ForceWare Graphics Driver
User's Guide

Driver Release 60 for Windows
NVIDIA Corporation
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INTRODUCTION

This chapter discusses the following major topics:

About this Guide

This *user's guide* is addressed to users of the control panel-based NVIDIA®
ForceWare™ graphics display driver.

This guide focuses on the NVIDIA workstation products, i.e, graphics cards
based on the NVIDIA **GeForce™** series of **GPUs (graphics processing units**)
listed in Table 2.6, "Supported NVIDIA GPU-Based Graphics Cards".

For technical details on the features and benefits of the NVIDIA ForceWare
graphics driver, refer to the NVIDIA Web page — **www.nvidia.com**.

Other Related Documentation

- *NVIDIA ForceWare Graphics Driver: Quadro Workstation User's Guide* — **Release 60 driver version**. Refer to this document if you are primarily using the NVIDIA workstation products, i.e, graphics cards based on the NVIDIA Quadro® series of GPUs listed in Table 2.6, "Supported NVIDIA GPU-Based Graphics Cards".

- *NVIDIA ForceWare Graphics Drivers nView Desktop Manager User's Guide* — **Release 60 driver version.** Refer to this document if you are using the nView™ Desktop Manager application component of the ForceWare graphics driver.

- *NVIDIA ForceWare Graphics Driver: Release Notes* — **Release 60 driver version**. These Release Note documents describe performance improvements and software fixes in the ForceWare graphics drivers. Release notes also enable add-in-card (AIC) producers and original equipment manufacturers (OEMs) to monitor performance improvements and bug fixes in the driver.

Online Help

Context Help

You can obtain context Help for any of the settings on the NVIDIA Display control panel pages.

Also, when a setting is disabled (grayed out), placing the cursor on the setting provides "too tip" help indicating the reason it is disabled.

For complete details on Help and tool tips, see "Using the NVIDIA Display Menu Help and Tool Tips" on page 51.

NVIDIA Display Properties and nView Desktop Manager

The NVIDIA ForceWare graphics display driver includes two major control panel-based components: NVIDIA Display properties **and** nView Desktop Manager.

In general terms, "**nView**" represents a collection of multi-display technologies encompassing driver support, multi-display GPU architecture, and desktop management support.

- **NVIDIA Display** properties, the topic of this *user's guide,* refers to the control panel-based user interface from which you can configure the advanced display properties of the current release of the NVIDIA ForceWare graphics driver.

  For details on using the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46 .

- **nView Desktop Manager** is a user-level application utility that focuses on making you more productive when working on your Windows desktop. nView Desktop Manager was originally created for multi-display graphics cards but has grown to enhance single-display user desktops as well. Desktop Manager supports both single-display and multi-display configurations running with single-display, multi-display, or multiple graphics cards based on NVIDIA GPUs.

  For details on using nView Desktop Manager features, refer to the *NVIDIA ForceWare Graphics Drivers*: *nView Desktop Manager User's Guide*.

Key Terms and Concepts

analog display
Analog display refers to your CRT display device, in general. The terms CRT and analog display may be used interchangeably in this guide.

application
An application (or program) can have any number of windows. Some applications, such as Windows Calculator or Notepad, have only a single window. Other applications, such as Microsoft Outlook, can have many windows open — i.e., you can open several E-mail windows, have your Inbox open, open calendars, and so on.

Control Panel (Windows)
You can access the **Windows Control Panel** window by clicking **Start** > **Settings** > **Control Panel** from the Windows desktop taskbar.

control panel (NVIDIA Display)
The NVIDIA Display Properties "control panel" (shown in Chapter 4, Figure 4.7) refers to the entire NVIDIA GPU-tabbed window, including the fly-out NVIDIA menu.

control panel (nView Desktop Manager)

The nView Desktop Manager "control panel" refers to the entire nView Desktop Manager control panel window (tabbed style or NVIDIA menu style, as shown in Figure 4.7) from which you configure nView Desktop Manager settings.

Note: nView Desktop Manager is also a clickable icon in the Windows Control Panel group of icons. When you click this icon, the nView Desktop Manager "control panel" appears.

digital display

A digital display device can be a **digital flat panel (DFP)** or, for example, a mobile (laptop or notebook) computer's LVDS internal display panel.

desktop

Desktop is your Windows on-screen work area on which windows, icons, menus, and dialog boxes appear.

dialog box

Dialog boxes are user-input windows that contain command button and various options through which you can carry out a particular command or task.

For example, in a Windows application "Save As" dialog box, you must indicate the folder to contain the document to be saved and the name of that document when saving it.

Also see the definition of "modal dialog box" and "modeless dialog box" on this page.

dual-card configuration

A setup where two or more display devices (such as an analog display, a digital display, or a TV) are connected to two NVIDIA GPU-based graphics cards installed in the computer.

GPU

NVIDIA graphics processor (chip) products are called **graphics processing units (GPU)**. Supported NVIDIA GPUs are listed in "Hardware — Supported NVIDIA Products" on page 20. The graphics card you are using is based on an NVIDIA GPU.

modal dialog box

A dialog box that puts you in the state or "mode" of being able to work only in the dialog box. You can move a modal dialog box but cannot reposition it behind other application windows. You cannot make a modal dialog box inactive. You can only close the dialog box by clicking one of its buttons.

modeless dialog box

You can move a modeless dialog box, make it inactive and active again, and close it.

multi-graphics card configuration

A setup where two or more display devices (such as an analog display, a digital display, or a TV) are connected to two (or more) NVIDIA GPU-based graphics cards installed in the computer.

multi-display configuration

A setup where two or more display devices are connected to either a

- multi-display NVIDIA GPU-based graphics card; *or*

- two (or more) NVIDIA GPU-based graphics cards.

single-display configuration

A setup where only one display device is connected to the NVIDIA GPU-based graphics card in your computer.

window

A window is any independent window on your desktop. Applications such as Microsoft® Windows® Outlook® or Explorer may have several windows which are all part of the same application. Windows can be dragged around the screen, opened and closed, and resized.

The nView Desktop Manager application (described in the *NVIDIA nView Desktop Manager User's Guide*) allows you to do even more with windows such as make them transparent or force them always to be on top of other windows.

Release 60 Enhancements

Latest GPU Support

The ForceWare Release 60 graphics drivers support the newest generation of NVIDIA GPUs, including

• Improved vertex and pixel compilers

• Video shaders

PCI Express Support

ForceWare Release 60 offers 2D and 3D graphics driver support for the PCI Express I/O, including:

• DirectX support

• Enhanced OpenGL support included improved texture memory management and bandwidth utilization

Enhancements in Driver Performance

• Enhanced Robustness

  The ForceWare Release 60 graphics driver offers more robust stability and compatibility in DirectX support, antialiasing, and desktop rotation.

  With the launch of the NVIDIA ForceWare Release 60 graphics driver, NVIDIA has modified the Performance & Quality control page to more accurately represent the driver settings. You now have full control over image quality (see "Image Settings" on page 115), anisotropic optimization (see "Anisotropic Optimization" on page 120), and trilinear optimization (see "Trilinear Optimization" on page 121) in Direct3D and OpenGL applications.

• Reduction of **online crash analysis (OCA)** issues

• Dynamic video memory streamlines operating system resources for large frame buffer configurations.

3D Graphics API Enhancements

Direct3D

• DirectX 9.0c support

OpenGL

• New drivers for the **OpenGL ARB shading language (GLSL)**

• Enhanced support for Windows XP 64-Bit Edition and IA32-E

• New extensions

   • `GL_NV_fragment_program2`

   • `GL_EXT_blend_equation_separate`

   • `NV_vertex_program3`

   • `ATI_draw_buffers`

   • `ATI_texture_float`

   • `ATI_texture_mirror_once`

   • `GL_ARB_texture_non_power_of_two`

   • `GL_NVX_centroid_sample`

   • `GL_NVX_conditional_render`

C H A P T E R

2

SYSTEM REQUIREMENTS

This chapter contains the following major sections:

System Requirements and Support

This section contains the following topics:

Operating Systems

This release of the NVIDIA ForceWare Graphics Driver driver is designed for the Microsoft Windows operating systems listed in Table 2.1.

Table 2.1   Operating System Requirements

Operating System	Minimum Requirements
Windows XP Home Windows XP Professional Windows XP Media Center Edition Windows XP Media Center Edition 2004	
Windows Server 2003 SP1 for 64-Bit Extended Systems Windows XP 64-Bit Edition for 64-Bit Extended Systems	
Windows 2000	
Windows NT 4.0	Service Pack 6
Windows Me	
Windows 98	Microsoft DirectX™ 5

Note: Windows 98 and Me are collectively called Windows 9*x* in this guide.

Minimum Hard Disk Space

The minimum hard disk space requirements for each operating system are listed in Table 2.2, Table 2.3, and Table 2.4.

Table 2.2   Hard Disk Space Requirements — English

Operating System	Minimum Disk Space Required
Windows XP	21.1 MB
Windows 2000	19.2 MB
Windows NT	15.0 MB
Windows Me	18.7 MB
Windows 98	19.3 MB

Table 2.3   Hard Disk Space Requirements — Non-English Languages

Operating System	Minimum Requirements
Windows XP	24.9 MB
Windows 2000	24.9 MB
Windows NT	24.8 MB

Table 2.3   Hard Disk Space Requirements — Non-English Languages

Operating System	Minimum Requirements
Windows Me	24.8 MB
Windows 98	24.8 MB

Table 2.4   Hard Disk Space Requirements — Full International Package

Operating System	Minimum Requirements
Windows XP	34.2 MB
Windows 2000	34.2 MB
Windows NT	29.4 MB
Windows Me	33.0 MB
Windows 98	33.0 MB

Software — NVIDIA Graphics Driver

Make sure the current version of the NVIDIA ForceWare graphics display driver for your Windows operating system has been installed on your computer.

Note: Consult your System Administrator if you are unsure about the version that is installed.

Hardware — Supported NVIDIA Products

Table 2.5 and Table 2.6 list the NVIDIA GPU-based integrated systems and the NVIDIA GPU-based graphics cards, respectively, that are supported by the NVIDIA graphics driver.

Table 2.5   Supported NVIDIA GPU-Based Integrated Systems

NVIDIA Integrated System	Core GPU-based Graphics Card	Number of Displays Supported per GPU-based Graphics Card
nForce^{TM}2 S nForce2 ST nForce2 G nForce2	GeForce4 MX	**2**— applies to all GPUs in this category.
nForce 420/420D nForce 220/220D nForce	GeForce2 MX	**2**— applies to all GPUs in this category.

Table 2.6   Supported NVIDIA GPU-Based Graphics Cards

NVIDIA Desktop GPU-based Graphics Cards	NVIDIA Workstation GPU-based Graphics Cards	Number of Displays Supported per GPU-based Graphics Card
GeForce 6800 Ultra		**2** — applies to all GPUs in this category.
GeForce 6800	Quadro FX 4000	**2** — applies to all GPUs in this category.
GeForce PCX 5950 GeForce PCX 5750 GeForce PCX 5300 GeForce PCX 4300		**2** — applies to all GPUs in this category.
GeForce FX 5950 Ultra		**2** — applies to all GPUs in this category.
GeForce FX 5700 Ultra GeForce FX 5700 GeForce FX Go5700	Quadro FX 1100	**2** — applies to all GPUs in this category.
GeForce FX 5900 GeForce FX 5900 Ultra GeForce FX 5950	Quadro FX 3000	**2** — applies to all GPUs in this category.
GeForce FX 5200 Ultra GeForce FX 5200 GeForce FX Go5100 GeForce FX Go5200	Quadro FX 500 Quadro NVS 280 PCI	**2** — applies to all GPUs in this category.
GeForce FX 5600 Ultra GeForce FX 5600 GeForce FX 5600 SE GeForce FX Go5600	Quadro FX Go700	**2** — applies to all GPUs in this category.
GeForce FX 5800 Ultra GeForce FX 5800	Quadro FX 2000 Quadro FX 1000	**2** — applies to all GPUs in this category.
GeForce4 Ti 4800 GeForce4 Ti 4800 SE GeForce4 Ti 4200 GeForce4 4200Go	Quadro4 980 XGL Quadro4 780 XGL Quadro4 Go700	**2** — applies to all GPUs in this category.
GeForce4 Ti 4600 GeForce4 Ti 4400 GeForce4 Ti 4200 GeForce4 440 Go GeForce4 420 Go GeForce4 410 Go	Quadro4 900 XGL Quadro4 750 XGL Quadro4 700 XGL	**2** — applies to all GPUs in this category.
GeForce3 GeForce3 Ti 500 GeForce3 Ti 200	Quadro DCC	**1** — applies to all GPUs in this category.

Table 2.6   Supported NVIDIA GPU-Based Graphics Cards (continued)

NVIDIA Desktop GPU-based Graphics Cards	NVIDIA Workstation GPU-based Graphics Cards	Number of Displays Supported per GPU-based Graphics Card
GeForce4 MX 440 GeForce4 MX 440 SE GeForce4 MX 420 x	Quadro4 580 XGL Quadro NVS 280 Quadro4 380 XGL	**2** — applies to all GPUs in this category.
GeForce4 MX 460 GeForce4 MX 440 GeForce4 MX 440-SE GeForce4 MX 420	Quadro4 550 XGL Quadro NVS 200	**2** — applies to all GPUs in this category.
	Quadro NVS 400	**4** — applies to all GPUs in this category.
GeForce2 Ti GeForce2 Ultra GeForce2 Pro GeForce2 GTS	Quadro2 Pro	**1** — applies to all GPUs in this category.
GeForce2 MX GeForce2 MX400 GeForce2 MX200 GeForce2 MX100 GeForce2 Go	Quadro2 MXR Quadro2 EX Quadro2 Go	**2** — applies to all GPUs in this category
GeForce 256	Quadro	**1** — applies to all GPUs in this category.
NVIDIA RIVA TNT2™ Ultra NVIDIA RIVA TNT2 Pro NVIDIA RIVA TNT2 NVIDIA RIVA TNT2 M64 NVIDIA Vanta™ NVIDIA Vanta LT	---	**1** — applies to all GPUs in this category.
NVIDIA RIVA TNT™	---	**1** — applies to all GPUs in this category.

Supported Languages

The following languages are supported in the NVIDIA Display control panel pages:

English (USA)	Czech	German	Japanese	Portuguese (Euro/Iberian)
English (UK)	Danish	Greek	Korean	Russian
Arabic	Dutch	Hebrew	Norwegian	Slovak
Chinese (Simplified)	Finnish	Hungarian	Polish	Slovenian
Chinese (Traditional)	French	Italian	Portuguese (Brazil)	Spanish
Spanish (Latin America)	Swedish	Thai	Turkish	

Notes on Feature and Configuration Support

Feature Support

- To access features on the nView Display Mode page (see "nView Modes" on page 55), you need:

  - a multi-display graphics card based on any of the NVIDIA GPUs that support multiple displays on a single card, as indicated in Table 2.1, *and*

  - at least two display devices connected to the card.

- When running with multiple graphics cards (i.e., two or more NVIDIA GPU-based graphics card are installed in your computer), ensure that the same version of the NVIDIA ForceWare graphics display driver is installed for each card. For a detailed discussion of using multi-display nView modes, see "Using nView Multi-Display Modes" on page 53.

- Some NVIDIA Display and nView Desktop Manager features are supported by either single-display or multi-display NVIDIA GPU-based graphics cards. Therefore, to access features that are supported by single-display configurations, you only need a singe display device connected, provided that the particular NVIDIA GeForce-based graphics card supports these features.

- The settings available on the NVIDIA Display control panel pages may vary depending on the specific NVIDIA GeForce GPU-based graphics card you are using. For example, settings that are available for a specific graphics card, such as one that is GeForce FX 5900 Ultra-based, may not be available on a

C H A P T E R

3

NVIDIA FORCEWARE GRAPHICS DISPLAY DRIVER — FEATURE HISTORY

This chapter provides information on the previous releases of the NVIDIA ForceWare graphics display driver and summarizes the features and enhancements that have been introduced in each release.

The following major topics are discussed:

N V I D I A   C o r p o r a t i o n

Driver Release History

Release 60 is the latest release of the NVIDIA ForceWare graphics display driver for Windows. Table 3.1 includes a summary of previous driver releases and the versions associated with them.

Note: Some versions listed may not have been released outside of NVIDIA.

Table 3.1   NVIDIA Graphics Drivers for Windows

Driver	Name	Versions	Comments
Release 60	ForceWare	60.50 – 60.*xx*	Releases ongoing
Release 55	ForceWare	55.xx – 57.xx	Releases ongoing
Release 50	ForceWare	50.x – 5x.x	Releases ongoing
Release 40	Detonator FX	43.45, 45.23	
Release 40	Detonator 40	40.*xx* – 43.44	Releases ongoing
Release 35		35.*xx* – 36.xx	Releases ongoing
Release 25	Detonator XP	26.00 – 29.42	Releases ongoing
Release 20	Detonator XP v2*x*.*xx*	21.83 – 23.xx	
Release 10	Detonator 3 v1*x*..*xx*	10.00 – 17.xx	
Release 6	Detonator 3	6.09 – 8.*xx*	
Release 5	Detonator 2	5.00 – 5.*xx*	

Release 60 Enhancements

See "Release 60 Enhancements" on page 16.

Release 55 Enhancements

The NVIDIA ForceWare Release 55 version of the graphics driver offers new features not found in previous releases of the NVIDIA driver. The following sections highlight the new features in Release 55.

PCI Express Support

2D and 3D graphics drivers support PCI Express I/O.

PAE Support

2D and 3D graphics driver support systems that utilize **physical address extensions (PAE)[1]**.

nView Desktop Manager Enhancements

- Seamless nView support between 32-bit and 64-bit processes on Windows 64-bit Edition
- **Dual NVKeystone™** support for independent keystone trapezoids under nView Span modes
- Per-display desktop management

1. PAE is an extension that enables Intel compatible computers to address more than 4 GB of physical memory.

User Interface Enhancements

- New application profiles capability lets you associate a collection of driver settings, such as antialiasing and display quality settings, with an application.
- Easy access stand-alone control panel, independent of the Microsoft Display Properties page.
- Improved support for multiple graphics card installed in one system
- Improved TV and HDTV controls

Video Support Enhancements

- Advanced de-interlacing and inverse 3:2 pull-down capability
- Enhanced HDTV and Windows Media Center support

3D Graphics API Enhancements

Direct3D

- Improved antialiasing performance
- Improved shaders

OpenGL

Note: Most of these OpenGL features are limited to the **NVIDIA Quadro series of GPUs**.

