by the monitor. If the monitor is black or has an unrecognizable display, the test will time out and report a failure. When the test passes the X Windows configure file, XF86Config-4, is written to /etc/X11. Select ***Skip*** to write the XF86Config-4 without running the test. Select ***Ok*** to run the test.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Linux Television Output Setup/Configuration

The Linux driver can be configured to display X server output to a television monitor. This section describes the television specific options. To enable television output, choose one of the TV options in the output selection dialog.

Default Television Monitor Timings

The television monitor timings can not be automatically determined. Default timing values have been supplied. Please check that these timings are compatible with the television monitor connected to the Sentiris graphics adapter. Select ***Back*** to return to the output selection dialog. Select ***Ok*** if the supplied monitor timings are compatible with the connected television monitor. Select ***Custom*** to provide custom monitor timings.

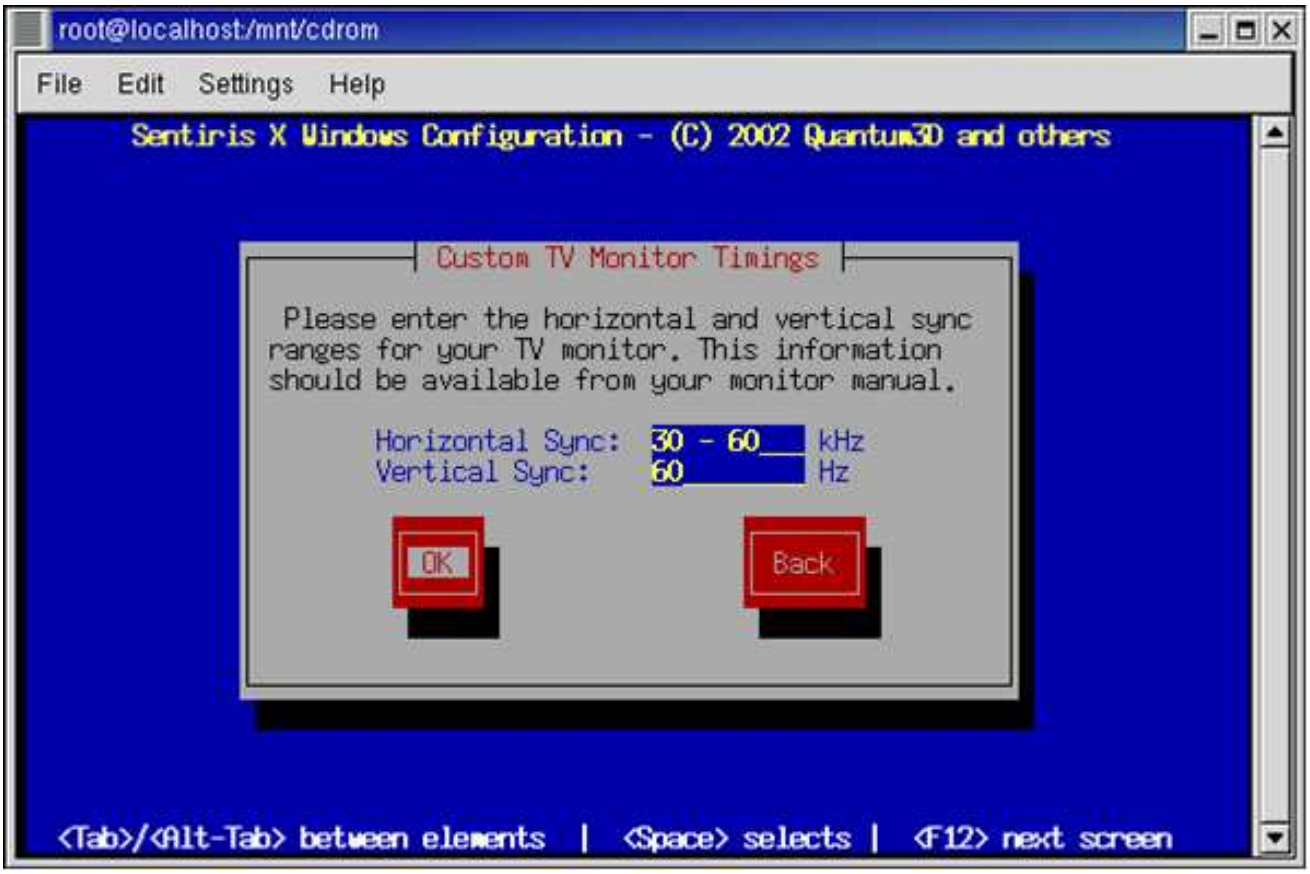


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Custom Television Monitor Timings

The television monitor timings can not be automatically determined. Default timing values have been supplied. Please check that these timings are compatible with the television monitor connected to the Sentiris graphics adapter. Select ***Back*** to return to the default TV monitor information dialog. Select ***Ok*** to use the custom timing and to continue.

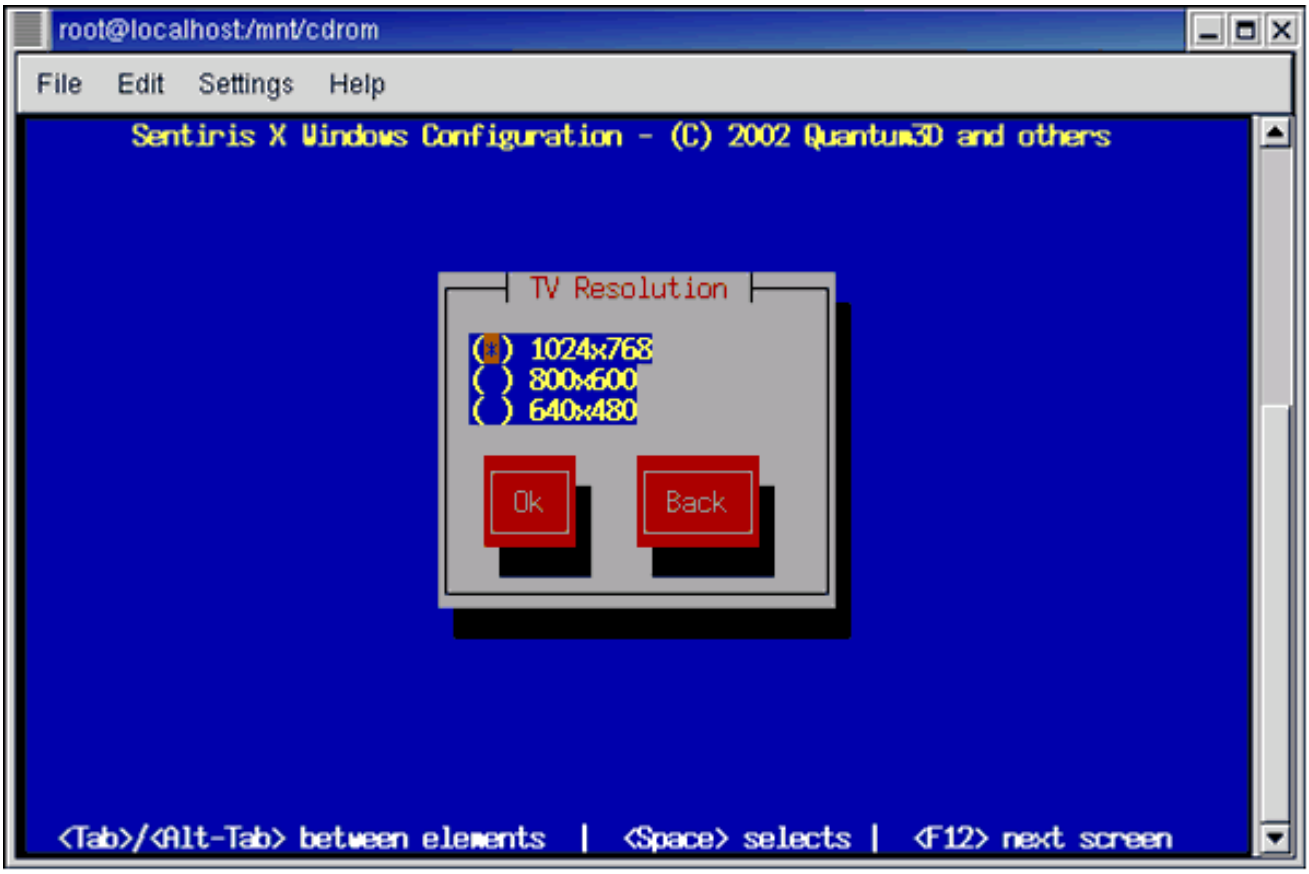


Television Resolution Selection

The television screen resolution is chosen from the displayed list. Select ***Back*** to return to the output selection dialog. Select ***Ok*** to continue.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

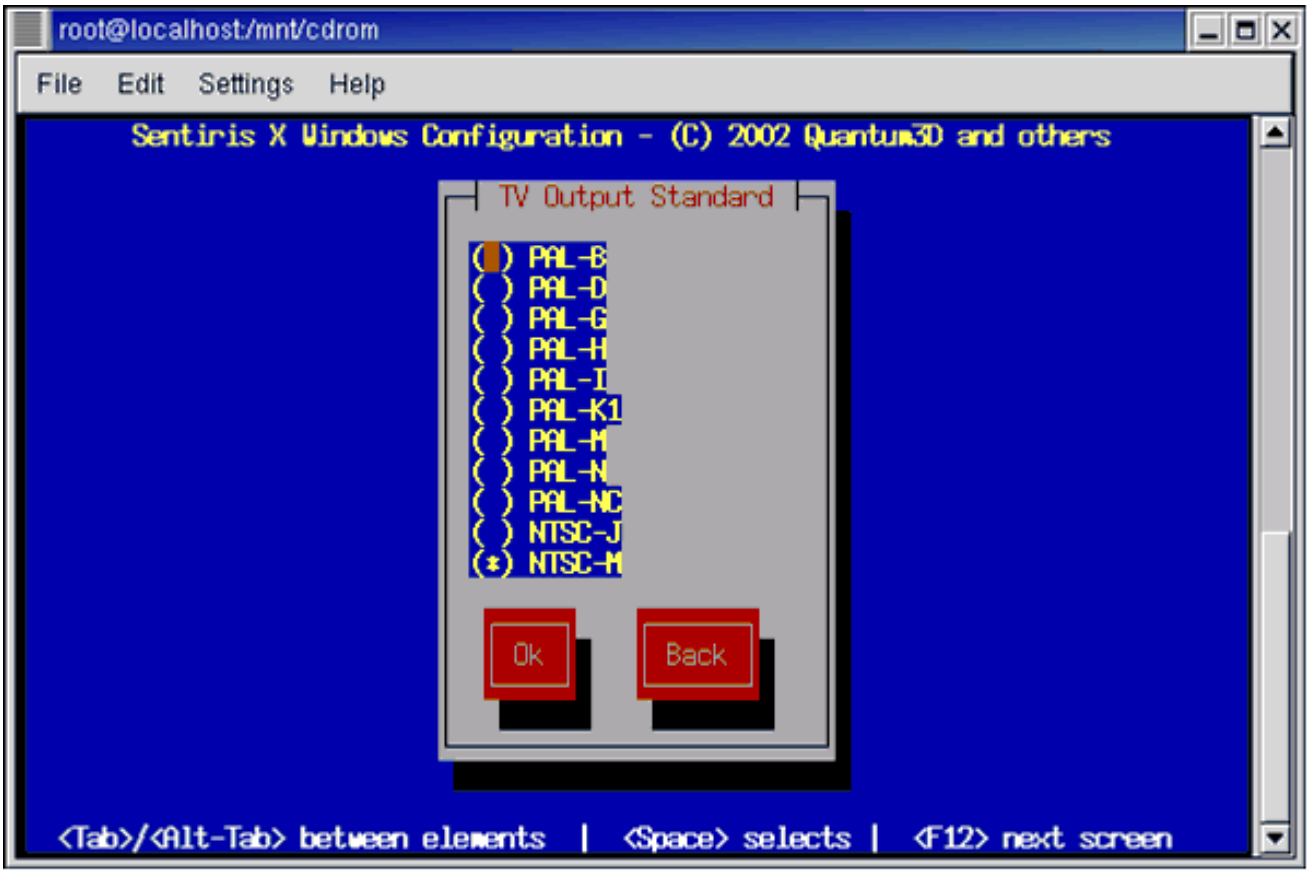


Television Output Standard Selection

Different regions of the world have the different television broadcast standards. As an example, the United States of America and Canada use NTSC-M while Great Britain uses PAL-I. The document /usr/share/doc/NVIDIA_GLX-1.0/README provides additional information on the television output standards. Select ***Back*** to return to the output selection dialog. Select ***Ok*** to continue.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