- The following new extensions have been added:
  - GL_NV_pixel_buffer_object
  - WGL_ARB_ make_current_read

- ARB_precision_hint_fastest

- Improved 64-bit operating system support

- Improved **High Resolution Scalable Desktop (HRSD)** mode support — *only* for Quadro-based graphics cards

Release 50 Enhancements

The Release 50 driver offers new features not found in previous releases of the NVIDIA Driver for Windows.

New Feature Highlights

64-bit Support

NVIDIA Driver Release 50 offers AMD64 and IA64 operating system support.

Dynamic Memory Mapping

Dynamic memory mapping adds support for 256 MB graphics cards for video, display, and OpenGL drivers.

NVIDIA Unified Driver Architecture

As today's GPUs become more and more programmable they are entering a similar era to that of the CPU. For CPUs, it is common for developers to implement code paths specifically optimized for AMD or Intel (e.g., MMX and 3DNow!). Programmable GPUs are no different. Because architectures vary, it makes sense that one common assembly language can't cover all the nuances of specific GPU micro-architectures. In fact, different code paths make different GPUs go faster. As a result with the GeForce FX architecture, NVIDIA has implemented a GPU-specific compiler that can be used to optimize application performance.

Display Driver Changes — New Features

- **Rotation (NVRotate™)** support for Windows Me/9*x*

- **Custom resolutions** enable you to construct new modes using the NVIDIA Display control panel.

- **Dynamic EDIDs** updates the master mode list with new modes contained in the connected device's EDID.

- **Support for special flat panels and devices**

- Large panels
- Wide panels
- Seamless nView Span modes included in the mode list to support T221 style large panels
- DVI device hot plugging
- **Frame Lock** functionality for synchronizing applications across multiple displays (*only a*pplies to Quadro FX 3000G-based graphics cards)
- **Edge Blend** functionality for blending the adjacent edges of overlapped displays on projection systems (*only a*pplies to Quadro FX 3000G-based graphics cards)

Video — New Features

- **VMR (Video Mixing Renderer)** support for full-screen video
- Support for Windows Media Center's playback and recording features

PowerMizer — New Features

- Dynamic peak power control
- Thermal Protection v2.0

User Interface Changes

- Dualview support
- Change Resolution page
- Edge Blending and Desktop Overlap page
- Frame Lock page
- New Color Correction page with enhanced gamma setting
- Video BIOS flash utilities
- ATL client page
- Menus for NVIDIA user components
- Device selection drop-down options in the NVIDIA slider tray menu
- NVIDIA Display control panel access for non-Administrator users
- Tool tips for the NVIDIA slider tray menu
- Performance and Quality Settings page

- TV-Out settings

- Device selection

- Overlay settings

- Full Screen video controls

nView Desktop Manager

- Action toolbar

- Kinematic mouse actions

- Resolution per desktop support

- Application monitor exclusions and inclusions

- Internet Explorer pop-up prevention

- Monitor grids

- NVKeystone luma compensation

- Multiview support for Quadro NVS-based GPUs

- nViewCmd

- NVManagement

- Faster desktop switching

- Integrated control panels

- New Setup Wizard

- Driver independence

DirectX Graphics

- Floating point render targets

- Multi-element textures

- Improved antialiasing compatibility

- Improved shader handling and stability

- Improved render-to-texture performance

OpenGL

- Windows 9*x* rotation (NVRotate) support

- New extension supported: `GL_ARB_occlusion_query`

- Faster vertex processing pipeline—Improved geometry processing and display list support

- Faster vertex and fragment program compilers

- Improved support for **ARB_vertex_buffer_object (vbo)** extension

- Improved stability during mode switches, antialiasing, and unified back/depth buffer

- Faster texture downloads

Release 40 Enhancements

This section provides a summary of the new features and enhancements provided with the NVIDIA Release 40 drivers for Windows. In addition to overall performance and stability improvements, the following are the specific areas that have undergone significant changes:

Enhanced Graphics Driver, DirectX, and Video Capabilities

Windows XP SP1

- Release 40 supports Windows XP SP1, Windows Media Center Edition, and Windows XP Tablet computer.

- Release 40 provides support for bugcheck EA callbacks, enabling OCA EA failures to be resolved more quickly while assisting to identify failure causes—such as due to chip instability or overclocking.

Temperature Settings

Note: Temperature Settings features are available with GeForce FX and later NVIDIA GPUs *and* on certain older NVIDIA GPUs *only if* a specific registry setting has been enabled on the computer.

Temperature Settings features let you adjust the temperature of the selected NVIDIA GPU on your computer. See "Adjusting Temperature Settings" on page 142 for details.

Direct 3D Vertical Sync Settings

Vertical Sync settings for Direct3D™ specify how vertical synchronization is handled in Direct3D applications.

NVRotate

NVRotate™ [2] is a desktop rotation feature that lets you rotate your desktop by 90, 180, or 270 degrees.

For further details, see "Enabling NVRotate Settings" on page 140.

- **Controls —** Desktop rotation is controlled through the NVIDIA Display control panel, or integrated seamlessly with Windows XP Tablet computer.

- **Graphics API support —** NVRotate includes support for windowed and full-screen applications in all rotation modes for Direct3D and OpenGL[®] application.

- **Hardware platforms —** Rotation functionality is supported on desktop, mobile, and Tablet PCs.

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2. Rotation is not supported on graphics cards based on the NVIDIA TNT, TNT2 or Vanta product families.

DirectX 9 Support

When Microsoft releases DirectX™ 9 runtime, Release 40 will provide support for DirectX 9, which includes the new vertex shaders, antialiasing modes, and multi-display device support.

Video Enhancements

Changes in the video driver include:

• Flip Sync functionality support

• Support for multiple Macrovision clients

• Simplified Video Mirror feature controls

TV Screen Size Support

Depending on the TV encoder used, Release 40 supports the adjustment of the TV screen up to a DVD-optimal mode. This setting is accessible through the NVIDIA Display control panel.

For further details, see "Device Adjustments — TV Output" on page 84.

Additional Enhancements

• Improved support for wide-aspect ratio screen resolutions.

• Improved memory management support for Dualview.

• Improved memory management support for OpenGL.

NVIDIA Display Control Panel — New User Interface

New NVIDIA Display Control Panel

The NVIDIA Display control panel pages have been redesigned to improve control over the display adapter settings and make navigation easier.

Some of the new features include the following:

• A menu in the form of a "slider tray" that allows all pages to be available from the top level page.

• Dynamic tracking allows the pages to adapt to the state of the driver, and user interface controls are modified, or even created, accordingly.

• Driver configuration changes are maintained across driver installations.

nView Desktop Manager —— Enhancements and New Features

Feature Enhancements

The following features have been enhanced in the new version of NVIDIA nView Desktop Manager:

- **Operating system support** includes Windows NT® 4.0, Windows 98/Me, and Windows 2000/XP.

- **Profile feature** — Display modes are now saved to and loaded from each profile. (This feature is not available in Windows NT 4.0.)

- **Multiple desktop support** additions include:

  - Support for multi-display wallpaper selection

  - Graphical display in explorer shell extension

  - Support for icons to represent desktops

  - Support for arbitrary positioning of windows on the desktops

  - Zoom Support includes new "Fixed-Frame zoom" and "Bi-Directional" zoom editing capability

New Features

The following features are new to the current version of the nView Desktop Manager:

- **Task switcher** — When enabled, nView Desktop Manager adds a desktop switcher in addition to the standard application tab switcher. By default, this additional "switch desktop" functionality is accessed through a **Alt-~** keystroke combination which you can change through settings in the Desktop Manager Hot Keys page.

- **Color-keyed windows** allows the user to color key windows for easy identification when activating them on the desktop.

- **NVKeystone™** allows real-time image correction on portable projectors and heads-up displays.[3]

  For example, NVKeystone can be set to compensate for keystoning effects on your windows display, allowing you to fix distorted projection images. This feature is primarily for mobile (notebook) computers.

- **Taskbar and menu transparency**

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[3] NVKeystone is not supported on graphics cards based on the TNT, TNT2 or Vanta product families

- **New window actions**, such as Collapse
- **New applications settings,** including a full set of application launch and disable settings.

OpenGL Enhancements

OpenGL 1.4 ICD with NVIDIA Extensions

- New extension includes ARB_vertex_program, which co-exists with NV_vertex_program
- Meets new conformance tests

Additional OpenGL Enhancements

- **Multi-Display Improvements**

  New accelerated spanning mode is enabled by default.

- **Reduced Power Consumption —** Release 40 utilizes CPU cycles more efficiently, resulting in reduced power consumption without sacrificing performance.

- **Dynamic AGP/Video Memory Management**
  - Accommodates multiple applications open at the same time
  - Dynamic Memory Resizing

- **Allowance for additional memory tuning.**

Release 35 Enhancements

The Release 35 driver offers new features not found in previous releases of the NVIDIA graphics driver.

- **NVRotate —** The NVRotate feature lets you view your Windows desktop in Landscape or Portrait mode. You can rotate desktop by 90, 180 and 270 degrees.

  For details on using this feature, see "Enabling NVRotate Settings" on page 140.

- Improved and expanded **NVIDIA nView Desktop Manager** application

  nView Desktop Manager has now been redesigned with a convenient user interface and many new features and utilities designed to solve specific problems for users. Utilities such as anti-keystoning support and flat panel

display calibration screens and utilities have been designed to improve windows multi-display usability.

For example, **NVKeystone** can be set to compensate for keystoning effects on your windows display, allowing you to fix distorted projection images. This feature is primarily for mobile (notebook) computers.

Release 25 Enhancements

The Release 25 driver offers new features not found in previous releases of the NVIDIA graphics driver for Windows. These features are:

- **nView,** the next-generation of the former "TwinView" feature, is the latest multi-display technology encompassing driver support, multi-display GPU architecture, and desktop management support.

- **nView Desktop Manager** is a desktop management engine for application window management, extension of application functions, and support of multiple desktops.

  Note: Desktop Manager has been significantly redesigned from its previous TwinView version. nView Desktop Manager is now a separate item on the Windows Control Panel group. You can click this item to access the Desktop Manager configuration tabs and windows.

- **NVIDIA Display Properties** (the topic of this guide) now offers improved features for multi-display functionality, including Clone modes and Horizontal and Vertical Span modes.

- **Dualview support** for Windows 2000

- **Improved DirectX Video Acceleration (DXVA)**

- **Special support for NVIDIA GPUs in the GeForce4 (Quadro4) family**
  - IDCT support for DirectX VA
  - Improved antialiasing compatibility and performance

- **Enhanced 3D Stereo functionality**
  - Support for lenticular lenses on LCDs (liquid crystal displays)
  - Stereo DIN connector support
  - VSync Off with 3D Stereo
  - Stereo API for developers

- **OpenGL enhancement**
  - New `render_to_texture` extension

Release 20 Enhancements

The Release 20 driver offered new features not found in previous releases of the NVIDIA graphics driver for Windows.

- OpenGL 1.3 ICD with NVIDIA extensions

- OpenGL performance optimizations

- Optimized DirectX pipeline with NVIDIA pixel and vertex shaders

- Full support for Windows XP, including:

  - full hardware acceleration for Windows XP user interface features *and*

  - accelerated Windows XP 3D performance through the NVIDIA XPress Link technology.

Release 10 Enhancements

The Release 10 driver offered new features not found in previous releases of the NVIDIA graphics driver for Windows.

- Support for Microsoft DirectX 8

- Support for Microsoft DirectX VA 1.0

- NVIDIA 3D Stereo (requires installation of the "optional" Stereoscopic driver). The driver provides stereoscopic viewing capabilities for games and still images.

- Special support for the following NVIDIA GeForce3 (Quadro DCC) capabilities:

  - Pixel and vertex shader support for DirectX 8 and OpenGL.

  - NVIDIA Quincunx™ antialiasing setting for enhanced image quality and performance.

- AMD Athlon and Intel Pentium 4 processor optimizations

- Improved TwinView interface

Release 6 Enhancements

The Release 6 driver offered new features not found in previous releases of the NVIDIA graphics driver for Windows.

- "TwinView" on page 37
- "Digital Vibrance Control" on page 38
- "OpenGL" on page 38
- "Direct3D" on page 38
- "Cursor Trails Support" on page 38
- "Windows Display Properties – Settings – Advanced Tabs" on page 38

TwinView

TwinView is a Release 6 *and later* feature that supports connecting dual displays using an NVIDIA GPU-based multi-display card.

TwinView includes major features such as the *Virtual Desktop*, *Video Mirror*, and *Desktop Manager*.

TwinView supports a variety of display settings, such as digital flat panels, red-green-blue (RGB) displays, TVs, and analog flat panels and display modes; i.e., Standard, Clone, and Span.

Virtual Desktop

Virtual Desktop is a TwinView feature that is useful for flat panels and analog display with limited resolution. Virtual Desktop is used to set a larger than viewable area on the second display, which supports full pan-and-scan of the entire desktop area. Currently, Virtual Desktop functionality is available under the following operating systems and modes:

- Windows NT 4.0 and Windows 2000 in TwinView Standard or Clone mode
- Windows 9*x* in TwinView Clone mode

Video Mirror

Video Mirror is a TwinView feature that allows a video or DVD application to mirror its playback in full-screen mode on any one of the connected display devices. In other words, Video Mirror allows video data that's displayed on a hardware overlay to be displayed at full-screen on a secondary display. Currently, Video Mirror functionality is available under

- Windows 2000 in TwinView Clone mode

• Windows 9*x* in TwinView Clone or Span mode

Desktop Manager
See description of "NVIDIA Display Properties and nView Desktop Manager" on page 12

Digital Vibrance Control

Digital Vibrance Control™ (DVC), a mechanism for controlling color separation and intensity, boosts the color saturation of an image. DVC is supported by the GeForce2 MX (Quadro MXR) and later series of NVIDIA GPUs.

OpenGL

The NVIDIA OpenGL Settings page contains the following changes:

• Improved full-scene antialiasing methods
• Additional settings for Windows 2000 and Windows NT 4.0
  • Force 16-bit Depth Buffer
  • Enable Advanced Multiple Monitors

Direct3D

The NVIDIA Direct3D Settings page contains the following changes:

• Improved full-scene antialiasing methods not previously available
• Removed certain obsolete settings

Cursor Trails Support

Release 6 for Windows provides support for cursor trails in Windows 9*x*.

Windows Display Properties – Settings – Advanced Tabs

TwinView, Digital Vibrance Control, OpenGL, and Direct3D features have associated NVIDIA-specific tabs from which the above-mentioned features can be configured.

Release 5 Enhancements

The Release 5 driver offered new features that were not found in previous releases of the NVIDIA graphics driver for Windows.

- "OpenGL" on page 39
- "Direct3D" on page 40
- "Display Properties – Settings – Advanced Tabs" on page 41

OpenGL

Changes have been made to the core, extensions, performance, and available features of OpenGL.

OpenGL 1.2 Core

Release 5 adds all the features that constitute the OpenGL 1.2 core capabilities:

- BGRA pixel formats
- Packed pixel formats (plus R5_G6_B5 formats and reversed formats)
- Rescaling vertex normals
- Specular highlights after texturing
- **Level-of-detail (LOD)** control for mipmapped textures (supported in software on TNT2)
- Texture coordinate edge clamping
- 3D textures (performed in software on all platforms)
- Vertex array subranges for optimizing vertex array processing (`glDrawRangeElements()` retains the performance of `glDrawElements()`)

OpenGL Extensions

The OpenGL extensions in Table 3.2 were added or changed in Release 5.

Table 3.2   Openly Extensions Modified in Release 5

Extension	Status	Comment
`ARB_texture_cube_map`	New	Same as `EXT_texture_cube_map`
`ARB_texture_env_add`	New	Same as `EXT_texture_env_add`
`ARB_transpose_matrix`	New	
`GL_ARB_texture_compression`	New (5.16)	To replace `S3_s3tc`
`NV_blend_square`	New	
`S3_s3tc`	New	Deprecated

Table 3.2 Openly Extensions Modified in Release 5 (continued)

Extension	Status	Comment
EXT_clip_volume_hint	Removed	
EXT_cull_vertex	Removed	
GL_NV_light_max_exponent	Renamed	Was GL_EXT_light_max_exponent

OpenGL Performance Enhancements

A number of features are significantly improved in Release 5.

- For RIVA TNT and TNT2, polygon offset is faster.

- For GeForce 256 (Quadro), a number of improvements have been made:

  - glDrawPixels() and glReadPixels() have been made faster

  - Display lists use AGP memory for better performance.

  - Large texture sets are handled more efficiently by the texture manager.

  - Vertex arrays with two-sided lighting are faster.

  - Compiled vertex arrays are faster for primitives that use multi-textured TexCoord2f+Color4ub+Vertex3f.

  - Vertex array range extension is fully functional.

- Windows **Display Properties** > **Settings** > **Advanced** tabs enables accelerated full-scene antialiasing — GeForce/GeForce2 (Quadro/Quadro2 Pro)

- Multi-display hardware is accelerated on Windows 2000.

- GL_WGL_swap_interval extension can change VSync operation.

- VSync is on by default. (Default behavior is selectable from the NVIDIA OpenGL properties tab.)

- Default anisotropic filtering can be triggered by checking the anisotropic filtering box on the NVIDIA OpenGL properties tab.

- Enabling GL_POLYGON_SMOOTH no longer forces software rendering, resulting in much better performance at some cost in visual quality.

Direct3D

Release 5 contains the following Direct3D changes:

- Accelerated full-scene antialiasing is enabled (Quadro/Quadro2 MXR).

- Limited three-stage setup is now possible.

- D3DVTXPCAPS_MATERIALSOURCE7 capability bit is now disabled (leaving the driver with DirectX 6 material source capabilities)

The following Registry keys are useful for applications that do not blit correctly:

- FLUSHAFTERBLITENABLE is a new Registry key that controls the wait-after-blit condition when the DDBLT_WAIT flag is set.

  (Default is DISABLED—do not wait.)

  Note: This Registry key was formerly named WAITAFTERBLITENABLE.

- FORCEBLITWAITFLAGENABLE is a new Registry key that forces the DDBLT_WAIT flag to be set for all blits, which prevents applications that do not check the return value from unexpectedly losing blits.

  (Default is DISABLED.)

- LIMITMAXQUEUEDFBBLITSENABLE is a new Registry key that limits the maximum number of queued blits to the front buffer to a value set by the PRERENDERLIMIT Registry key, which is 3 by default.

  (Default is DISABLED.)

Display Properties – Settings – Advanced Tabs

NVIDIA now provides tabs (**Display Properties** >**Settings** > **Advanced**) for Windows NT 4.0 and Windows 2000.

C H A P T E R

4

NVIDIA DRIVER INSTALLATION AND CONTROL PANEL ACCESS

This chapter contains the following major topics:

Before You Begin

Note: In order to access the latest version of the NVIDIA Display menu and control panel, the latest version of the NVIDIA ForceWare graphics display driver for your Windows operating system must be installed on your computer.