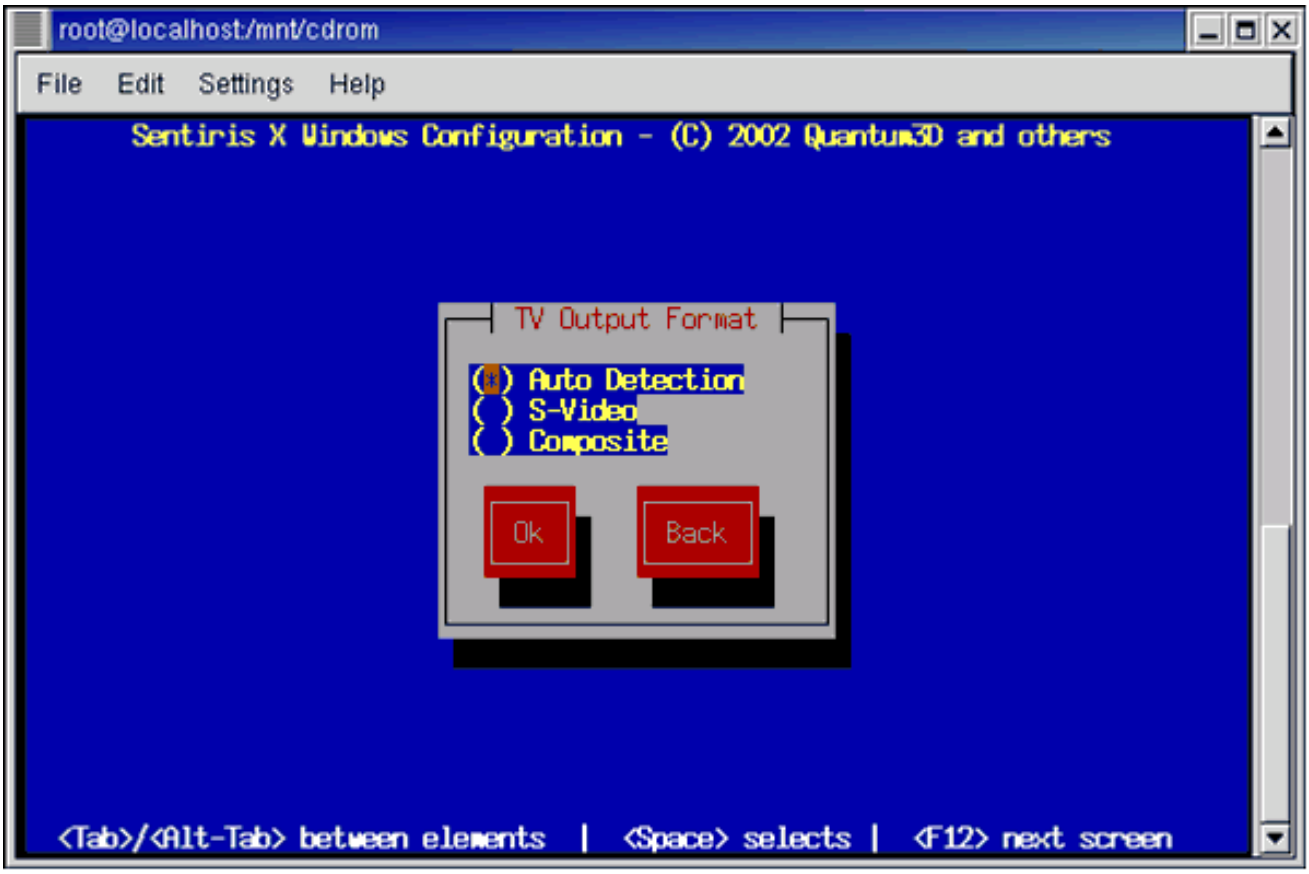


Television Output Format Selection

The Linux driver supports either ***Composite*** or ***S-Video*** output. If the output format is unknown, choose the ***Auto Detection*** and the driver will determine the appropriate format. Select ***Back*** to return to the output selection dialog. Select ***Ok*** to continue.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Linux TwinView Output Setup/Configuration

TwinView allows the simultaneous use of the CRT and TV outputs. TwinView is equivalent to nView on Windows. The CRT is the primary display. The TV is oriented relative to the CRT.

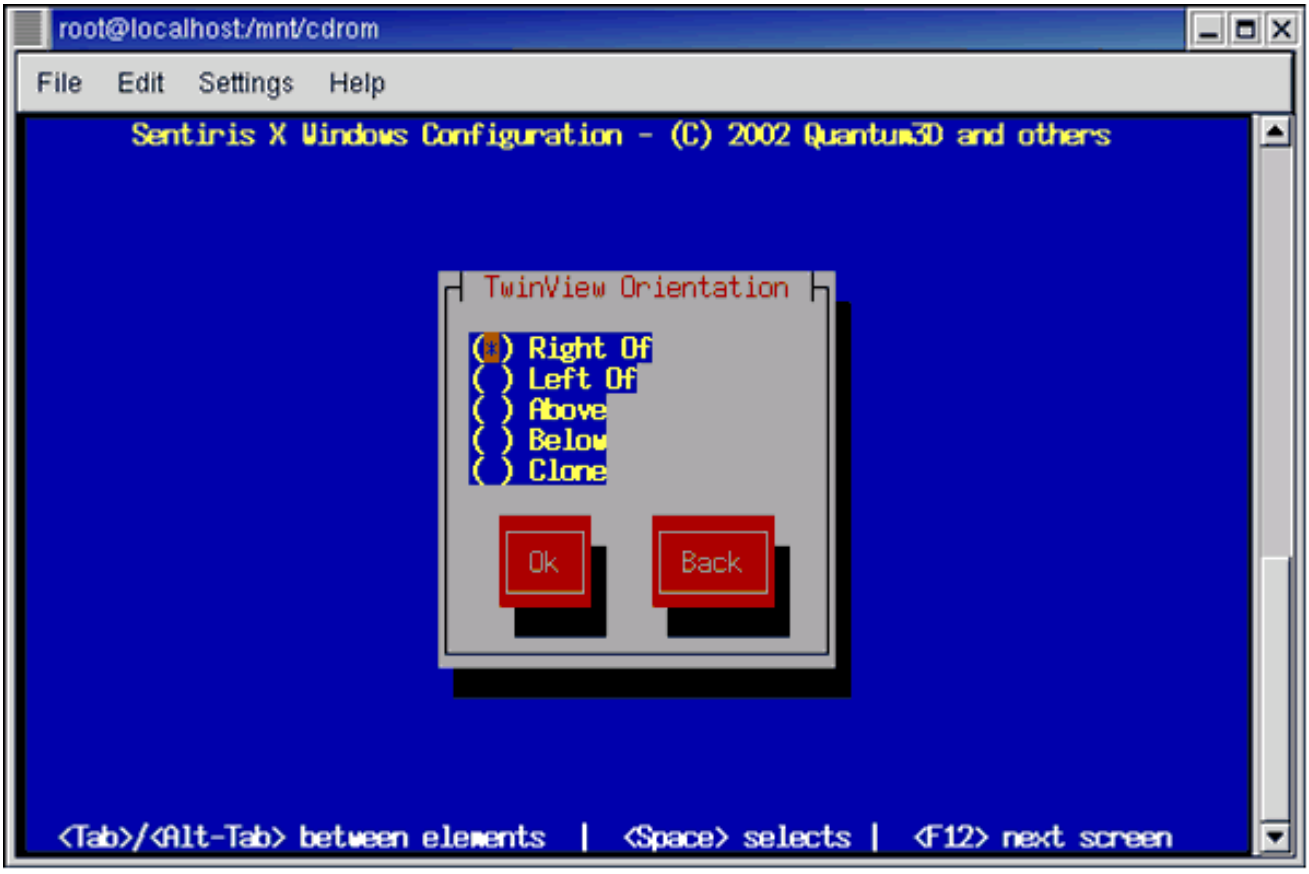
To enable TwinView, choose the CRT, TV option in the output selection dialog.