- If you do not have System Administrator access privileges, it is assumed that the person with System Administrator access in your organization will set up and install the NVIDIA ForceWare graphics display driver on your computer.

- For details on configuring and using the nView Desktop Manager application component of the NVIDIA ForceWare graphics driver, see the *NVIDIA ForceWare Graphics Driver: nView Desktop Manager User's Guide*.

About the NVIDIA Graphics Driver Installation

NVIDIA graphics driver installation provides both an **.inf** file-based installation method and an InstallShield (**setup.exe**) Wizard-based installation method.

Note: Under Windows 2000, the NVIDIA graphics driver is installed in Span mode. If you are running under Windows 2000, you will need to follow additional steps to install and uninstall nView Dualview mode. For details, see "Installing nView Dualview Mode for the First Time — Windows 2000" on page 63 and "Enabling nView Dualview Mode After Initial Installation — Windows 2000" on page 65.

File Locations

- The installation process copies all necessary files for operation into the appropriate directories.

- The nView system files are copied to your **Windows\System** directory.

- nView Desktop Manager "profile" (**.tvp**) files are saved in the **Windows\ nView** directory. See "Preserving Settings Before Upgrading Your Software" on page 43.

  Note: Depending on the version of the NVIDIA driver previously installed, profiles may also be located in the **Documents and Settings\ All Users\Application Data\nView_Profiles** directory.

Preserving Settings Before Upgrading Your Software

Before uninstalling or installing software, your can preserve your nView Desktop Manager and/or NVIDIA Display settings by using the nView Desktop Manager **Profiles** features.

Note: Follow the steps below and/or refer to the *NVIDIA nView Desktop Manager User's Guide* for details. Under Windows XP/2000 and Windows NT 4.0, you must have, at least, **Power User** access privileges in order to create or save a profile. (Refer to Windows Help if you need an explanation of Power User access rights.)

Follow the steps below and/or refer to the *NVIDIA nView Desktop Manager User's Guide* for details.

1 Open the nView Desktop Manager Profiles page (Figure 4.1).

2 To preserve your current settings, you can use either the **Save** or the **New** option from the nView Desktop Manager **Profiles** page:

Figure 4.1   nView Desktop Manager — Sample Profiles Page
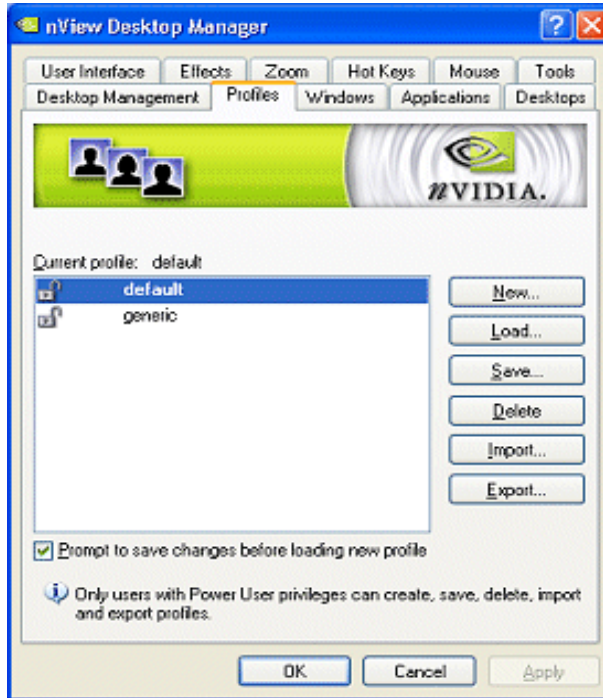
- If you want to *overwrite* the currently loaded profile with your changed settings, use the **Save** option. Notice that a warning message indicates that you are about to overwrite the selected profile.

- If you want to retain the currently loaded profile and want to save your changed settings to a new file, click the **New** option. Enter a name and description of the profile in the New Profile dialog box. For example, you can name this profile **My Settings**.

3 If you are an "advanced" user and want to customize certain settings in the saved profile, click **Advanced <<** to expand the dialog box (Figure 4.2).

4 To customize the settings, you can select or clear any of the settings check boxes.

5 Click **Save** to return to the main Profiles page.

If you created a new profile, you will see the name of the newly created profile in the profiles list.

If you overwrote a current profile, the same profile name is retained in the list.

Note: nView Desktop Manager profile (**.tvp**) files are saved in the **Windows\nView** directory. Depending on the version of the NVIDIA

driver previously installed, profiles may also be saved in the
**Documents and Settings\All Users\Application Data\
nView_Profiles** directory.

Figure 4.2   nView Desktop Manager — Save Profile Settings
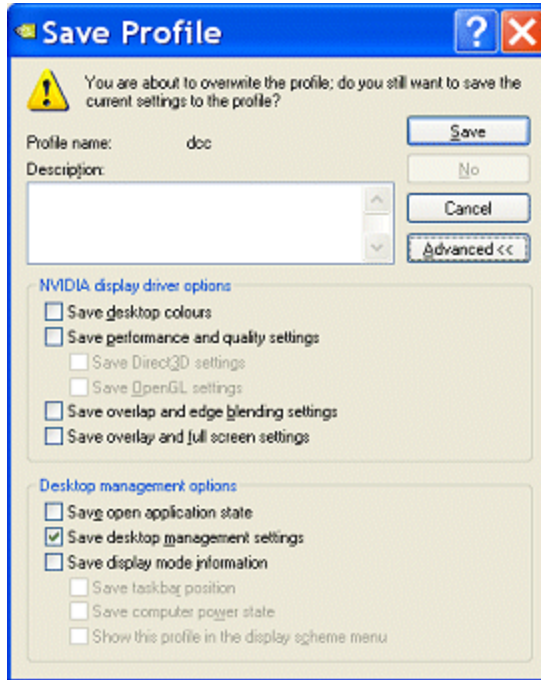
6 Now you can uninstall your current driver for a driver upgrade.

7 After you restart your computer following an NVIDIA new driver install, you
can easily load the saved profile from the **Profiles** page of nView Desktop
Manager.

About Using Saved Profiles in Another Computer

You can easily use any saved profile (**.tvp** file in the **Windows\nView**) from
one computer and use it in another computer, if you want. You'll need to copy it
to the **Windows\nView** directory of a computer that has the NVIDIA
ForceWare graphics display driver, etc. installed properly. Then this profile can
be loaded from another computer from the nView Desktop Manager Profiles
page just as it can from your original computer.

Uninstalling the NVIDIA ForceWare Graphics Display Driver

Note: It is strongly recommended that you follow the steps in this section to completely uninstall the existing NVIDIA driver installed on your computer before you install a new version of the driver.

To uninstall the NVIDIA ForceWare graphics display driver, follow these steps:

1 From the Windows taskbar, click **Start** > **Settings** > **Control Panel** to open the Control Panel window.

2 Double click the **Add/Remove Programs** item.

3 Click the **NVIDIA Display Driver** item from the list.

4 Click **Change/Remove**.

5 Click **Yes** to continue.

A prompt appears asking whether you want to delete all of the saved nView profiles.

- If you click **Yes**, all of the nView software and all of your saved profiles will be deleted.

- If you click **No**, the nView software is removed, but the profile file are saved in the `Windows\nView` directory on your hard disk.

Your system now restarts.

Accessing the NVIDIA Display Control Panel Pages

Once your NVIDIA ForceWare graphics display driver is installed, you can easily access the driver features from a convenient menu. You can quickly access the **NVIDIA Display** menu that gives you direct access to the NVIDIA Display control panel pages.

For quick access, you can use either the Desktop Access or the NVIDIA Settings Menu — Windows Taskbar Access access method, explained below.

Note: When needed, you can still access the NVIDIA Display control panel pages through the Microsoft Display Properties **Settings** > **Advanced** option. (See "Windows Display Properties Setting Access" on page 49.)

Desktop Access

1 Right click from your Windows desktop to open the desktop menu.

2 Click **NVIDIA Display** (Figure 4.3).

Figure 4.3   NVIDIA Display Option on the Windows Desktop Menu

3 Choose your display type that appears, based on the number and type of display device(s) that are connected to your computer. You will see one or more of these options:

- • **Analog display**

- • **Digital display**

- • **TV**

The NVIDIA Display control panel with menu appears (Figure 4.7).

NVIDIA Settings Menu — Windows Taskbar Access

1 Make sure you have added the NVIDIA Settings menu icon to your Windows taskbar notification area. For details, see "Adding the NVIDIA Settings Menu Icon to the Windows Taskbar Notification Area" on page 136.

2 From your Windows taskbar, click the NVIDIA Settings menu icon (Figure 4.4) to display the types of menus shown in Figure 4.5 and Figure 4.6.

Figure 4.4   NVIDIA Settings Menu Icon in the Windows Taskbar Notification Area

Windows Taskbar   └─NVIDIA Settings menu icon

Figure 4.5   NVIDIA Settings Sample Menu
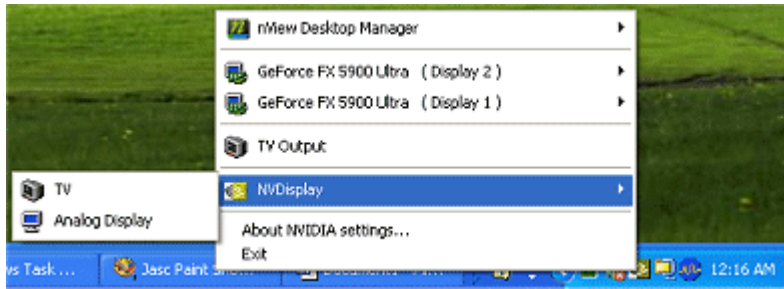
3 Click **NVIDIA Display** (Figure 4.5) and then select a display type that appears. Based on the number and type of display devices that are connected to your computer, you will see one or more of these options:

  • **Analog display**

  • **Digital display**

  • **TV**

4 Select a display type. The NVIDIA Display control panel appears (Figure 4.7).

Note: Figure 4.6 shows another view of the NVIDIA Settings menu. You can use this menu to quickly access the same NVIDIA ForceWare graphics display driver-based settings that you can access in the regular NVIDIA Display menu shown in Figure 4.7.

Figure 4.6   NVIDIA Settings — Sample Menus with Four Graphics Cards Connected
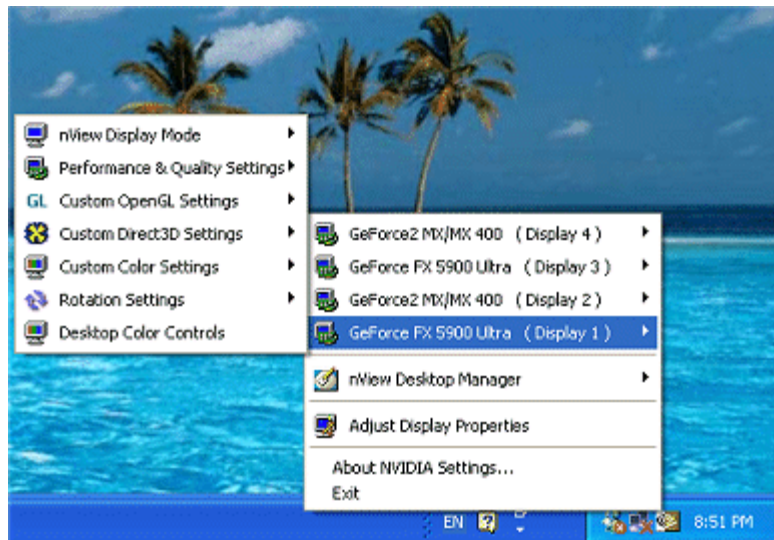
Windows Display Properties Setting Access

You can still access the NVIDIA Display control panel through the Microsoft Display Properties **Settings** > **Advanced** option, if needed.

1 Right click from your Windows desktop to open the desktop menu.

2 Select **Properties** and then the **Settings** tab.

3 Click **Advanced** and then click the NVIDIA GPU tab.

The NVIDIA Display control panel with menu appears (Figure 4.7).

Using the NVIDIA Display Menu

From the NVIDIA Display menu (Figure 4.7), you can access all the NVIDIA Display control panel pages where you can configure the NVIDIA driver features listed below.

To view any of the NVIDIA Display control panel pages, simply click a menu name from the NVIDIA Display menu.

To toggle between hiding and showing the menu, click the green button on the NVIDIA menu, as shown in Figure 4.7.

To see the entire content of the longer menu names in on the NVIDIA Display menu, you can use the scroll bar or use the tool tip feature. See "Tool Tips" on page 52 and Figure 4.7.

• **nView Display Mode**. This menu option *does not appear* if you have only one display device attached. It appears only when you have more than one display device attached. For complete details on using the nView Display Modes features, see the next chapter "Using nView Multi-Display Modes" on page 53.

• **Performance and Quality Settings**

• **Overlay Controls**

• **Full Screen Video**

• **NVRotate**

• **Temperature Settings**. This option is available on newer GPUs, such as GeForce FX, and on certain older GPUs.

• **Refresh Rate Override**

Figure 4.7   NVIDIA Display Menu — Displayed and Hidden

To view the full name
of any obscured long
menu, rest your mouse
pointer on the name.

**NVIDIA Display
menu**

Click the green button
to **hide** the NVIDIA
Display menu.

.

Click this **green
button** *or* the
Additional Properties
button to show the
NVIDIA Display
menu.
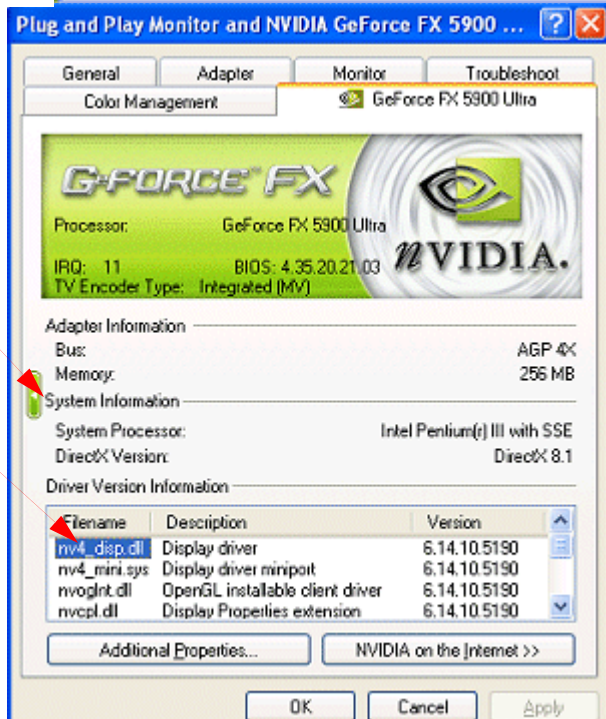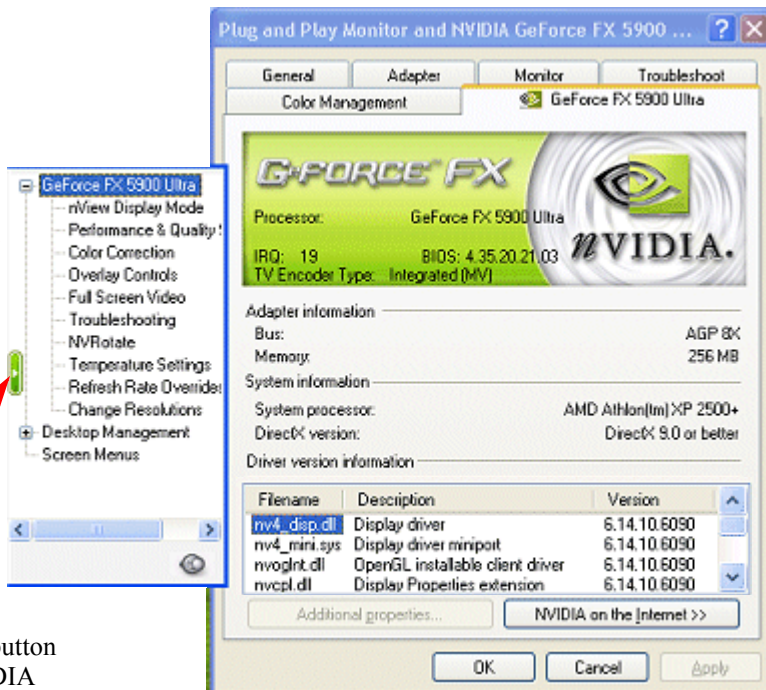
- **Change Resolution**
- **Desktop Manager**
- **Screen Menus**
- **Troubleshooting**

Using the NVIDIA Display Menu Help and Tool Tips

Context Help

You can obtain context Help (Figure 4.8) for any of the settings and options on the NVIDIA Display control panel page by using any *one* of these methods:

- Select or move your mouse pointer to the option for which you want help and then press **F1,** *or*

- Click the "**?**" icon located on the top right corner of the NVIDIA Display control panel page you have open, move the "**?**" icon over the option for which you want help, then click your mouse again to display the help.

Figure 4.8   NVIDIA Display Control Panel Page — Sample Context Help
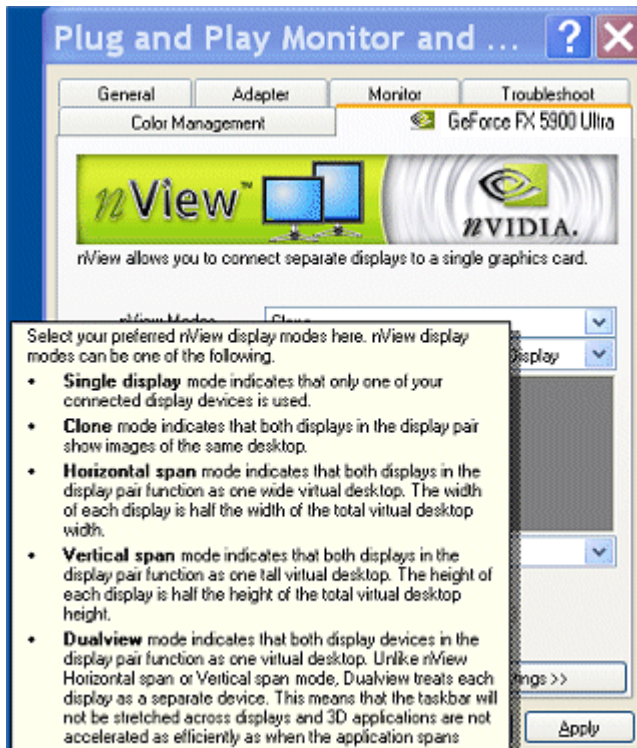
Tool Tips

Windows-style tool tip (pop-up) Help appears when you hover your mouse pointer on an item that is partially obscured. For example, you can place you mouse on any of the long NVIDIA menu names that may be partially obscured (such as Performance and Quality Settings) and be able to view the name in its entirety.