TwinView Orientation Selection

The orientation options are ***Right Of***, ***Left Of***, ***Above***, ***Below*** and ***Clone***. In the ***Right Of*** orientation, the TV monitor is to the right of the CRT on the desktop and has a starting x coordinate of the CRT monitor resolution width. In the ***Left Of*** orientation, the TV monitor is to the left of the CRT on the desktop and has a starting x coordinate of 0. In the ***Left Of*** orientation, the CRT monitor has a starting x coordinate of the TV monitor resolution width. In the ***Above*** orientation, the TV monitor is above the CRT on the desktop and has a starting y coordinate of 0. In the ***Above*** orientation, the CRT monitor has a start y coordinate of the TV monitor resolution height. In the ***Below*** orientation, the TV monitor is below the CRT on the desktop and has a starting y coordinate of the CRT monitor resolution height. In the *Clone* orientation, the TV monitor has the same starting x and y coordinate as the CRT monitor.

Some orientations and monitor resolutions combinations may cause part of the desktop to be unusable. In the Clone orientation sentiris_config requires that the CRT and TV monitors to be the same resolution. If the Gnome and KDE window mangers behave correctly if both the CRT and TV monitors have the same resolutions.

Select ***Back*** to return to the output selection dialog. Select ***Ok*** to continue.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Software Development

Windows 2000 / XP Support

What's required to do Windows development for Sentiris

The installation of the Windows 2000/XP driver for your Sentiris CVxx graphics card also installs:

- accelerated OpenGL 1.2 library
- WDM drivers supporting on-board video capture

Additional facilities required for developing OpenGL applications include:

- Microsoft Developer Network (MSDN) Professional license (or above) and
- Microsoft Visual Studio 6.0
  C/C++ integrated development environment
  recently bundled with MSDN above
- NVIDIA developers resources for Windows 2000 / XP
- (optional) Microsoft Direct X SDK Version 8.X or higher

My application code uses the xxxx library...

OPENGL	Microsoft's OpenGL library is opengl32.dll The Sentiris driver installation adds an accelerated ICD (installable client driver) to the Microsoft implementation
GLU	Microsoft's GLU library is glu32.dll
GLUT	Compile yourself a version. Source is here. Failing that, web search "GLUT source win32"
GLX	WGL is the Windows analog to GLX. Source code changes are required.
WGL	In the NVIDIA OpenGL SDK above.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Are Embedded Windows 2000 or XP supported?

Microsoft contends that the embedded versions of Windows 2000 and XP are application and driver compatible with their desktop cousins. Quantum3D has not, to date, certified the operation of the OpenGL software stack on these embedded versions.

If you need Quantum3D's assurance on Embedded Windows 2000 or Embedded Windows XP, please approach our EVC Marketing Department to inquire how this becomes possible.

Let's see some demos...

The vast majority of example code for OpenGL on the net can be found through the Developers and Coding Examples sections on: http://www.opengl.org

RedHat Linux 7.X Distribution

What's required to do Linux development for Sentiris

Load the RedHat Linux 7.X distribution on the system, indicating that the loading of **Development Tools** is desired. This will load GNU development tools for code development and debug.

Load the RedHat Linux driver for Sentiris.

1. Install Red Hat 7.X workstation.
2. Log into Linux using the console.
3. Switch to root

```
$ su root
$ <root password >
```

4. Load the Software CD into the CD drive.
5. Mount the CD to the filesystem. The actual cdrom device may be different from /dev/cdrom if your system has multiple cdrom drives

```
# mount /dev/cdrom /mnt/cdrom
```

6. Run the install script.

```
#  /mnt/cdrom/install
```

Besides adding Sentiris run-time binaries, the installation will position Sentiris code development resources on the system for subsequent use.

Configure the Linux driver is done by the sentiris_config application that was installed during the driver installation. The Sentiris graphics adapter hardware must installed. During the configuration, the text console should be used instead of an X Windows console. See the Sentiris 4110 CV Installation manual to be walked through the steps.

Incorporate the Sentiris code development resources into your builds. On your Makefiles, include the

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

following INCLUDE paths

My application code uses the xxxx library...

X Windows	Provided with Linux, accelerated by the Sentiris driver.
GLX	Provided with Linux, accelerated by the Sentiris driver.
OPENGL GLU	Installed with the RedHat Linux driver for Sentiris
GLUT	Compile yourself a version. Source is at http://www.xmission.com/~nate/glut.html . Failing that, web search "GLUT source Linux"

Let's see some demos...

The vast majority of example code for OpenGL on the net can be found through the Developers and Coding Examples sections on: http://www.opengl.org

Wind River's VxWorks 5.4 (under Tornado 2.0)

The Sentiris SDK for VxWorks, a separate royalty-bearing product, provides the resources necessary to do code development for Sentiris graphics under WindRiver's Tornado 2.0 development environment, and to target that code for VxWorks 5.4. Contact your Quantum3D sales representative or product distributer. .

VxWorks development

What's required to do VxWorks development for Sentiris?

- ☐ Window River's VxWorks 5.4 / Tornado 2.0 development system for X86 or PowerPC target systems for the PC platform. This is the code development system, used for "cross-development" to the target...
- ☐ Sentiris Development System (Quantum3D part number 993-2002-00) or other X86 target system or PowerPC single board computer (SBC) with available VxWorks 5.,4 board support package (BSP) from Wind River Systems or board vendor.
- ☐ Sentiris SDK for VxWorks (Quantum3D part number 993-2001-00)

What makes up the Sentiris SDK for VxWorks

The Sentiris SDK for VxWorks provides the industry's best and most widely distributed OpenGL library implementation (OpenGL 1.3) for application developers targeting PowerPC or X86 and the VxWorks 5.4 real-time OS.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Complementing the OpenGL library are supporting libraries for X Windows / GLX enthusiasts or folks interested in Realtime GL (RGL).

How do I set up to do VxWorks development for Sentiris?

- ☐ Install Wind River Systems Tornado 2.0 on PC development system.
- ☐ Install target system's Board Support Package (BSP.)
- ☐ Install Sentiris SDK for VxWorks.

How do I specify display resolutions and timings?
The operational mode of a display is specified by the application program using the q3deg or rgl application program interface. See an example program like TriGears, which is (optionally) installled with the Sentiris SDK for VxWorks software. There are versions for both the q3deg and the RGL library.

How do I meld graphics and live video?
Combining video and symbols is simply a case of back-to-front drawing.

Render a quadrilateral with the video texture, and texture coordinates that pin the corners of the video to the corners of the rectangle. Then draw designed lines, symbols fonts and finally swap-buffer to make the results visible.