Tool Tips for Disabled Settings

When an option or setting is disabled (grayed) on any NVIDIA Display control panel page, you can place the mouse pointer on the disabled option for a couple of seconds to see "tool tip" help describing the reason it is disabled.

An example of this kind of tool tip Help is shown in Figure 4.9.

Figure 4.9   NVIDIA Display Control Panel Page — Sample Tool Tip for Disabled Settings
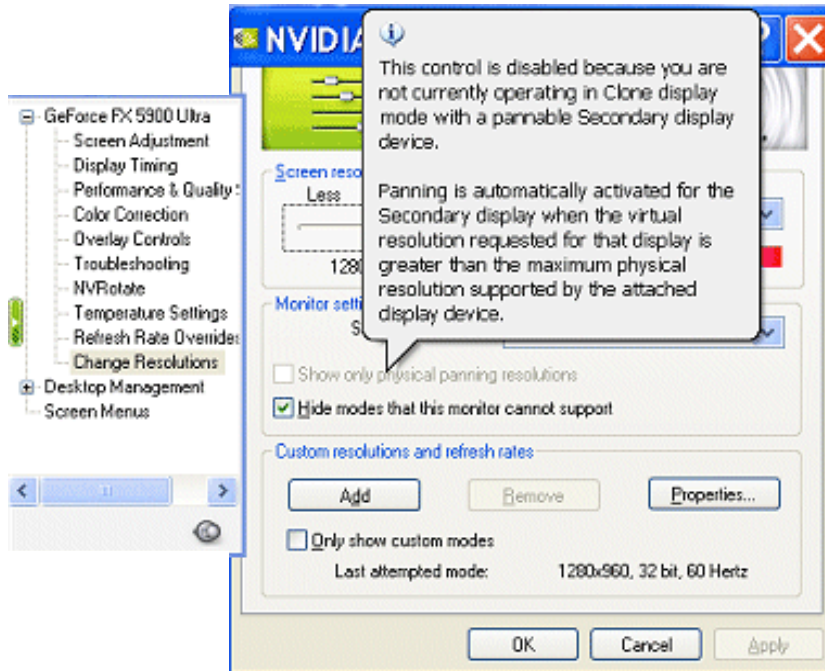
5

USING NVIEW MULTI-DISPLAY MODES

This chapter contains the following major sections:

nView Multi-Display Applications

For extensive information on nView applications, click the **Products** tab from the NVIDIA Web site: **www.nvidia.com**

Engineering or mechanical CAD applications can use multiple displays for different directional views of an object or a building, such as a front or side view or even a wireframe model on one screen and a textured version of the same model on another. Many professional applications offer extensive graphical user interfaces, which can be left fully enabled and visible on one

display, while the second display remains unobstructed for viewing the actual work.

Training and Presentation — nView **Clone mode** (see "Enabling nView Clone Mode" on page 70), where two display devices show identical images, is useful for presentations. A presenter may use the smaller display on the podium, while a projector display reflects the presentation to the audience. In training applications, the instructor can see what the student is doing under nView Clone mode. The ability to see the presentation while it's being projected can be especially useful when using mobile computers.

Virtual Desktop (see "Enabling Virtual Desktop — Clone Mode" on page 72), a sub-feature of nView Clone Mode, is useful for flat panels and ana log displays with limited resolution and is used to set a larger than viewable area on the second display, which supports full pan-and-scan of the entire desktop area.

Digital content creation (DCC) applications can use one display for toolbars and palettes and the other for rendered output. Additionally, many real-time or game development environments allow the authoring tools or game engine code to be visible on one display, while showing the art or game engine in a full screen, game play-like mode on the second display.

Graphics Artists can have common applications such as Adobe Photoshop or 3D Studio Max open with the palettes and menus on one display and the other display dedicated to workspace. **Writers** can use one display for research and the other for writing.

Financial applications, such as stock trading applications, can use a pair of large digital flat panels. This would allow you to watch real-time stock data on one screen and use the other screen for trading activity.

Video editing applications would use one large computer display and one NTSC display. Since nView technology allows decoupling of refresh rates, the primary (editing) display could be a high-resolution RGB display for running the application (Adobe Premiere, for example), while the second display device can be an NTSC or S-Video display for checking the video output for proper color balance and quality.

Entertainment applications can use multiple display support in several ways. Game titles, such as Microsoft's Flight Simulator 2000, support multiple displays out of the box. With nView **Clone mode**, game play can be sent to a big screen TV or even to a VCR.

Home theater systems can take advantage of the DVD capabilities of your computer. Simply hook up a large screen television as your second display device and you can watch DVDs — without having to buy a dedicated DVD player. *See* "Using Full Screen Video Settings" on page 131.

Television and Movies — Using the NVIDIA Display "video mirror" feature, you can watch TV and any other video while you work. *See* "Using Full Screen Video Settings" on page 131.

nView Modes

The nView Display Mode page provides several display modes for your multi-display configuration.

When using NVIDIA products that are multi-display capable, there are three ways to run multi-display configurations *under most operating systems*; Dualview, Span, or Clone mode.

These nView modes are available from the nView Display Mode page as shown in Figure 5.1 and Figure 5.2**.**

• **Single display** mode indicates that only one of your connected display devices is used.

  Note: If you have only one display that is connected, you will not see the nView Display Mode option on the menu.

Figure 5.1   NVIDIA nView Single Display Mode — Windows XP/2000
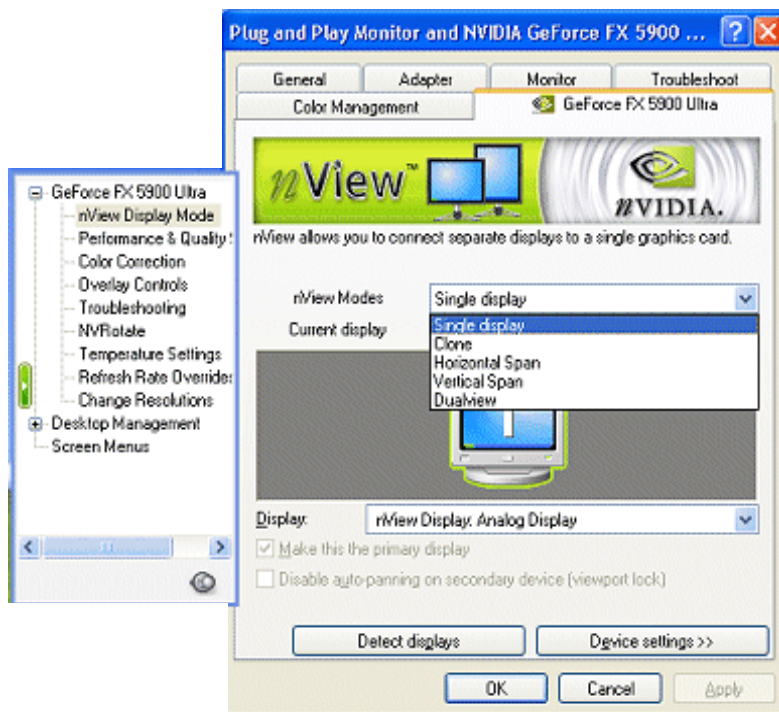
- **Clone** mode indicates that both displays in the display pair show images of the same desktop.

- **Horizontal Span** mode indicates that both displays in the display pair function as one wide virtual desktop. The width of each display is half the width of the total virtual desktop width.

- **Vertical Span** mode indicates that both displays in the display pair function as one tall virtual desktop. The height of each display is half the height of the total virtual desktop height.

- **Dualview** mode (Figure 5.2, Figure 5.3, and Figure 5.4) indicates that both display devices in the display pair function as one virtual desktop. Unlike Horizontal Span or Vertical Span mode, Dualview treats each display as a separate device. This means that the Windows taskbar will not be stretched across displays and 3D applications are not accelerated as efficiently as when the application spans displays.

Figure 5.2   nView Modes under Windows XP/2000
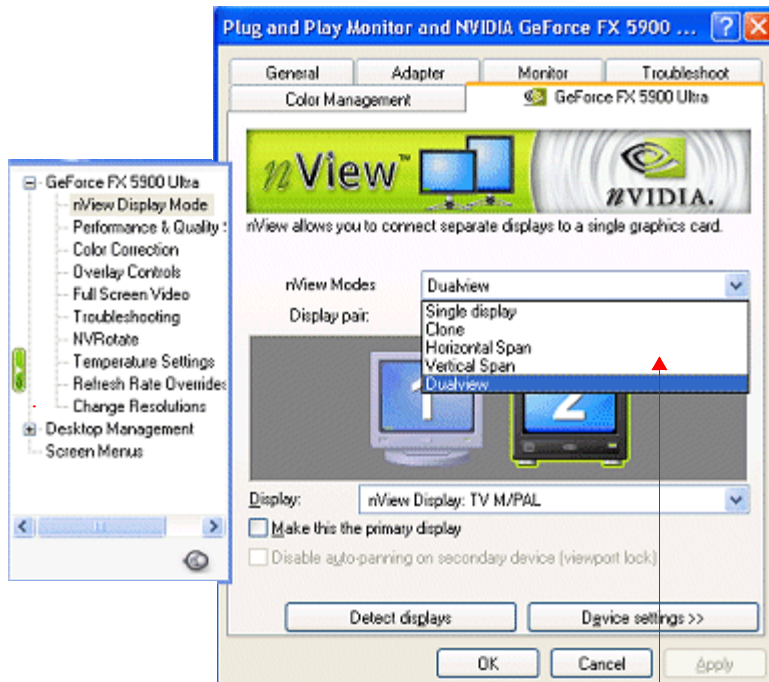
nView display modes

Accessing the Display Device Context Menus

The **monitor icons** on the nView Display Mode page display a graphical representation of your nView display configuration — i.e., the *single* (Figure 5.1) OR *pair* of display devices (Figure 5.2 and onward) connected to your computer and being used by the nView display mode you selected from the **nView Modes** list.

1 Click a display image to select it as your current display.

2 Then right click the display image to display a popup context menu (Figure 5.3) from which you can adjust settings for that display.

Figure 5.3   Example Context Menus for Analog and TV Displays
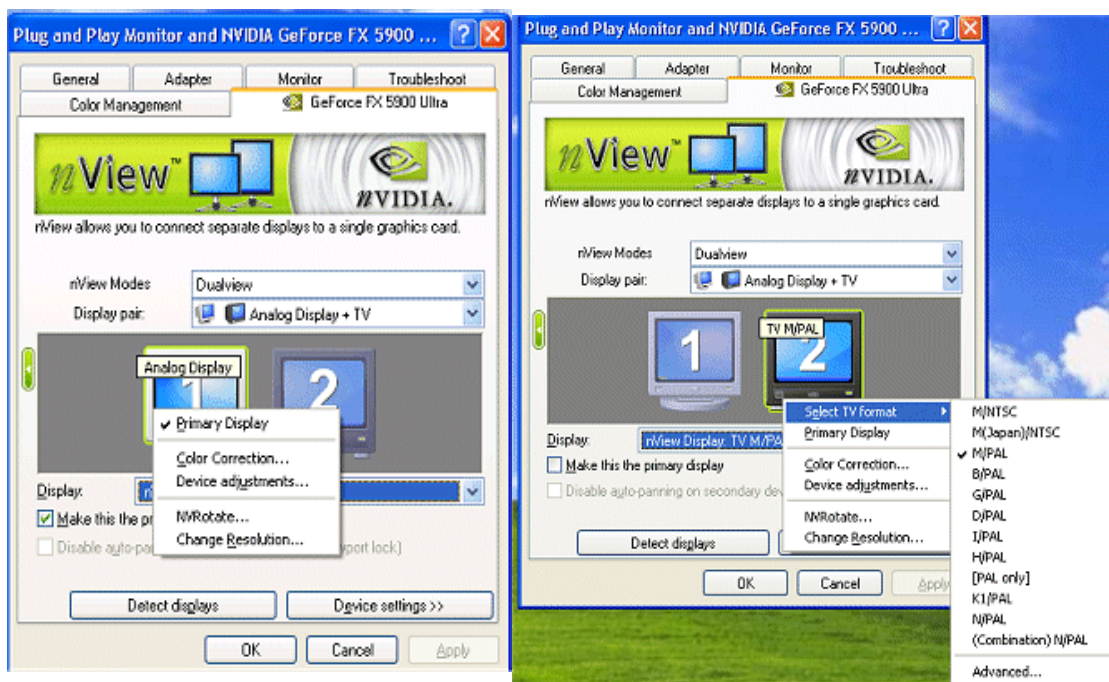
Available settings include:

- • **Color Correction**. See "Adjusting Desktop Colors" on page 106.
- • **Device adjustments**. See "Configuring Display Devices" on page 78.
- • **Select TV format**. See "Configuring Display Devices" on page 78.
- • **NVRotate**. See "Using NVRotate Settings" on page 139.
- • **Change Resolution**. See "Enabling Virtual Desktop — Clone Mode" on page 72 and "Changing Screen Settings" on page 146.

Note: You can access these same menu options by clicking the **Device Settings >>** option at the bottom of the nView Display Modes page.

Figure 5.4   nView Modes — Windows 9*x*
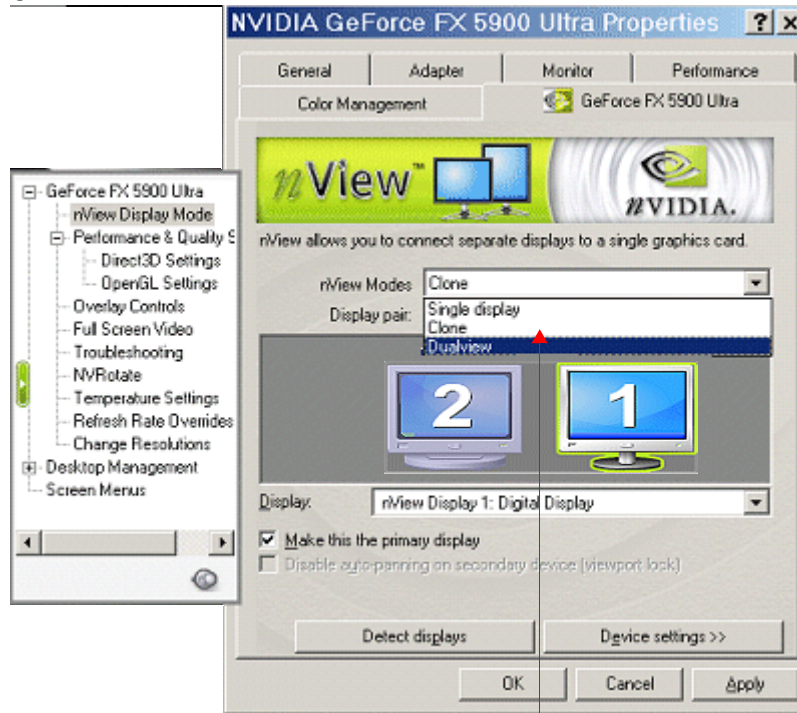
nView display modes in Windows 9*x* do not include nView Span modes.

NVIDIA Multi-Display Device Support

The following are sample display device combinations that NVIDIA GPU-based multi-display cards support when used with the NVIDIA ForceWare graphics display driver:

• Two RGB displays with second RAMDAC (digital-to-analog converter)

• Two analog flat panels

• Two digital flat panels

• One digital flat panel and one analog flat panel

• One digital flat panel and one RGB display

• One RGB display and one TV

- One RGB display and one analog flat panel (with second RAMDAC)

- One analog flat panel and one TV

Note: Actual combinations supported on a given graphics card will vary.

Setting up a multi-display graphics card involves installing the graphics card on a computer, connecting the display devices to your computer, and installing the current version of the NVIDIA ForceWare graphics display driver. After restarting your computer, the multiple display modes of the graphics cards installed are fully functional.

When using any nView multi-display mode, you can easily switch between the displays by following these steps:

1 Open the nView Display Mode page.

2 Then simply click the **Display pairs** list and click the paired display combination you want.

For example if you have an **analog display**, a **digital display**, and a **TV** connected to your computer, your choices are as listed below and shown in Figure 5.5.

Figure 5.5 nView Display Pair Options
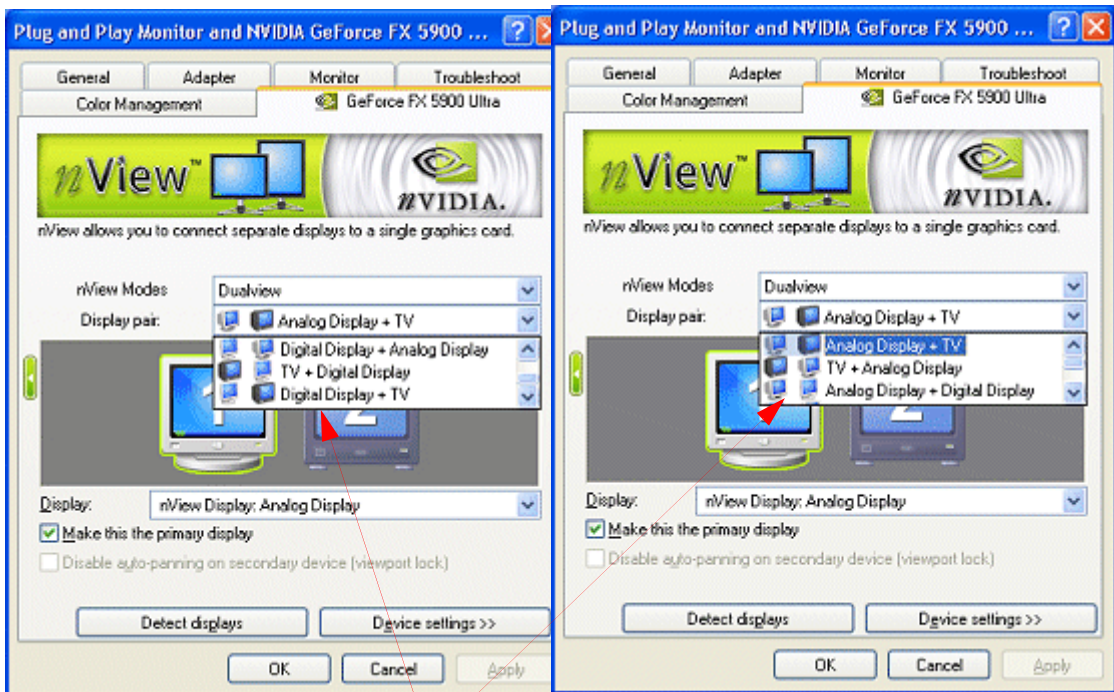
nView display pair options

- **Analog display + digital display**
- **Digital display + analog display**
- **TV + digital display**
- **Digital display + TV**
- **Analog display + TV**
- **TV + Analog display**

Primary and Secondary Displays

nView Display Mode

On the NVIDIA nView Display Mode page, the **primary** display is designated by the monitor icon on the left and the **secondary** display is designated by the monitor icon on the right.