Included with the SDK is a sample program that draws live video. To draw symbols, you'd just do further drawing between the video render and the swap-buffer. A version of this sample program is likely to be seen in an upcoming Sentiris SDK for VxWorks release.

Let's see some demos...

See the demos that (optionally) installed with your copy of Sentiris SDK for VxWorks. See also http://www.opengl.org for a wealth of additional OpenGL code.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Appendix A: Sentiris Specifications

Environmental Specifications

Temperature Range	OP	Non-OP
	0^{O} to $+55^{O}$C	-40^{O} to $+100^{O}$C
Operating Humidity	0 - 95% Non-condensing	
Sine Vibration	8g peak, 15 - 2k Hz	
Random Vibration	$0.05g^2$ / Hz, 15 - 2k Hz	
Shock	30g peak half-sine 9ms	
Conformal Coating	No	
Atmospheric Pressure	Sea level to 15k feet	
Decompression	N/A	

General Specifications

- IEEE P1381.1-compliant PCI Mezzanine Card (PMC) with convective cooling
- PCI bus support
  - 32-bit PCI, 33 MHz and 66 MHz capable
  - Both 3.3V and 5V PCI signal compatible
- NVIDIA Quadro4 embedded GPU (NV17GLM) with 256-bit internal architecture, dual graphics pipeline and 220 MHz operation
- NVIDIA lightning memory architecture with 128-bit wide interface to 64MB DDR SDRAM frame buffer/texture memory with 220 MHz operation
  - Approximately 7.0 GB/sec dedicated graphics bandwidth
  - Pixel fill rate performance up to 400 MP/sec with trilinear filtering enabled (RWB 2.3.2b GFILL)
- NVIDIA nfiniteFX onboard transformation and lighting engine
  - Up to 3.5M independent trilinear textured triangles/sec (based on RWB 2.3.2b GVT on PCI-66 MHz bus)
- NVIDIA Quadro4 acceleration for enhanced AA point, line and polygon performance
  - Up to 2.6M independent, Z-buffered, lit anti-aliased lines/sec (based on RWB 2.3.2b GVT on PCI-66 MHz Bus)
- NVIDIA nView™ support for dual, independent/clone channel output with two simultaneously active graphics or video outputs (see *Sentiris 4110 CV PMC Configurations* earlier in this manual):
  - DVI 1.0 (PanelLink™/TMDS) digital and analog output
  - LVDS (flat panel, OpenLVDS) digital output

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com
Title Block.Number:770-0006-03 Rev:00 Title Block.Lifecycle Phase:Production

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

- Composite or S-Video

- Flexible Video Input: NTSC, PAL, RS-170, RS-170A or S-Video (see *Sentiris 4110 CV PMC Configurations* earlier in this manual)
- NVIDIA PowerMizer™ technology for reduced power consumption and heat dissipation
  - Total power consumption at nominal 2D/3D/video load: less than 10 Watts
  - Reduced power consumption possible with clock de-rating
- Software and platform support
  - Microsoft® Windows2000™ with OpenGL® 1.2 (or earlier) and DirectX 8.0 on Intel® IA32™ platforms
  - WindRiver® VxWorks™ version 5.4 with OpenGL® 1.2 (or earlier) on Intel® IA32™ and PowerPC™ platforms
  - Red Hat® Linux™ version 7.3, 7.2, and 7.1. with OpenGL® 1.3 on Intel® IA32™
  - Quantum3D diagnostics, utilities and BIT for deployed IA32 and PowerPC environments
- EMI/EMC compatibility
  - FCC Part 15 level A and CE on all models
- Safety Certification: UL, ETL or equivalent and CE on all models

Video Output Resolutions and Refresh Rates

The video output resolutions and refresh rates supported by the Sentiris 4110 VC PMC for Windows on compatible analog CRT graphics display devices are illustrated in the following matrices:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

High Color (16 bits-per-pixel, 64K colors)							
Resolution	**Refresh Rates (Hz)**						
640 x 480	60	70	72	75	85	100	120
320 x 200	60	70	72	75			
320 x 240	60	70	72	75			
400 x 300	60	70	72	75			
480 x 360	60	70	72	75			
512 x 384	60	70	72	75			
640 x 400	60	70	72	75	85	100	120
800 x 600	60	70	72	75	85	100	120
1024 x 768	60	70	72	75	85	100	120
1152 x 864	60	70	72	75	85	100	120
1280 x 768	60	70	72	75	85	100	120
1280 x 960	60	70	72	75	85	100	120
1280 x 1024	60	70	72	75	85	100	120
1600 x 900	60	70	72	75	85	100	
1600 x 1024	60	70	72	75	85	100	
1600 x 1200	60	70	72	75	85	100	
1920 x 1080	60	70	72	75	85	100	
1920 x 1200	60	70	72	75	85		
1920 x 1440	60	70	72	75			
2048 x 1536	60						

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

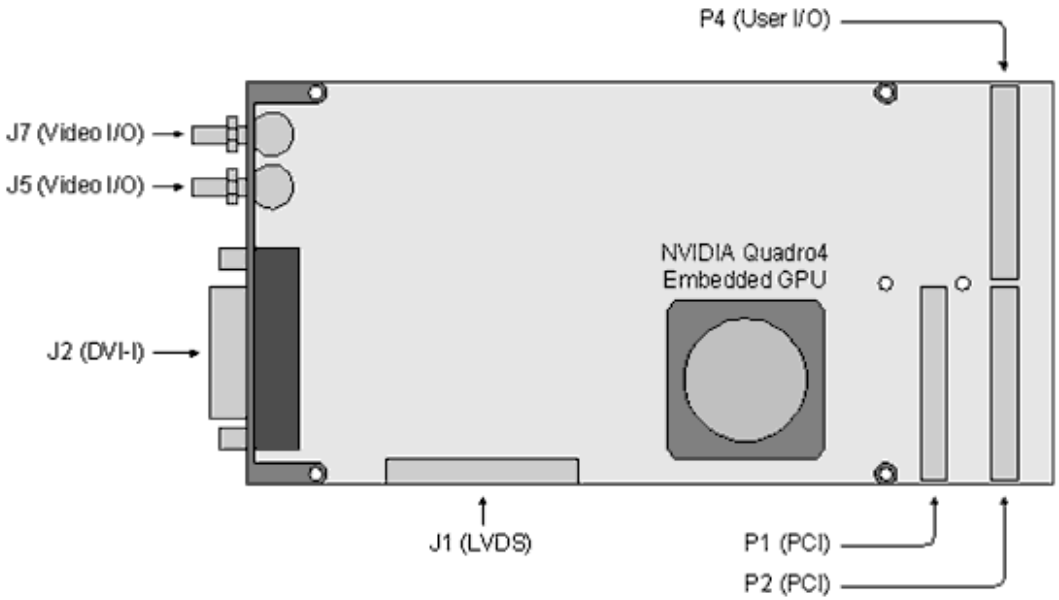
True Color (32 bits-per-pixel, 16.7M colors)							
Resolution	**Refresh Rates (Hz)**						
640 x 480	60	70	72	75	85	100	120
320 x 200	60	70	72	75			
320 x 240	60	70	72	75			
400 x 300	60	70	72	75			
480 x 360	60	70	72	75			
512 x 384	60	70	72	75			
640 x 400	60	70	72	75	85	100	120
800 x 600	60	70	72	75	85	100	120
1024 x 768	60	70	72	75	85	100	120
1152 x 864	60	70	72	75	85	100	120
1280 x 768	60	70	72	75	85	100	120
1280 x 960	60	70	72	75	85	100	120
1280 x 1024	60	70	72	75	85	100	120
1600 x 900	60	70	72	75	85		
1600 x 1024	60	70	72	75	85		
1600 x 1200	60	70	72	75	85		
1920 x 1080	60	70	72	75			
1920 x 1200	60	70					
1920 x 1440	60						

Display capabilities under Linux and VxWorks are analogous. Under VxWorks, applications play an active role in selecting and implementing graphics resolutions and refresh rates. See the Sentiris SDK for VxWorks for additional information.

Appendix B: Sentiris Connector Details

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



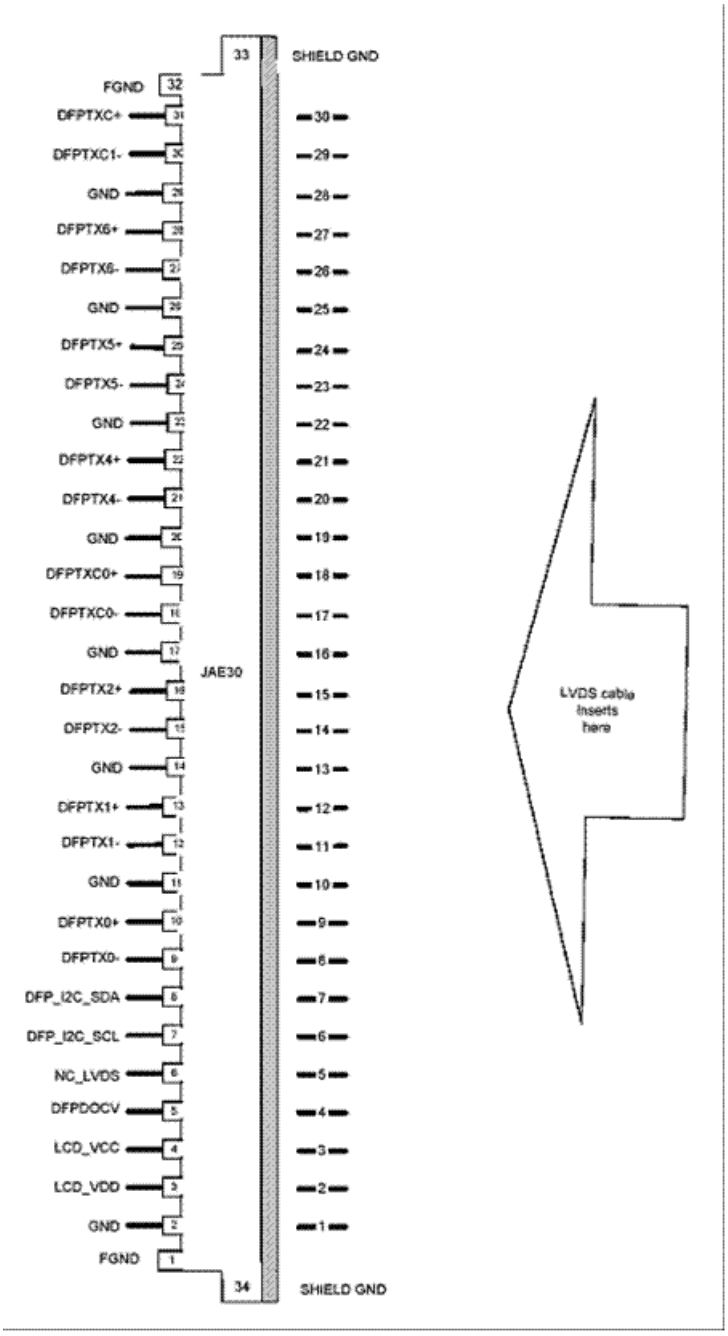
Board Designation	Connector (or equivalent)	Mating Connector
J1 (LVDS)	JAE FI-X30S-HFxx	JAE FI-X30M
J2 (DVI-I)	FORCE 52520-210129 NEWA 5250-010129	DVI-D cable, DVI-A cable, or DVI-D→RGB adapter e.g. TrippLite DVI-M/HDDB15F
J5 (SMB mini 75-ohm)	Johnson 131-8701-501	cable provided
J7 (SMB MINI 75-ohm)	Johnson 131-8701-501	cable provided
P1, P2 (PMC PCI)	PMC per IEEE 1386.1	PMC docking site per IEEE 1386.1
P4 (PMC User I/O)	PMC per IEEE 1386.1	PMC docking site per PMC IEEE 1386.1

LVDS (J1) Connector

The J1 low voltage differential signaling (LVDS) connector is based on the standard panel working group (SPWG) specification (http//www.displaysearch.com/SPWG). The signal assignments are:

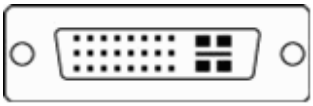
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



DVI-D Connector (J2)

The J2 (DVI-I) uses transition minimized differential signaling (TMDS) to provide digital outputs via its DVI-D pins and analog outputs via its DVI-A pins. One or the other of these outputs may be active through J2.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Subminiature B Connectors (J5 & J7)
Depending on the particular type of card you have (see below), the J5 and J7 (Video I/O) *Subminiature B (SMB)* connectors can be programmed to support S-Video and/or composite video. See **Which Card Do You Have** in the **Sentiris 4110 CV PMC Configurations** section of this manual.

PMC P4 Connector
The Sentiris CV03 and CV04 versions divert outputs to the PMC P4 connector which connects down to the host board.