Windows Display Properties Settings

On the Windows Display Properties Settings page, your can determine the **primary** display by placing your mouse pointer on a monitor icon where the tool tip text indicates "Primary".

Using nView Dualview Mode

Note: You must have *at least* two display devices connected to your computer to be able to view the nView Span mode settings.

nView Dualview mode treats every display as a separate device. Dualview mode is sometimes called "native mode" because it is the native mode supported by Windows multi-display configurations; i.e. it is the multi-display mode defined by Microsoft and supported by Microsoft Windows operating systems.

Dualview mode is equivalent to selecting the **Extend my Windows desktop onto this monitor..** setting on the Windows Display Settings page, which gives you an extended workspace.

When you start **Windows 9*x*** or **Windows XP** using multiple displays, Windows is pre-configured for Dualview mode. This is not the case for Windows 2000. To enable Dualview in **Windows 2000**, you need to install Dualview from the nView Display Modes page, as explained in subsequent sections.

Sample nView Display Mode pages in Dualview mode are shown Figure 5.2, Figure 5.3, and Figure 5.5.

Key Features

Dualview support and functionality include the following:

• Support for advanced NVIDIA features such as **Full Screen Video Mirroring** and **Overlay**. (See "Using Full Screen Video Settings" on page 131 and "Using Overlay Controls" on page 129.)

  Note: Windows NT 4.0 in nView Multiview mode does not support the "video mirroring" feature.

• Windows places the taskbar on only one display device *and* replicates (rather than stretches) the background on each display as shown in Figure 5.6 and Figure 5.7.

Figure 5.6   Multiple Display Devices in nView Dualview Mode (1)

Display 1 — resolution = 1280 x 768   **Display 2** — resolution = 800 x 600

Taskbar *is not stretched* across displays.   . **Background** is not stretched across displays
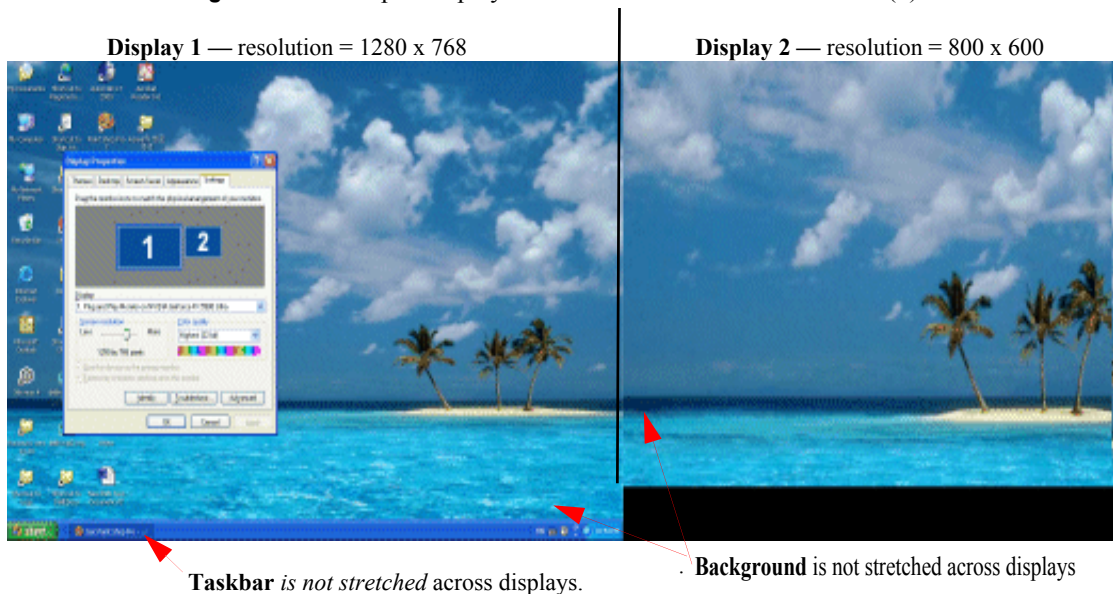
• When you maximize an application, it maximizes only to the single display, and so on. Figure 5.6 and Figure 5.7 show examples of Dualview systems where the left and right display devices are running at different screen resolution. Notice that the background is not stretched across the displays and the taskbar appears on a single display instead of being stretched across displays.

Figure 5.7   Multiple Display Devices in nView Dualview Mode (2)

Display 1 — resolution is 1280 x 768   **Display 2** — resolution is 1024 x 768

Taskbar is *not* stretched across displays.   **Background** is not stretched across displays.
.
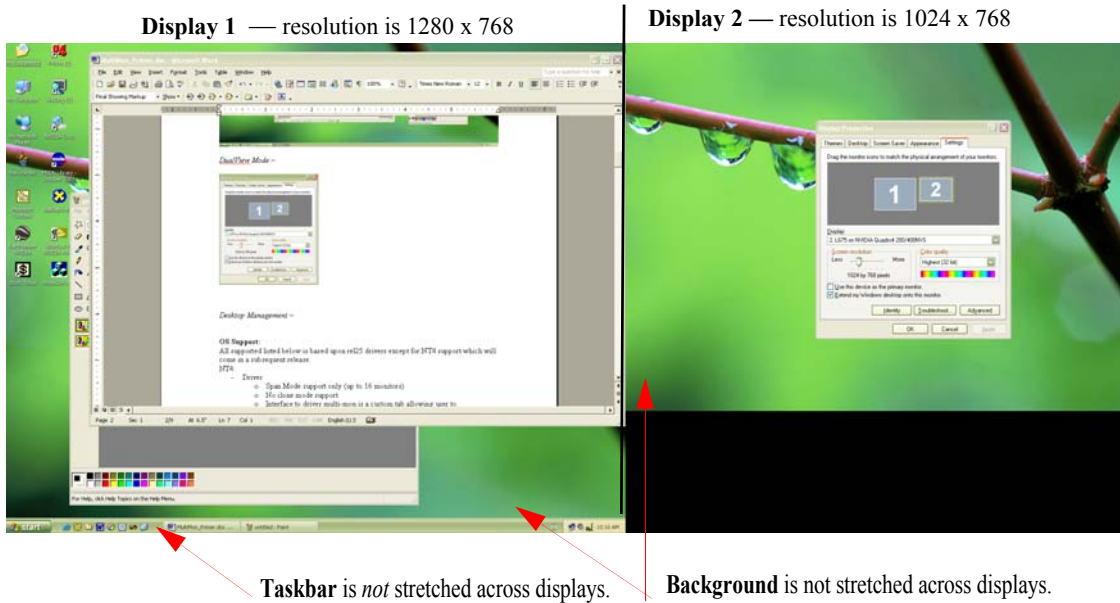
- You can set different color depths per display.

- You can arrange your multi-display desktop to be any shape; it does not have to be limited to "rectangular" as in nView Span modes.

- When you run a DirectX or OpenGL application in Dualview mode, it is accelerated as long as the window does not span more than one display. If the window spans two displays, drawing is not accelerated in the window.

   Note: In Span modes, drawing is always accelerated.

- Dualview mode is supported on various combinations dual display devices, as explained earlier in "NVIDIA Multi-Display Device Support" on page 58:

   For example, you can have a system with the primary display as an analog display that supports up to 1600 x 1200 at 100 Hz refresh rate, while the secondary display is connected to an NTSC TV that is limited to 800 x 600 at 60 Hz refresh rate. The TV has lower resolution and refresh rate than the analog display because the TV encoder on the GPU has fewer capabilities than the analog display.

Installing nView Dualview Mode for the First Time — Windows 2000

Note: When you start Windows 2000 with an NVIDIA GPU-based multi-display graphics card (or multiple NVIDIA GPU-based graphics cards), you are not yet in Dualview mode. You can confirm this when you view the Windows Display Properties Settings page and see only one display image in the display.

Follow these steps to enable Dualview.

1 Make sure your multi-display NVIDIA GPU-based graphics card (or dual graphics cards) is properly installed in your computer and securely connected to your display devices.

2 Make sure that the display devices are turned on and the NVIDIA ForceWare graphics display driver (including the nView Desktop Manager component) has been installed on your computer.

3 After Windows starts up, from your desktop, right click to view the Windows desktop menu.

4 Click **Properties** > **Settings** > **Advanced >** the NVIDIA GPU tab > **nView Display Mode** to display the nView Display Mode page.

5 Click the **nView Modes** list box and select **Install Dualview (Advanced)** as shown in Figure 5.8.

6 When the prompt appears, click **Restart Now**.

   Note: When the system starts up, you may see a series of Dualview installation prompts. It may take up to one minute for the first Dualview prompt to appear. Click the confirming prompts (such as, **Yes**, **OK**, or **Finish)** to follow through and then restart your computer as prompted.

7 After the system starts up, if the NVIDIA nView Desktop Manager Setup Wizard appears, run through the Wizard. (See the *NVIDIA nView Desktop Manager User's Guide* for details.)

8 From your desktop, right click to view the Window desktop menu, then click **Properties** and the **Settings** tab.

   You'll notice that at least two display images appear on the Windows Display Properties Settings page, as shown in Figure 5.9, indicating Dualview mode.

9 Click **Advanced,** the NVIDIA GPU tab, and the **nView Display Mode** menu option.

10 From the **nView Modes** list, select **Dualview**.

Figure 5.8   (nView Display Mode Page — Installing Dualview in Windows 2000
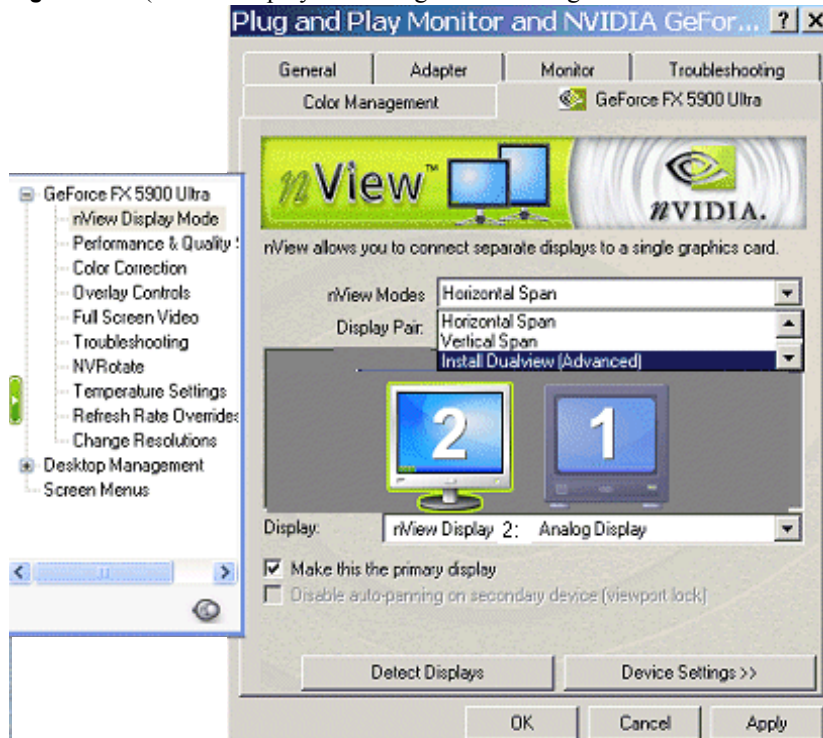
Figure 5.9   Display Properties Settings — Dualview Mode (Windows 2000)
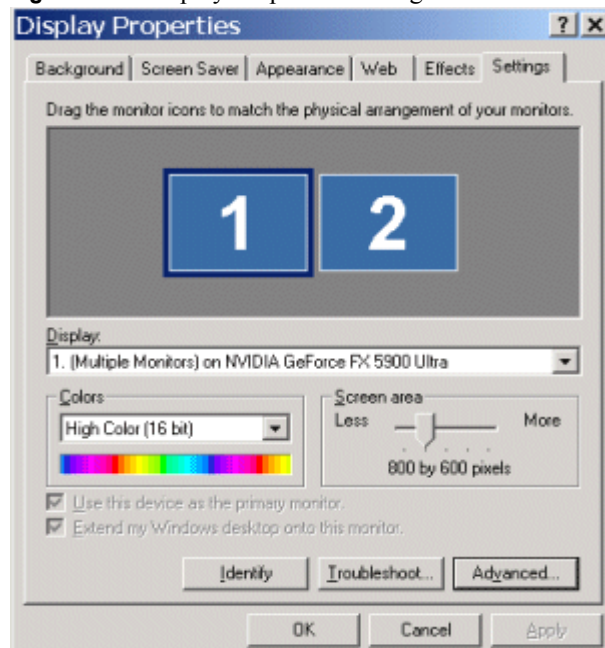
11 Follow the prompts to restart your computer again.

12 When you have returned to your desktop, open the **nView Display Mode** page and select **Dualview** from the nView Modes list.

Enabling nView Dualview Mode After Initial Installation — Windows 2000

Switching back and forth between Dualview and Span/Clones mode under Windows 2000 is much faster *after* the initial Dualview installation session described in the previous section. On subsequent Dualview enabling sessions, you can use fewer steps, as follows:

1 From your Windows 2000 desktop, right click to view the Windows desktop menu, then click **Properties** > **Settings** > **Advanced** and then the NVIDIA GPU tab.

2 Click **nView Display Mode** from the NVIDIA menu and select **Dualview** from the **nView Modes** list.

3 Follow the prompts to restart your computer.

4 When you have returned to your desktop, go to the nView Display Mode page and select **Dualview** from the **nView Modes** list.

> **Note:** To switch back to Clone, Horizontal Span, Vertical Span, or, under certain configurations, Single Display mode, you will need to restart your computer, as prompted.

Using nView Span Modes

> **Note:** nView Span modes do not apply under Windows 9*x* operating systems.

> **Note:** You must have *at least* two display devices connected to your computer to view the Span mode settings.

nView horizontal and vertical Span modes treat multiple displays as a single large desktop. In this mode, the desktop area is spread across both displays, however the operating system treats both displays as one large display. For this reason, the refresh rate, color depth, and resolution on both displays will be identical, and cannot be changed independently. The desktop may be "stretched" horizontally or "stacked" vertically, depending on your needs, as explained in "Using Horizontal & Vertical Span Modes" on page 67.

• **nView Horizontal Span mode** allows you to extend the Windows desktop across two display devices horizontally. In this mode the two displays combine to form a wide, spanned display surface, which is useful when viewing items that are wider then a single display.

- **nView Vertical Span mode** allows you to extend the Windows desktop across two display devices vertically. In this mode the two displays combine to form a tall, spanned display surface, which is useful when viewing items that are taller then a single display.

nView Span modes supports the "video mirror" feature, where you may want to dedicate an application to one of the two displays or run the application across both displays. Examples include entertainment applications, digital video editing, and DVD playback. For details, see "Using Full Screen Video Settings" on page 131.

Note: Windows NT 4.0 Multiview mode does not support the Video Mirroring feature.

nView Span Modes vs. Dualview Mode Features

nView Horizontal and Vertical Span mode support and functionality include the following:

- DirectX or OpenGL applications in Span modes are fully accelerated.

- In nView Span mode, your Windows desktop is "stretched" or "spans" all of your displays. In Span mode, Windows treats the multiple displays as a single "logical" display device connected to your computer ––– the real "physical" displays are combined together to give you this "logical" display.

    Figure 5.10 shows an example of running Span modes under Windows XP with both of the two displays set to 1280x1024 resolution. In this configuration, Windows recognizes *only* a single display running at 2x1280x1024 or 2560x1024.

- The key point to remember when running nView Span modes is that Windows does not detect that you have two displays connected – as far as it is concerned, you have an oversized display. This is the reason that you cannot use different bit depths or resolutions per display.

    Note: This also results in nView Span modes being slightly faster than Dualview mode because Windows only has to manage one display device instead of two.

- Under nView Span modes, Windows "stretches" the background wallpaper out to cover your large "logical" display and it stretches the taskbar out to fill your large "logical" display, as shown in Figure 5.10. If you maximize an application, the application will be maximized to fill the large "logical" display screen – i.e., both displays.

Figure 5.10 Multiple Displays in nView Horizontal Span Mode

Display 1   **Display 2**

Taskbar is stretched across displays.

Background is stretched across displays.
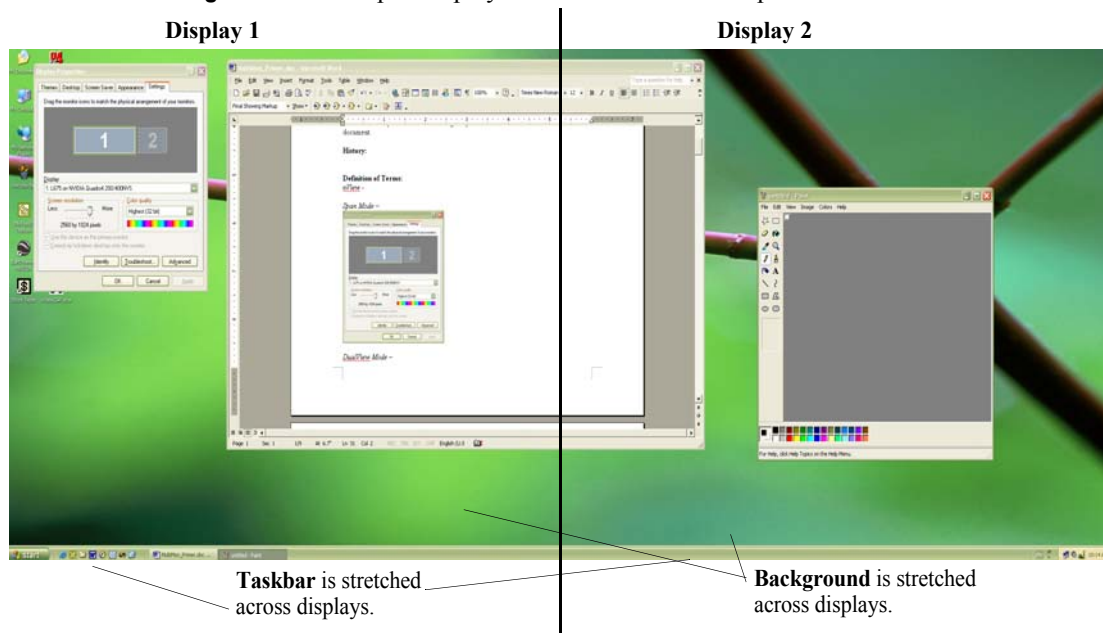
- Under Windows XP/2000, you can run nView Span modes with more than two displays. For example, if you are using a Quadro NVS-based graphics card to which you have four display devices connected, you can have two sets of two spanned displays.

  If you are using a Quadro NVS-based graphics card, refer to the document titled "*NVIDIA ForceWare Driver for Windows Using nView MultiView Modes with NVIDIA Quadro NVS-based Graphics Cards*"

Using Horizontal & Vertical Span Modes

Note: Span modes do not work if you have only one display device attached.

In Span mode, the Windows desktop area is spread across both display devices. This mode can be set for multiple categories of displays, although display limitations may override the capabilities of your NVIDIA multi-display graphics card. For example, if the second display is an NTSC TV display, depending on the TV encoder on the graphics card, the resolution may not be set above 800 x 600 and the refresh rate cannot be set above 60 Hz. However, the computer's analog display in such a configuration may have its refresh rate and resolution set much higher. The desktop may be "stretched" horizontally or "stacked" vertically, depending on user needs.

Due to operating system differences between Windows 9*x* and Windows NT 4.0/Windows 2000, the latter does not currently offer true multi-display support for Span modes using one NVIDIA multi-display graphics card**[4]**. As a result,

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4. If two graphics cards are installed, the Windows 2000 operating system does detect two devices

size of the actual desktop is limited to twice the smaller size of the two displays.

Note: The desktop can be extended either horizontally (Figure 5.11) or vertically (Figure 5.12).

Figure 5.11 nView Horizontal Span Mode — Windows XP
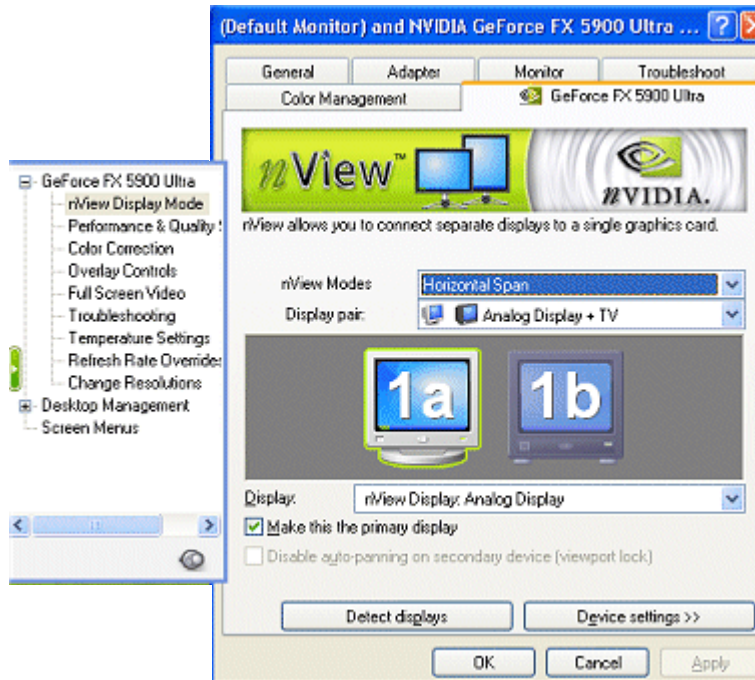
To access the nView Span modes, follow these steps:

1 Click the **Horizontal** or **Vertical Span** mode setting on the nView Display Mode page and click **Apply**.

2 Click **OK** and **Yes** when the messages appear.

If you just switched from Standard (Dualview) to one of the Span modes, your secondary display device will be activated. If needed, click **Detect Displays** to enable the display devices.

3 Depending on whether you have Horizontal or Vertical Span mode enabled, you can drag your active windows, images, or icons horizontally or vertically to move them to the secondary display.

Note: Figure 5.11 and Figure 5.12 show the primary display is designated by **a** and the secondary display is designated by **b**. Both display are identified with the same number — **1** in this case (can also be another Windows monitor number, depending on your configration) — because in nView Span mode, Windows doesn't treat the primary and secondary displays as two separate displays. (For details on this concept, see the section "nView Span Modes vs. Dualview Mode Features" on page 66.) From the Windows Display Properties Settings tab, if you click **Identify** when you are in nView Span mode, you will see the same number displayed on each of your active displays.

Figure 5.12 nView Vertical Span Mode — Windows XP
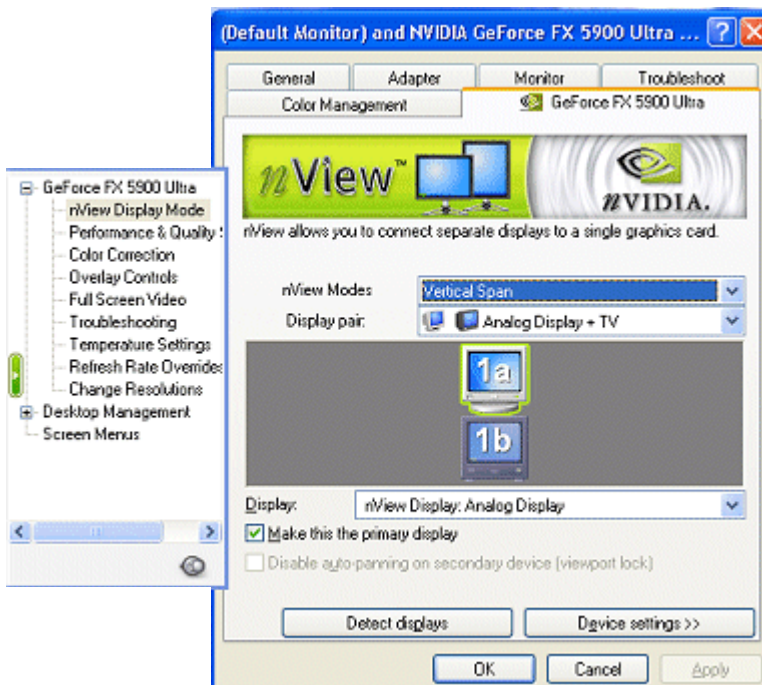
Using nView Clone Mode

Note: You must have *at least* two display devices connected to your computer in order to see the Clone mode setting.

nView Horizontal Span, Vertical Span, Clone, and Dualview modes support advanced NVIDIA features such as Video Mirroring.

In Clone mode, two displays show identical images, which is useful for presentations. For example, Clone mode is useful when giving presentations.

The presenter may have a small display or other display device on the podium while a projector or presentation quality display shows the larger image to the audience.

Full support for **virtual desktops** is available for flat panels and displays with limited resolution. Virtual desktops offer full pan-and-scan of the desktop and can be configured for one or both displays. See "Enabling Virtual Desktop — Clone Mode" on page 72.

In application Zoom mode (a feature of nView Desktop Manager), part of the image from the primary display is shown on the secondary display, but zoomed in. This mode can be used for image editing, close-up work in modeling or CAD applications, or image processing and mapping applications.

nView Clone mode supports the **Video Mirror** feature, where you may want to dedicate an application to one of the two displays or run the application across both displays. Examples include entertainment applications, digital video editing, and DVD playback. See "Using Full Screen Video Settings" on page 131.

Enabling nView Clone Mode

4 Click **nView Display Mode** from the NVIDIA Display menu.

5 From the nView Modes list, select **Clone** and click **Apply**.

Figure 5.14 show the primary display is designated by **a** and the secondary display is designated by **b**. Both display are identified with the same number — **2** in this case (this number can be another Windows monitor number, depending on your configuration) — because in nView Clone mode implies

Figure 5.13 nView Clone Mode — Analog + Digital Displays with Context Menus

the two displays are duplicate desktop images and, therefore, Windows identifies them with the same number.

From the Windows Display Properties Settings tab, if you click **Identify** when you are in nView Clone mode, you will see the same number on both your displays.

Figure 5.15 shows nView Clone mode using a TV as a primary device and a digital display as a secondary device.

Figure 5.14 nView Clone Mode — Analog + Digital Displays with Context Menus

Figure 5.15 shows nView Clone mode using a digital display as a primary display device and a TV as a secondary display device.

Enabling Virtual Desktop — Clone Mode

Before You Begin

If the maximum resolution of the secondary display is by default *set* to less than the current resolution of the primary display, once you enable Clone mode from the nView Display Mode page, Virtual Desktop will already be enabled.

Figure 5.15 nView Clone Mode — TV + Digital Display
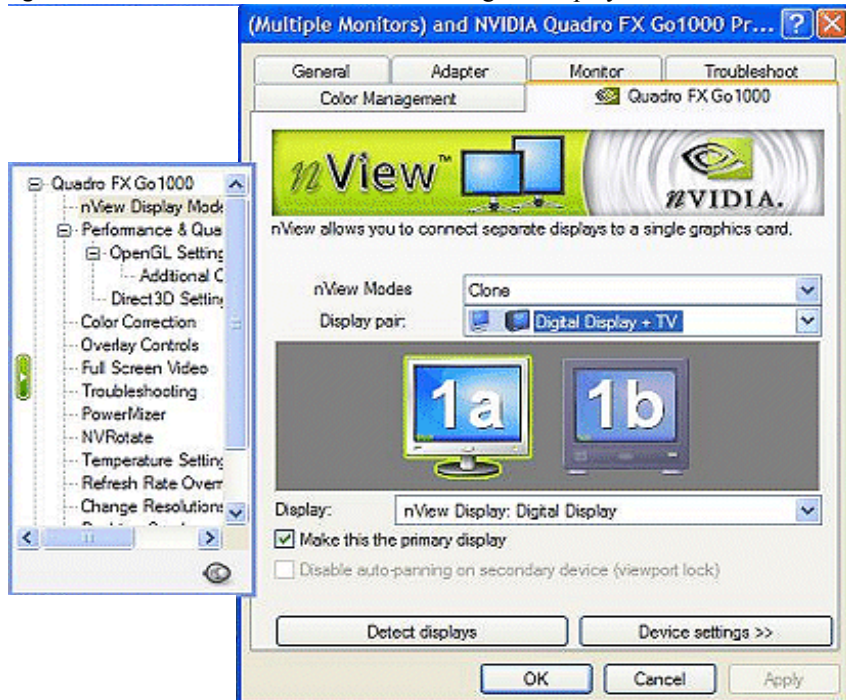
Note: You can test if Virtual Desktop is enabled by moving your mouse vertically and horizontally across your secondary display's desktop. If the desktop scrolls as you move your cursor to the far edges of the display, then Virtual Desktop is already enabled. However, you still may want to adjust the resolutions of the primary and/or secondary device using the steps below if you want to further adjust the screen resolutions of either display.

You can use the NVIDIA **Change Resolution** menu option to adjust the **screen resolution** of your primary and/or secondary display device so that the resolution of the secondary device is less than the primary, which allows you to enable **Virtual Desktop**, a useful feature for displays with limited resolution — newer flat panels offer high resolution. This feature lets you pan-and-scan the entire desktop area on the secondary display when its resolution is set to less than the value set on the primary display.

Procedure

Follow these steps to enable Virtual Desktop:

1 From your Windows desktop, right click to view the Windows desktop menu, then click **Properties** > **Settings** > **Advanced** and then the NVIDIA GPU tab.

2 From the NVIDIA menu, click the **nView Display Mode** option.

3 From the nView Modes list, select **Clone** and click **Apply**.

Note: If you just switched to Clone from Dualview, you'll need to follow the prompts to restart your computer. Then, when you have returned to your desktop, go to the nView Display Mode page and select **Clone** from the nView Modes list and click **Apply**.

4 From the nView Display Mode page, right click display image (i.e., **1a** or **1b**) to display the pop-up menu (pop-up menus for both primary and secondary displays are shown in Figure 5.14) and click **Change Resolution**.

The Change Resolution page appears, as shown in Figure 5.16.

Figure 5.16 Configuring Screen Resolution for Virtual Desktop — From nView Display Modes Page
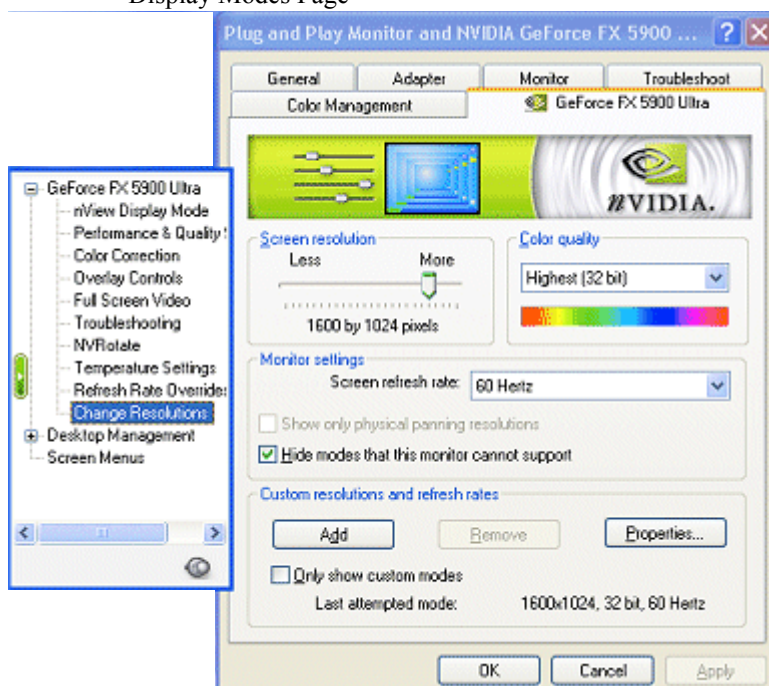
5 Use the **Screen resolution** slider to set the resolution so that the primary display's resolution is greater than the secondary display's resolution.

    Note: If you set the same screen resolution value for both primary and secondary displays, you cannot pan/scan the desktop area on the secondary display; both displays will remain static.

6 **Optional**: If you want, you can select a refresh rate from the list box.

7 Click **Apply** and **OK** close the Change Resolution page and return to the nView Display Mode page.

    Note: Now that you have adjusted the screen resolutions, notice that you can move your mouse horizontally and/or vertically all the way across the desktop on your secondary display (i.e., display **1b**) to pan and scan the desktop, thus enabling the Virtual Desktop feature.

Disabling Auto-Panning (Lock Pan Position)

Disabling the pan and scan feature (virtual desktop) results in locking the current pan position on the secondary clone display, letting you effectively freeze the virtual desktop at a certain position, which is useful for presentations or fine-detail work in applications.

If you want to disable the auto-panning on your secondary display, you can do *one* of the following:

• Select the check box labeled **Disable auto-panning on secondary device (viewport lock)** *or* simply

• Select the **Lock Pan Position** check box on the popup menu on your secondary display (i.e., display **1b**.)

The example in Figure 5.17 shows that the **Lock Pan Position** check box is selected, which also enables the equivalent **Disable auto-panning on the secondary device (viewport lock)** check box.

Figure 5.17 nView Clone Mode with Virtual Desktop Enabled — Disabling Panning

Disabling desktop panning of the
secondary display.
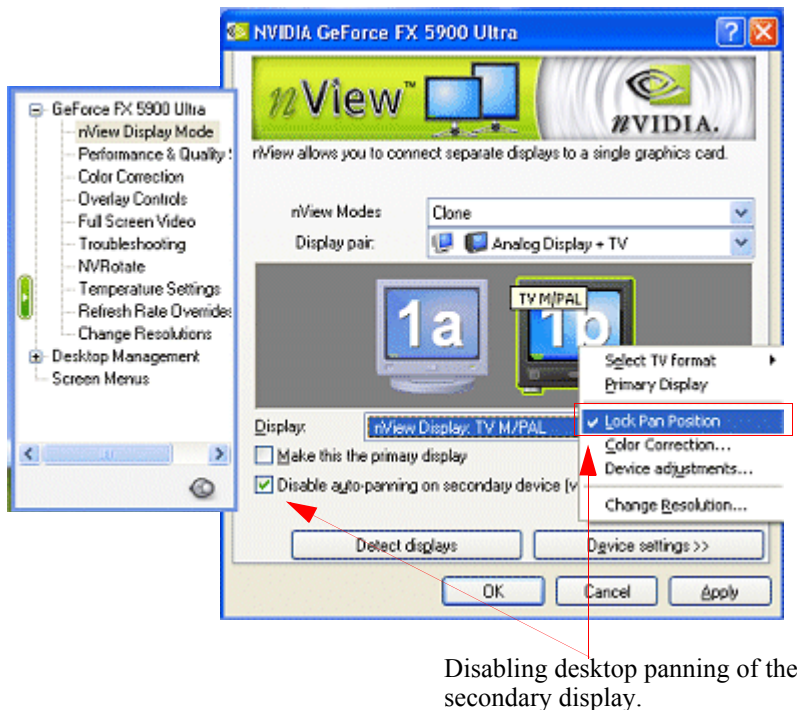
Switching Between nView Dualview and Span/Clone Modes — Windows 2000

Note: Under Windows 2000, switching between nView Span/Clone and Dualview modes requires restarting your computer. (Under certain configurations, switching between Single Display mode and Dualview/Span/Clone may also require restarting your computer.)

1 From your Windows 2000 desktop, right click to view the Windows desktop menu, then click **Properties** > **Settings** > **Advanced** and then the NVIDIA GPU tab.

2 Click **nView Display Mode** from the NVIDIA menu.

3 From the nView Modes list, select **Clone**, **Horizontal Span**, or **Vertical Span** mode.

Note: If you just switched to Clone, Horizontal Span, Vertical Span, or, under certain circumstances, Single Display mode from Dualview, you'll need to follow the prompts to restart your computer.

4 When you have returned to your desktop, go to the nView Display Mode page and select **Clone, Horizontal Span**, or **Vertical Span** mode from the nView Modes list.

> **Note:** To switch back to Dualview mode, you will need to restart your computer, as prompted.

Enabling nView Multiview Mode — *Only* for NVIDIA Quadro NVS-based Graphics Cards

> **Note:** nView Multiview mode is a custom mode that is only available when using the NVIDIA Quadro NVS GPU-based series of graphics cards.

The NVIDIA Quadro NVS is a series of multi-display graphics cards for professionals in the financial and **non-linear editing (NLE)** markets.

For further details on using this mode, see the NVIDIA Application Note titled *"Using nView MultiView Modes with NVIDIA Quadro NVS-based Graphics Cards"*

Multi-Display Mode — Arranging Displays on the Windows Display Properties Settings Page

> **Note:** This section applies only to nView Dualview mode; it does not apply to nView, The examples shown in Figure 5.18 through Figure 5.19 are Windows XP, but the procedure explained below applies to all Windows operating systems.

When using multiple displays, the desktop can be extended horizontally and vertically, as well as at other angles by page. You can drag the images to the positions that represent how you want to move items between your display devices.