On **Sentiris 4110 CV04**, LVDS outputs (only) go out through the P4 connector. The applicable signal assignments to pins are:

7	DFPTX1-	LVDS output data bit 1-
8	DFPTX0-	LVDS output data bit 0-
9	DFPTX1+	LVDS output data bit 1+
10	DFPTX0+	LVDS output data bit 0+
11	DFPTX4-	LVDS output data bit 4-
12	DFPTX2-	LVDS output data bit 2-
13	DFPTX4+	LVDS output data bit 4+
14	DFPTX2+	LVDS output data bit 2+
15	DFPTX5-	LVDS output data bit 5-
16	DFPTXC0-	LVDS output clock 0-
17	DFPTX5+	LVDS output data bit 5+
18	DFPTXC0+	LVDS output clock 0+
19	DFPTX6-	LVDS output data bit 6-
23	DFPTXC1-	LVDS output clock 1-
24	DFPTX7-	LVDS output data bit 7-
25	DFPTXC1+	LVDS output clock 1+
26	DFPTX7+	LVDS output data bit 7+

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

39	DFPTX3-	LVDS output data bit 3-
40	I2C2_SCL	I2C SCL line for LVDS output
41	DFPTX3+	LVDS output data bit 3+
42	I2C2_SDA	I2C SDA line for LVDS output

Depending on your cabling strategy, you may also want one or several ground signals to run through your cable. We've seen LVDS cables w it h differential pairs simply carried as twisted pairs, and also see ribbon cables with each matched pair separated from neighbors by a grounded shield conductor. We suggest matching the cabling strategy implemented by the "pig-tail" cable they supply for their display. Available ground signals on the P4 connector are:

5	GND	Ground
6	GND	Ground
32	GND	Ground
33	GND	Ground
36	GND	Ground
37	GND	Ground
38	GND	Ground
49	GND	Ground
51	GND	Ground
53	GND	Ground
55	GND	Ground
59	GND	Ground

The **Sentiris 4110 CV03**, diverts all input / output through the P4 connector. The applicable signal assignments to pins are

pin #	signal name	Description
1	TMDSCLK2-	TMDS output clock-
2	TMDSD0-	TMDS output data bit0-

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

3	TMDSCLK2+	TMDS output clock+
4	TMDSD0+	TMDS output data bit0+
5	GND	
6	GND	
7	DFPTX1-	LVDS output data bit1-
8	DFPTX0-	LVDS output data bit0-
9	DFPTX1+	LVDS output data bit1+
10	DFPTX0+	LVDS output data bit0+
11	DFPTX4-	LVDS output data bit4-
12	DFPTX2-	LVDS output data bit2-
13	DFPTX4+	LVDS output data bit4+
14	DFPTX2+	LVDS output data bit2+
15	DFPTX5-	LVDS output data bit5-
16	DFPTXC0-	LVDS ouit put clock 0-
17	DFPTX5+	LVDS output data bit5+
18	DFPTXC0+	LVDS output clock 0+
19	DFPTX6-	LVDS output data bit6-
20	I2C1_SCL	I2C SCL line for VGA and TMDS output
21	DFPTX6+	LVDS output data bit6+
22	sense	
23	DFPTXC1-	LVDS output clock 1-
24	DFPTX7-	LVDS output data bit7-
25	DFPTXC1+	LVDS output clock 1+
26	DFPTX7+	LVDS output data bit7+
27	I2C1_SDA	I2C SDA line for VGA and TMDS output

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

28	CIN	S-video Chroma Input Signal
29	CVBS_YIN	Compos it e video input or S-Video Luminance Input
30	CIN_rtn	S-video Chroma Input Return
31	CVBS_YIN_rtn	Compos it e video input or S-Video Luminance Input Rtn
32	GND	Ground
33	GND	Ground
34	TMDSD1+	TMDS output bit1+
35	TMDSD1-	TMDS output data bit1-
36	GND	Ground
37	GND	Ground
38	GND	Ground
39	DFPTX3-	LVDS output data bit3-
40	I2C2_SCL	I2C SCL line for LVDS output
41	DFPTX3+	LVDS output data bit3+
42	I2C2_SDA	I2C SDA line for LVDS output
43	COUT	S-video Chroma Output
44	MCRT1HSYNC_rtn	Horizontal Sync Return
45	COUT_rtn	S-video Chroma Output Return
46	MCRT1HSYNC	Horizontal Sync
47	CVBS/YOUT	Compos it e Video or S-Video Luminance Output
48	MCRT1VSYNC	Vertical Sync
49	GND	Ground
50	MCRT1VSYNC_rtn	Vertical Sync Return
51	GND	Ground
52	CVBS/YOUT_rtn	Compos it e Video or S-Video Luminance Output Rtn

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

53	GND	Ground
54	MDAC1BLUE_rtn	Analog Blue Return
55	GND	Ground
56	MDAC1BLUE	Analog Blue
57	DDC5V	DDC power
58	MDAC1RED_rtn	Analog Red Return
59	GND	Ground
60	MDAC1RED	Analog Red
61	TMDSD2-	TMDS output data bit2-
62	MDAC1GREEN_rtn	Analog Green Reture
63	TMDSD2+	TMDS output data bit2+
64	MDAC1GREEN	Analog Green

:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Appendix C: Retrofitting Display EDIDs

Why isn't my CRT / DFP recognized?

EDID display information

Contemporary graphics displays (attachable CRT and LCD panels) support a protocol for describing themselves, called EDID for extended device identification. When prompted, they will return a stream of bytes to a host controller giving a small wealth of information about the display resolution(s) and rates(s) are supported.

Display adapters like Sentiris, rely on the EDID response from the display device to confirm that the device is present. Failing to get a response send the graphics BIOS logic looking for an alternative display for its output.

If the target display does not support EDID, there are a couple of directions to go: adding (retrofitting) EDID support, or forcing assumptions about the display location, geometries, and tolerances. Implementing EDID for the display is preferable, as it portable and adaptive. The alternative, hard-coding display information in the host locks the application to a single display, but is also covered below in due course.

Implementing retro-EDID

The cleanest way to get Sentiris to talk correctly to the connected graphics display is to insure the display supports the EDID (extended device identification) protocol. This is a facility where a graphics display adapter (Sentiris in this instance) can query the graphics display as to its capabilities, using an I^2C bus incorporated in the interface.