• For example, if you're using two displays and you want to **move items from one display to the other by dragging left and right**, position the images side-by-side (Figure 5.18).

• **To move items between displays by dragging up and down**, position the images one above the other (Figure 5.18).

• **To move items between displays by dragging at an angle**, position the images diagonally (Figure 5.19). The positions of the images don't have to correspond to the physical positions of your displays. That is, you can position the images one above the other even though your displays are side-by-side.

Figure 5.18 Display Settings — Horizontal and Vertical
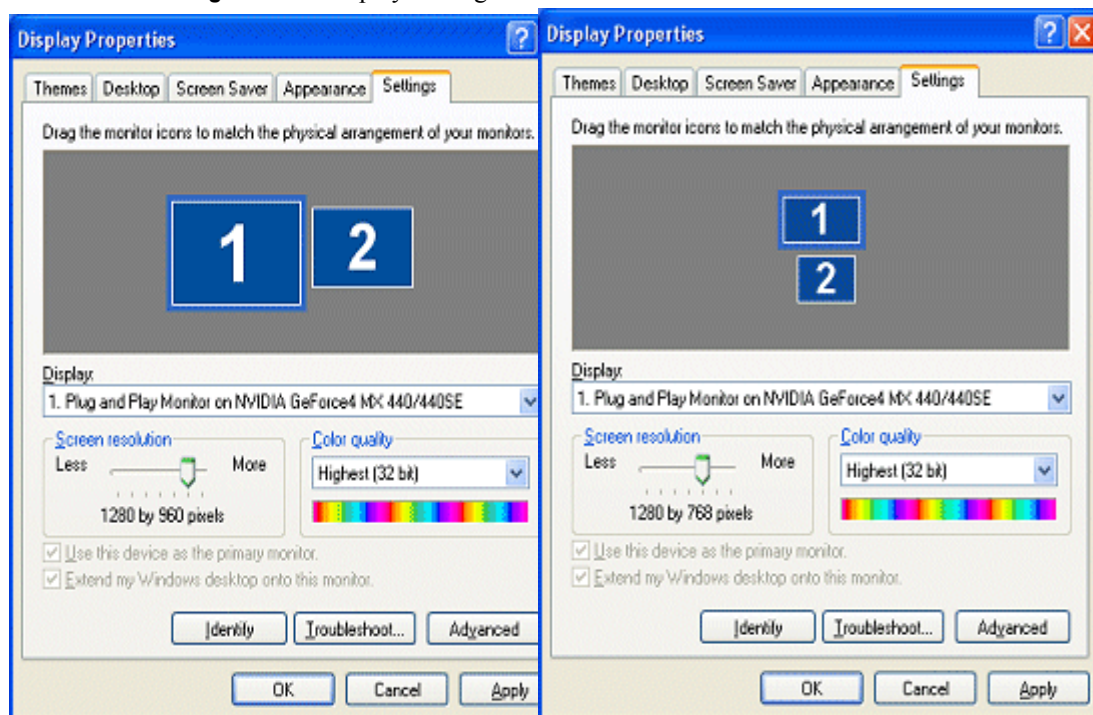
Figure 5.19 Display Settings — Diagonal
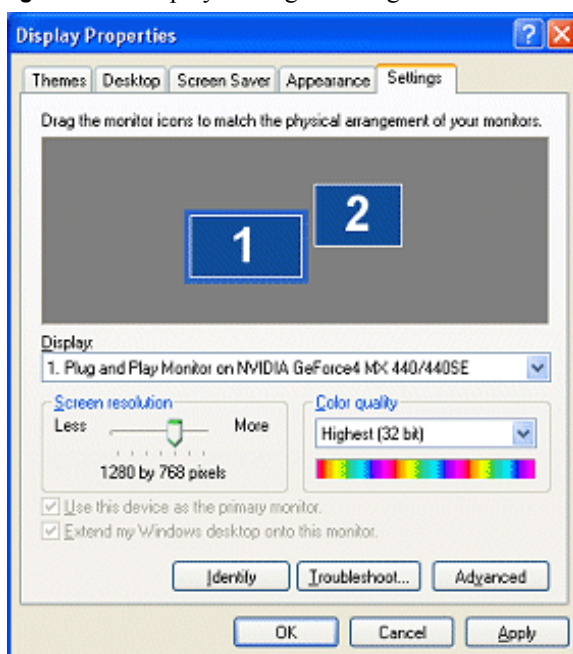
6

CONFIGURING DISPLAY DEVICES

This chapter contains the following major topics:

Adjusting Analog Display Settings

If your NVIDIA GPU-based graphics card is connected to an analog display, follow these steps to access the analog display device's **Device Adjustment** window from which you can configure **Screen Adjustment** and **Display Timing** settings.

To access the **Device Adjustments** window for an analog display connected to your computer, follow these steps:

1 Click **nView Display Mode** from the NVIDIA Display menu.

  If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

2 Left click on the display image that represents your **analog display** to select it.

3 Right click on that display image and click **Device Adjustments** to open the Device Adjustment window (Figure 6.1), which contains the following two pages. (The Device Adjustments window automatically opens on the Screen Adjustment page.)

- **Screen Adjustment**. See "Screen Adjustment" on page 79.
- **Display Timing**. See "Display Timing" on page 79.

Screen Adjustment

Figure 6.1   Screen Adjustment Settings — Analog Display
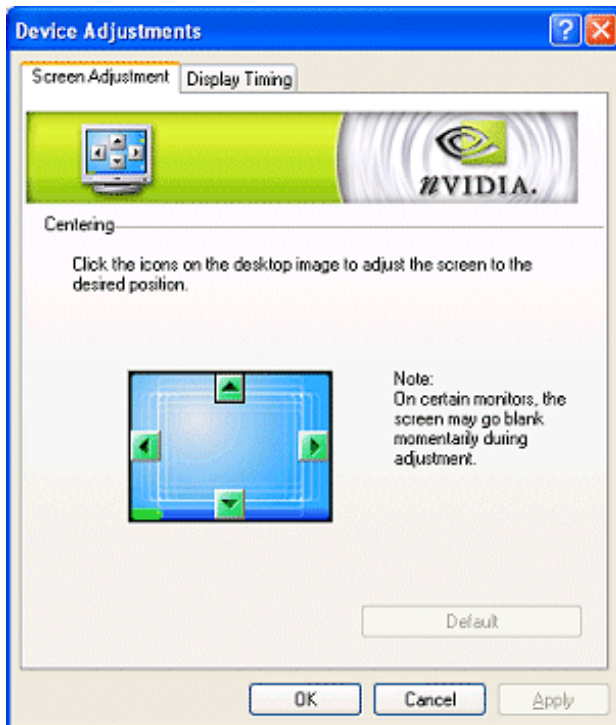
The Screen Adjustment page is shown in Figure 6.1.

To adjust the screen position on your analog display, use the arrow positioning buttons for fine adjustments.

Display Timing

The Display Timing page is shown in Figure 6.2. Select the proper timing mode for your analog display device.

- **Auto-Detect** (default setting) allows Windows to receive the proper timing information directly from the analog display device.

  Note: Some older analog display devices may not support this feature.

Figure 6.2   Display Timing Settings — Analog Display

- **General Timing Formula (GTF)** is an older but widely used timing standard. However, newer display are switching to the CVT standard.

- **Discrete Monitor Timings (DMT)** timing is a set of pre-defined VESA timings. VESA updates this standard every year. If DMT timing is available for a specific mode, the NVIDIA display driver normally selects it instead of the GTF standard.

- **Coordinated Video Timings (CVT)** became the VESA standard on March 2003. CVT supports higher resolutions better than other timing standards.

- **Fixed Aspect Ratio Timing** forces the displayed image to retain the aspect ratio of the mode rather than aspect ratio of the analog display device

    Note: The driver may place a black border around the displayed image, as needed.

- **Enable doublescan for lower resolution modes**. Enabling this setting greatly improves image quality at lower resolutions, which is most useful for full screen video or computer games.

Adjusting Digital Display Settings

If your NVIDIA GPU-based graphics card is connected to a **digital display**, follow these steps to access the display device's **Device Adjustment** window where you can configure some flat panel display settings.

To access the **Device Adjustments** window for the digital display connected to your computer, follow these steps:

1 Click **nView Display Mode** from the NVIDIA Display menu.

If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

2 Left click on the display image that represents your digital display to select it.

3 Then right click on that display image and click **Device Adjustments** to open the **Device Adjustment** window (Figure 6.3) for your digital flat panel.

Figure 6.3   Flat Panel Display Settings — Digital Display
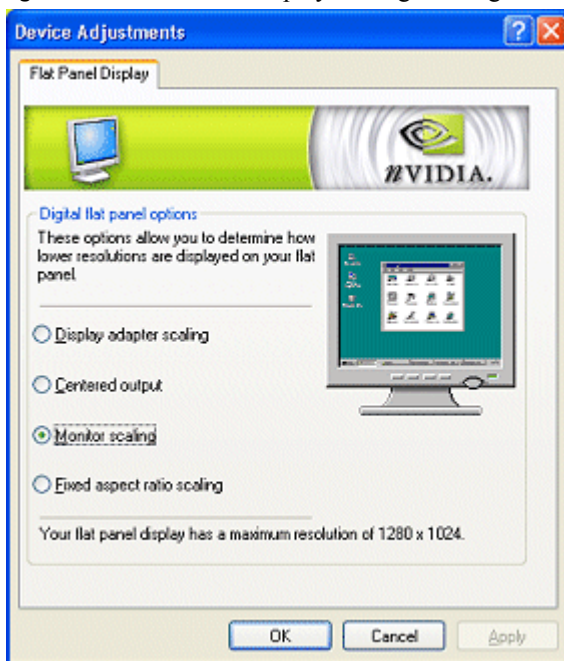
• **Display Adapter Scaling**. Enable this setting if you want lower-resolution images scaled to fit the flat panel. For example, if your flat panel has a maximum resolution of 1400x1050, an image with a resolution of 1024x768 will be scaled to appear on the screen at a 1400x1050 resolution.

- **Centered Output**. Enable this setting if you want to display lower-resolution images *as is* in the center of the flat panel. For example, if your flat panel has a maximum resolution of 1400x1050, an image with a resolution of 1024x768 will be displayed in the center of the screen at a 1024x768 resolution with black borders.

- **Monitor Scaling** is only available for digital flat panels that support multiple native resolutions.

- **Fixed Aspect Ratio Scaling**.

  Note: The availability of this setting depends on your display configuration.

  Enable this setting if you want lower-resolution images scaled to fit the flat panel but preserve the aspect ratio of the image. For example, if your flat panel has a maximum resolution of 1680 x 1050, an image with a resolution of 1024 x 768 will be scaled to appear on the screen at a 1400 x 1050 resolution with black borders.

Adjusting Television (TV) Settings

If you have a TV connected to your computer, follow these steps to access page where you can choose the correct regional format for TV reception, choose the correct TV connection mode, and configure several TV display settings.

To access the **Device Adjustments** window for the digital display connected to your computer, follow these steps:

1 Click **nView Display Mode** from the NVIDIA Display menu.

   If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

2 Left click on the display image that represents your **TV** to select it.

3 Then right click on that display image and follow *any one* of these steps:

- Click **Select TV format** to display a list of the common TV regional settings and choose a setting that applies to your region.

  For additional settings, click **Advanced** to display the **TV Settings** window (Figure 6.4). For details on using the settings on this page, see the "TV Settings" on page 83 section that follows.

- Click **Device Adjustments** to open the **TV Output** page where you can configure TV display settings. For details, see "Device Adjustments — TV Output" on page 84.

TV Settings

Figure 6.4 show a sample NVIDIA **TV Settings** page.

Signal Format

Click the **Signal format** list to access a regional signal format that is suitable for your locale. The list that appears allows you to select the format used in the country where you live.

Note: If your country is not in the list, select the country closest to your location.

Video Output Format

Click the **Video output format** connection list to specify the type of video connector, based on the output signal format supported by your regular TV or **HDTV (High Definition television)**, if you have one connected. For details on configuring an HDTV, see "Configuring HDTV" on page 87.

Figure 6.4   TV Settings
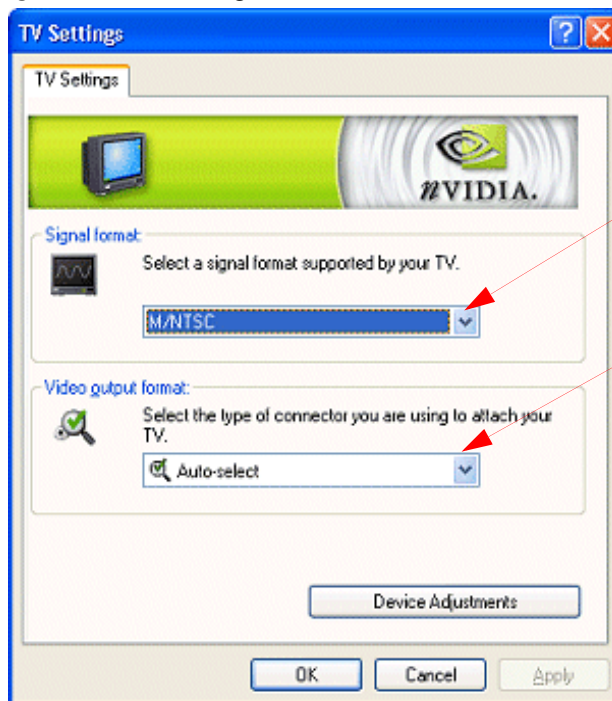
Click to display a list of **regional signal formats** and select a format.

Click to display a list of connectors and select the type you are using to attach your TV.

The default setting is **Auto-select** (Figure 6.4).

If you have the proper connector cable, **S-Video Out** generally provides a higher quality output than **Composite Video Out**.

If you are not sure about the type of video connector you should specify, choose **Auto-select**.

Device Adjustments — TV Output

You can customize your TV display settings from the TV Output page shown in Figure 6.5.

Note: Availability of settings on your TV Output page can vary from those shown in Figure 6.5 and depend on the "Internal" TV encoder on your NVIDIA GPU *or* the "external" TV encoder on the NVIDIA GPU-based graphics card you are using.

Screen Positioning

Repositioning the TV Screen — To reposition the TV screen (desktop), click any of the long arrow buttons displayed on the outer top, bottom, left, and right edges of the TV monitor icon, as shown in the TV Output page in Figure 6.5.

Figure 6.5   TV Output — Sample Page.
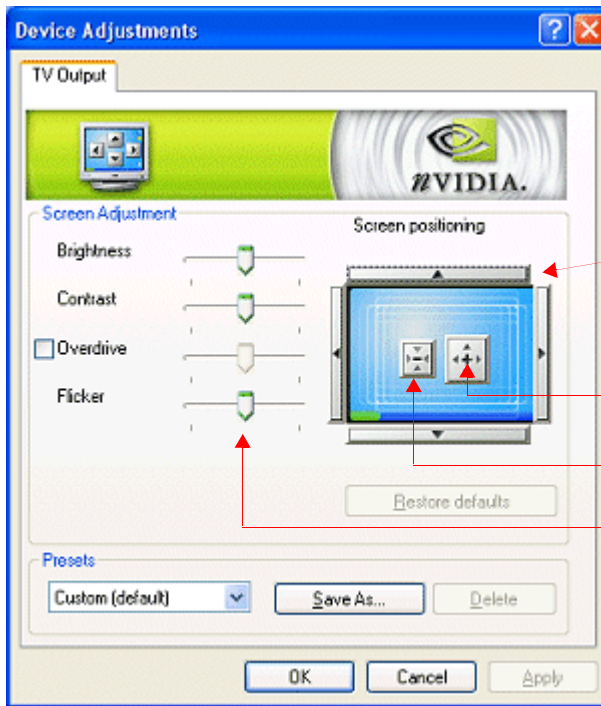
NOTE: The settings that are visible on your TV output page depends on the "internal" TV encoder of your NVIDIA GPU *or* "external" encoder on your NVIDIA GPU-based graphics card. Therefore, the settings on this sample TV Output page may not match those on your TV Output page.

To **reposition your TV screen**, click any of these long arrow buttons *outside* the top, bottom, left, or right edge of the TV display image.

To **increase the size of your TV screen**, click the arrows in the box on the right.

To **decrease the size of your TV screen,** click the arrows in the box on the left.

Use any of these sliders to adjust settings, such as **Flicker**, **Brightness, Contrast, Overdrive**, and **Overscan shift**.

Note: If the TV picture becomes scrambled or is blank due to over-adjustment, simply wait 10 seconds; the picture will automatically return to its default position. You can then begin your adjustments again. Once you have positioned the desktop where you want it, click **OK** or **Apply** to save the settings before the 10 second interval has elapsed.

Resizing the TV Screen — To increase the size of your TV screen (desktop), click the arrows in the box on the right, *inside* the TV display image, as shown in Figure 6.5.

To decrease the size of your TV screen (desktop), click the arrows in the box on the left, *inside* the TV display image, as shown in Figure 6.5.

Brightness/Contrast/Saturation

Note: Availability of the Brightness, Contrast, and Saturation slider depends on TV encoder used on your NVIDIA GPU or NVIDIA GPU-based graphics card.

Use the **Brightness, Contrast,** and **Saturation** sliders to adjust the brightness, contrast, and saturation of the TV image.

Flicker

Use the **Flicker** slider to adjust the amount of flicker filter you want applied to the TV signal.

Note: It is recommended that you turn off the **Flicker** filter completely (move slider all the way to the left) for DVD movie playback from a hardware decoder.

Overdrive

To use the Overdrive slider, select the check box and click **Apply**.

The overdrive range is between 0% and 100%.

When you set the slider to adjust "overdrive," you are simultaneously adjusting the **Brightness** and **Contrast** slider to remove or reduce edge breaks — i.e., the balloon effect of the visible edges based on content. As you increase the overdrive value, the **Brightness** is increased and the **Contrast** is decreased by a similar amount.

Overscan Shift

Note: This feature is available on the following TV encoders — Conexant 871, 872, 873, 874, 875, and integrated encoders.

Depending on the TV encoder on the NVIDIA GPU or NVIDIA GPU-based graphics card, for some HDTV output modes, there is no available downscaler to implement overscan compensation. The **Overscan shift** slider option is available for this condition.

Using the **Overscan shift** slider, you can shift the desktop by 0% to 20% (based on the position of this slider) in response to the movement of your mouse.

For example, if you start moving the mouse cursor near the Windows taskbar **Start** button, the desktop will shift up and right so that the **Start** button becomes visible. Also, if you see a black border on your TV screen, you can use the slider to enlarge the TV screen to remove the border.

Supported TV and HDTV Adjustment Features Based on TV Encoder and NVIDIA GPU

Table 6.1 lists TV encoders and the TV adjustment features they support..

Table 6.1   TV Encoders and Supported TV Adjustment Features

TV Encoders	Supported TV Adjustment Features						
	Brightness [7]	Saturation	Contrast [7]	Overdrive	Flicker	Screen Positioning	Screen Size
Integrated [5]			x		x	x	x
Chrontel [5]	x	x				x	x
Philips [5, 8]						x	
Conexant [5, 8]			x		x	x	x
Conexant [6]	x	x				x	x

5. This category of TV encoders is supported, *at minimum,* by a GeForce MX or newer NVIDIA GPU family.

6. This category of TV encoder supports NVIDIA GPU families that are older than those listed in the previous footnote **5.**

7. When using the Release 50 and later NVIDIA graphics display drivers, the **Contrast** and **Brightness** sliders are available for all NVIDIA GPU-based graphics cards that are, *at minimum*, based on the NVIDIA GeForce4 MX 420 through GeForce4 MX 460 class, independent of the TV encoder family: Also, note that any TV encoder that supports both **Contrast** and **Brightness** features automatically supports the **Overdrive** feature.

8. Conexant 875 and Philips 7108 TV encoders support HDTV.

7

CONFIGURING HDTV

Note: Read this chapter if you have an HDTV connected to your computer.

This chapter explains how to initialize and configure your HDTV display under single-display and multiple-display configurations. It discusses the following major topics:

About HDTV Features

In order to understand the various modes of HDTV operation that the NVIDIA graphics driver provides, you must first understand the limitations of the HDTV encoders available on the market today.

Traditionally, **overscan compensation** — defined as making the video image smaller to prevent the edges being hidden by the television's plastic casing — is achieved by a simple downscaler.

When operating in SDTV mode (NTSC or PAL), the Conexant 875 encoder has a downscaler that it uses to remove overscan. But when operating in HDTV output mode, the Conexant 875 is really only DAC, with color-space conversion and tri-level synchronization insertion and its downscaler is completely bypassed. That means that any downscaling would have to take place inside the NVIDIA GPU before the digital video is sent to the Conexant encoder.

However, the NVIDIA GPU also doesn't have a downscaler. Therefore, NVIDIA decided to offer other means to achieve overscan compensation by first looking at the various tasks that a computer user would want to perform using the NVIDIA graphics driver-based HDTV display.

- **Watch movies**. For watching movies, you do not need any overscan compensation for these reasons:

  - The common downscaler method of implementing overscan compensation always reduces the quality of the video being watched.

  - Sometimes there is additional electronic information recorded in the invisible portions of the video stream. This is not supposed to be seen directly by the viewer, as it can be very distracting.

  Because of these criteria, NVIDIA decided to provide a mode where no overscan compensation is done in order to give the user a true cinematic experience. This mode is called "**native mode**."

- **Browse the Web**

- **Run applications**

- **Play games**

For the above "three" activities (browse the Web, run applications, and play games) it is very important to provide some means of **overscan compensation**, so that the user can see all of the desktop and applications. If NVIDIA did not support this in some way, then the user would not be able to see, for example, the **Start** button in Windows XP or the system clock in the lower right-hand corner. But when displaying in HDTV mode through the Conexant 875 encoder, NVIDIA has no downscaler available anywhere on the graphics card to implement overscan compensation the traditional way.

For this reason, NVIDIA introduced two alternative methods, which are available as configurable options on the NVIDIA TV Settings page when configuring HDTV options:

- **Underscan** and

- **Overscan Shift**

Underscan

Underscan works by centering a lower resolution on the HDTV screen.

Because this resolution is **lower than the native resolution** of the HDTV mode, the pixels that are hidden by the outer case of the HDTV are never used. In a sense, this method is superior to the traditional downscaling method, because it does not reduce the visual quality of the video.

Also, based on market analysis, 15% overscan is common with many TVs (both SDTV and HDTV) and so 85% underscan is most often the ideal amount of overscan compensation. NVIDIA used this information to create two custom resolutions that are optimal for Web browsing, running applications, and playing games on HDTV sets. These resolutions are:

- **720p:** 1088 x 612 (85% of the full 1280x720.)

- **1080i:** 1600 x 900 (1632 x 918 is 85% of the full 1920x1080, but that is so close to 1600x900 that 1600 x 900 is used instead.)

Note: 480p and **480i:** Windows XP assumes that the lowest possible desktop resolution is 640 x 480. Therefore, NVIDIA was not able to provide a **"**underscan**"** mode for these two HDTV settings. Therefore, users must choose between "**Native**" and "**Overscan Shift**" for 480i and 480p.

Use of the **underscan** option is explained in "Configuring your HDTV for a Single Display" on page 90 and "Configuring Your HDTV Display for Dual Displays" on page 96.

Overscan Shift

"Overscan shift" works by tracking the position of the mouse cursor and slightly shifting the display when the cursor starts to become close to an edge of the desktop. This mode looks just like "native" mode because it runs at the full HDTV resolution, which causes certain elements of the desktop (such as the **Start** button and the clock) to not be visible to the user at all times. But as the mouse cursor gets close to these desktop elements, the NVIDIA driver intelligently shifts the desktop a little in order to move those elements into view.

"Overscan shift" is designed to feel as natural to the end user and panning. In fact, it is possible to have both panning *and* "overscan shift" active at the same time, in which case it is very difficult to tell where "overscan shift" ends and panning begins.

Use of the **Overscan shift** option is explained in "Configuring your HDTV for a Single Display" on page 90 and "Configuring Your HDTV Display for Dual Displays" on page 96.

Notes on Startup Functionality with HDTV Connected

Single Display

When you first start your computer, you will notice that the HDTV display has color distortion and may not fill the entire screen display. This is because when you first start your computer with a newly-installed driver, the TV signal format defaults to NTSC.

For configuration of HDTV modes, see "Configuring your HDTV for a Single Display" on page 90.

Multiple Display

When two displays are connected to your computer, you will notice both displays are mirrored or "cloned." This is nView Clone mode, which is the default configuration on first-time startup following NVIDIA driver installation.

As with first-time startup on a single-display setup, in a multi-display setup you will also notice that the HDTV screen will have color distortion and may not fill the entire screen display area. Again, as in a single-display setup, this is because when you first start your computer with a newly-installed driver, the TV signal format defaults to NTSC.

For configuration of HDTV modes, see "Configuring Your HDTV Display for Dual Displays" on page 96.

Configuring your HDTV for a Single Display

Note: The procedures explained in this section assume that you have a single-display setup where you have only *one* HDTV display connected to your computer.

Single Display — Native Resolution

For further details on the concept of native resolution, see "About HDTV Features" on page 87 and the sections it comprises.

1 After installing the NVIDIA graphics driver (Release 50 or higher), right click on your Windows desktop.

2 Click **TV** to open the NVIDIA Display menu and control panel.

3 Select **TV Setting** from the NVIDIA Display menu on the left to display the associated page on the right (Figure 7.1).

4 Click the list in the **Signal format** section — Figure 7.1.

You have an option of many source types including **PAL**, **NTSC**, and **HDTV** modes. HDTV Modes include

- **480p (720x480)**

- **480i (720x480)**

- **720p (1280x720)**

- **1080i (1920x1080)**

Figure 7.1   NVIDIA TV Settings for HDTV
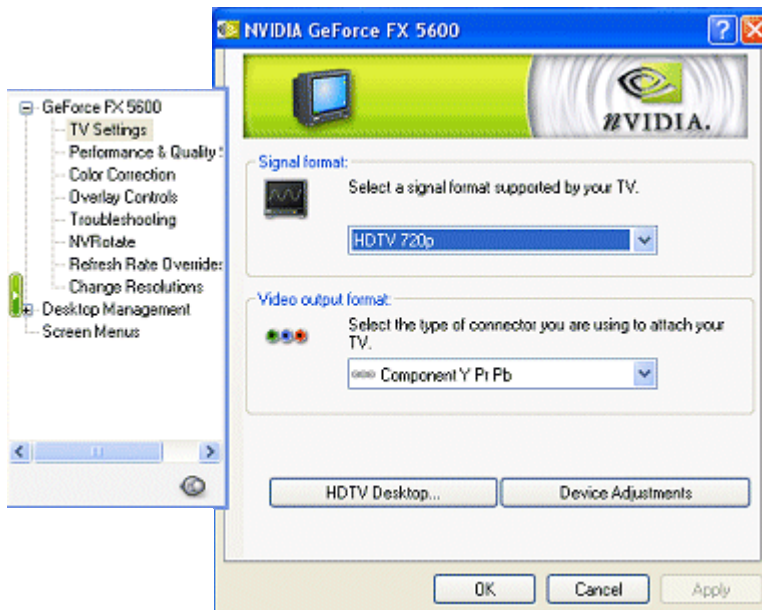
5 Select a desired HDTV mode (for example, 480p) and click **Apply.**

An **HDTV Overscan Configuration** dialog box appears (Figure 7.2).

6 Select the option labeled **Keep the native HDTV Resolution** and click **OK**

Native HDTV resolution will set the resolution you selected in the previous step to fill the entire display area of the HDTV screen.

7 Click **OK** to display the Display Settings prompt — Figure 7.3.

8 Click **OK** to display the Confirm Display Settings prompt — Figure 7.4.

Figure 7.2   NVIDIA HDTV Overscan Configuration — Native HDTV Resolution
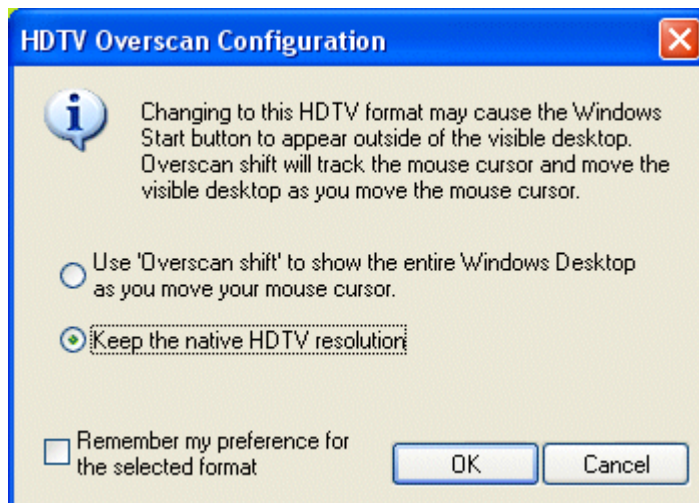
Figure 7.3   Display Settings Prompt
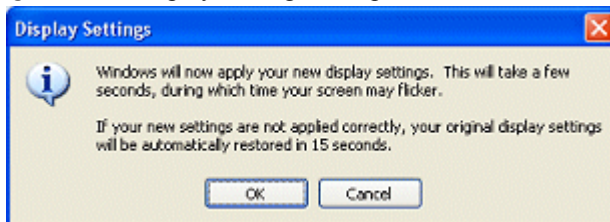
Figure 7.4   Confirm Display Settings Prompt
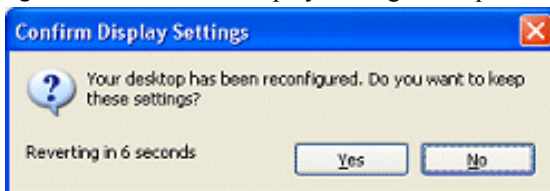
9 If you are satisfied with the appearance of your display, click **Yes** and you are
done setting the native HDTV resolution.

10 If you are not satisfied with the appearance of your display, click **No** to revert
the display to its previous settings. You are returned to the TV Settings page
(Figure 7.1). Go the next step.

11 Click the list in the **Signal format** section — Figure 7.4.

12 Try the HDTV modes one at a time, until you arrive at the mode that works
for you. For each HDTV mode that you try, confirm each of the following:

- Mode is set properly free of corruption and distortion.
- Mode is set to desired resolution detailed in step 5.
- Display is rendered to the full extents of the display area.
- Display is rendered free of panning.

Single Display — Overscan Shift

For details on the concept of "overscan shift," see "Overscan Shift" on page 89.

1 After installing the NVIDIA driver (Release 50 or higher), right click on your Windows desktop.

2 Click **TV** to open the NVIDIA Display menu and control panel.

3 Select **TV Setting** from the NVIDIA Display menu on the left to display the associated page on the right (Figure 7.1).

4 Click the list in the **Signal format** section.

The list contains many source types including **PAL**, **NTSC**, and **HDTV** modes. HDTV Modes include

- **480p (720x480)**
- **480i (720x480)**
- **720p (1280x720)**
- **1080i (1920x1080)**

Note: Overscan shift configuration is supported by all four HDTV modes.

5 Select a desired HDTV mode and click **Apply**.

An **HDTV Overscan Configuration** dialog box appears (Figure 7.2).

6 Select the **Use overscan shift . . .** option (Figure 7.5) and click **OK**.

The Display Settings prompt in Figure 7.3 appears.

7 Click **OK** to display the Confirm Display Settings dialog box (Figure 7.4).

8 If you are satisfied with the appearance of your display, click **Yes** and you are done setting the Overscan shift resolution.

9 If you are not satisfied with the appearance of your display, click **No** to revert the display to its previous settings. You are returned to the TV Settings page (Figure 7.1). Go the next step.

Figure 7.5   NVIDIA HDTV Overscan Configuration — "Use Overscan shift" Option
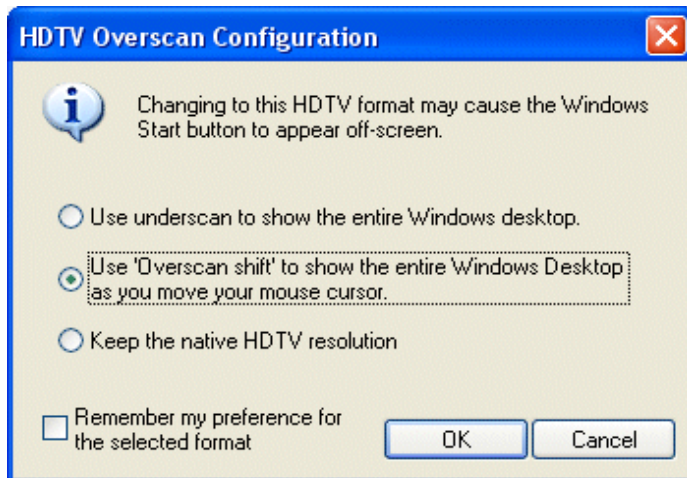
10 Click the list in the **Signal format** section and try the HDTV modes one at a time, until you arrive at the mode that works for you. For each HDTV mode that you try, confirm each of the following:

- Mode is set properly free of corruption and distortion.
- Mode is set to desired resolution detailed in step 5.
- Display is rendered to the full extents of the display area.
- Display is rendered free of panning.

Single Display — Underscan

For details on the concept of "underscan," see "Underscan" on page 88.

Note: The "underscan" configuration is supported *only* under the 720p and 1080i HDTV modes. Underscan is not required for the 480i and 480p HDTV modes.

1 After installing the NVIDIA driver (Release 50 or higher), right click on your Windows desktop.

2 Click **TV** to open the NVIDIA Display menu and control panel.

3 Select **TV Setting** from the NVIDIA Display menu on the left to display the associated page on the right (Figure 7.1).

4 Click the list in the **Signal format** section.

The list contains many source types including **PAL**, **NTSC**, and **HDTV** modes. HDTV Modes include

- **480p (720x480)**
- **480i (720x480)**
- **720p (1280x720)**
- **1080i (1920x1080)**

5 Select an HDTV mode and click **Apply**. An **HDTV Overscan Configuration** dialog box appears (Figure 7.2).

6 Select the **Use underscan . . .** option (Figure 7.6) and click **OK**.

Figure 7.6   NVIDIA HDTV Overscan Configuration — "Use underscan" Option
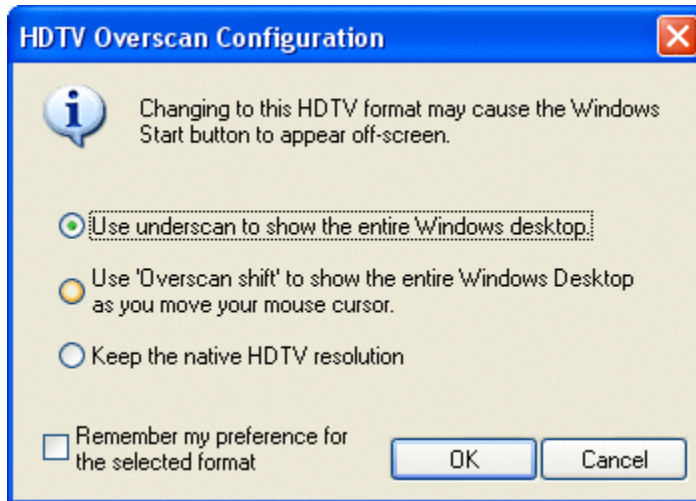
A new overscan configuration window appears. This is a warning to tell you that the display resolution is being reduced.

7 You can use the default lower resolution.

   a Click **No**.

   b Click **OK** to confirm mode change.

   c Click **Yes** to confirm that mode was set correctly.

   d Verify each of the following:

   Mode is set properly free of corruption (Should be slightly smaller than display area)

   Mode is set to desired resolution (720p – 1088x612 / 1080i – 1600x900)

8 You have the option to fine tune the resolution

   a Click **Yes**

    b Click **OK** to confirm mode set.

    c Click **Yes** to confirm mode set correctly. A Change Resolution page appears where you can use a slider to fine tune the resolution.

    d Verify mode is set properly free of corruption — should be slightly smaller than display area.

    e Verify mode is set to desired resolution (720p – 1088x612 / 1080i – 1600x900)

    f Verify resolution slider is functional.

    g Repeat steps **d)** through **f)** for all custom modes.

Note: Custom modes scale to the center of the monitor — which is by design.

Configuring Your HDTV Display for Dual Displays

Note: These procedures assume that you have at least two displays connected to your computer, where *one* is an HDTV display and the other is a digital or analog display device.

Clone Mode — Quick Set

You can use the nView Display Mode page "quick set" function to set the desired TV signal format for your HDTV display.

1 After installing the NVIDIA driver (Release 50 or higher), right click on your Windows desktop.

2 Click **TV** to open the NVIDIA Display menu and control panel.

3 Select **nView Display Mode** from the NVIDIA Display menu on the left to display the associated page on the right (Figure 7.7).

Two monitor icons are shown in this page (CRT/DFP and a TV).

4 Right click on the TV display image and click the **Select TV format** .... option to display a long list of modes, including **PAL**, **NTSC**, and **HDTV** modes (Figure 7.7).

HDTV Modes include:

- **480p (720x480)**
- **480i (720x480)**
- **720p (1280x720)**
- **1080i (1920x1080**

Figure 7.7   nView Clone Mode — Quick Set TV Formats