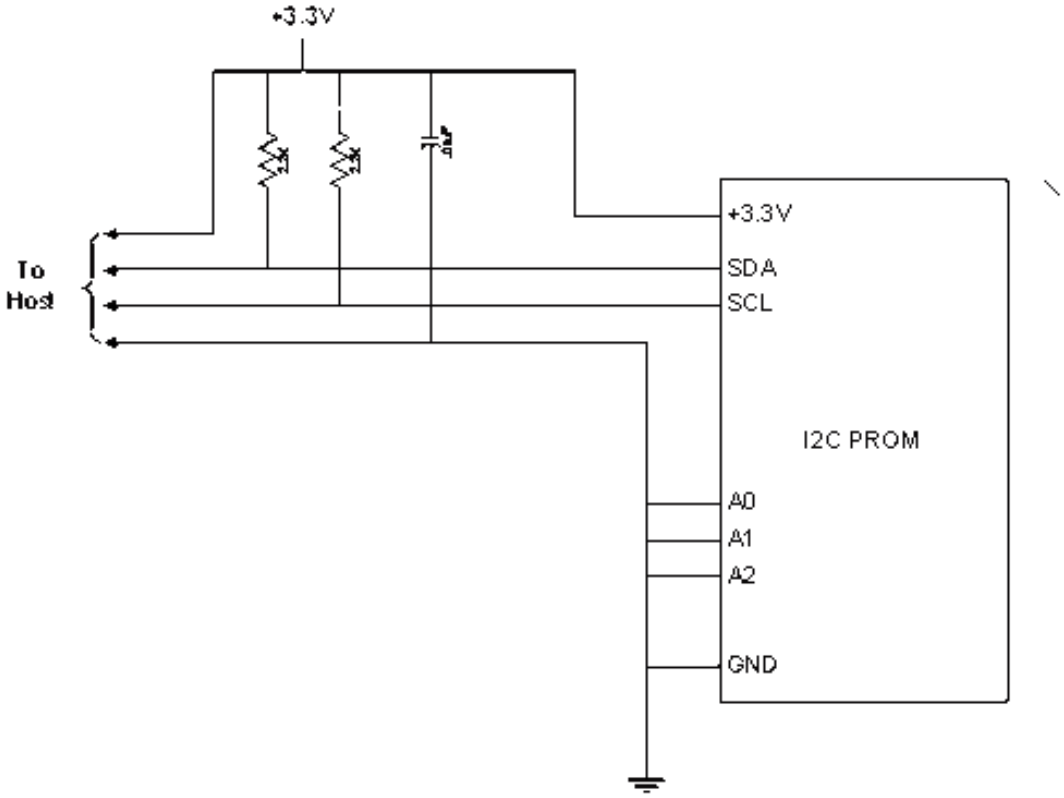
Older displays, including legacy embedded display components may not support EDID, but it's easy to add, requiring one IC and a couple of passive components. The design is simply an I^2C prom with some supporting logic:

RetroEDID Circuit Design

The design is simply an I^2C prom with some supporting logic. See a data sheet for a candidate I^2C prom at http://www.semiconductors.philips.com/pip/PCF8582C-2. Note that this device correctly responds to I^2C address A0-AE.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Appendix D: Acronyms

Acronym	Description	Web (If Applicable)
API	Application Program Interface is a well-defined application interface for programmatic access to the features of a supplied library	
CV	Convection Cooled.	
DDC	Display data channel, a **VESA** standard for a communications channel between a computer display and a host system, with the intent of allowing the display to relate its capabilities to the system, and for the system to make optimum use of the same.	www.vesa.org
DDWG	Digital Display Working Group, and open industry group including Intel, Compaq, Fujitsu, HP, IBM and more.	www.ddwg.org
DFP	Building upon the **P&D** standard (**VESA**) Digital Flat Panel is an electrical, signaling, and physical interconnection standard for connect digital panel displays to a host computer. Uses **TMDS** signaling and **DDC** and **EDID** standards for characterizing the attached device	www.vesa.org
DVI	Digital Visual Interface is a signaling, electrical and physical interconnect standard for connecting analog or digital display monitors to (principally PC) graphics controllers. PanelLink® is a registered trademark for such an implementation.	www.ddwg.org
EDID (E-EDID)	(Enhanced) Extended Display Identification Data defines data structures and protocol for a host computer to query capabilities from a suitably designed display monitor	www.vesa.org
FPD	Flat Panel Display	
GLX	GLX is a “glue” library (**API**) that provisions X Windows applications to employ OpenGL graphics for their 2D and 3D graphics rendering.	
GPU	Graphics Processing Unit	
LVDS	Low voltage differential signaling is a high-speed, low power data transmission standard canonized in ANSI/TIA/EIA-644-A Electrical. For graphics displays, LVDS usually implies a flat panel display conformant to Industry Standard Panel (ISP) set by the **SPWG** of the **DDWG**.	
Nano-X	Quantum3D’s implementation of a tiny subset of the X Windows standard, usable for hosting windowed OpenGL applications on Sentiris graphics. Usually accompanied by the GLX and OpenGL libraries to provide a full suite of capabilities to a hosted application.	
NTSC	National Television System Committee whose name became synonymous with the US domestic television signal of 525 stacked video lines drawn in alternating even and odd line fields at a rate of 59.94 Hz.	
OpenGL	**API** for developing portable, interactive, 2D & 3D graphics applications	www.opengl.org
OpenLDI	A minority standard for connecting digital monitors to host machine	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

	graphics with LVDS signaling, once championed by SGI	
P&D	(**VESA**) Plug and Display Standard defines a video interface which provides both digital and analog interfaces for video data, along with serial bus facilities for dialogs between the host computer and the display monitor.	www.vesa.org
PAL	Phase Alternating Line standard for television signals implemented in most European countries except France. Based on 625 lines per frame even/odd line field alternated at 50 Hz.	
PCI	Intel-developed standard I/O bus for connecting peripheral devices (boards) to a host computer. Amongst more capable variants, the base implementation is of a 32 bit bus clocked at 33 MHz.	
PMC	**PCI** Mezzanine Card is a mechanical and interface standard for hosting PCI device and device interfaces to a baseboard, typically a **SBC**	
Q3Deg	Quantum3D's companion library to the Sentiris OpenGL implementation. This API provides for enumerating and initializing displays, establishing window regions, and extra run-time functionality for OpenGL applications running in these windows.	
RGL	Realtime Graphics Library is an API for hosting windowed (or non-windowed) OpenGL graphics applications running on Sentiris graphics on real-time operating systems (RTOS) like VxWorks	
RTOS	Real Time Operating System	
SBC	Single Board Computer is a computer implementation on a single PCB board, usually including CPU, memory, I/O bridges, perhaps even disk and network interfaces on-board.	
SMB	Subminiature B type connector.	
SPAM	Distinctive canned luncheon meat derived from pork shoulder and ham, plus spices.	www.spam.com
SPWG	Standard Panel Working Group of the Digital Display Working Group (**DDWG**)	www.ddwg.org
S-Video	Short for Super-Video a means of transmitting video signals over a cable by dividing the video information in two separate signals: one for color (chrominance) and one for brightness (luminance) a.k.a. Y/C video.	
TMDS	Transition Minimized Differential Signaling is a leading electrical interface for sending digital data to a display monitor, and is defined by the DVI interface standard of the Digital Display Working Group	www.ddwg.org
VESA	Video Electronics Standards Association	www.vesa.org
VIP	Video Interface Port is a **VESA** standard for a dedicated port on a graphics display generator to accept video data from MPEG-2 decoders, video digitizers, broadcast receivers and the like.	www.vesa.org
VxWorks	WindRiver's realtime operating system (**RTOS**) popular for embedded computing applications. Application developers will also become familiar with their Tornado development environment.	www.windriver.com
X	X Windows is an implementation of a portable, windowed graphical user interface with matching **API**	www.X.org

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Printed By:Q3D Sales Printed On:10/26/2011 3:55:28 PM

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP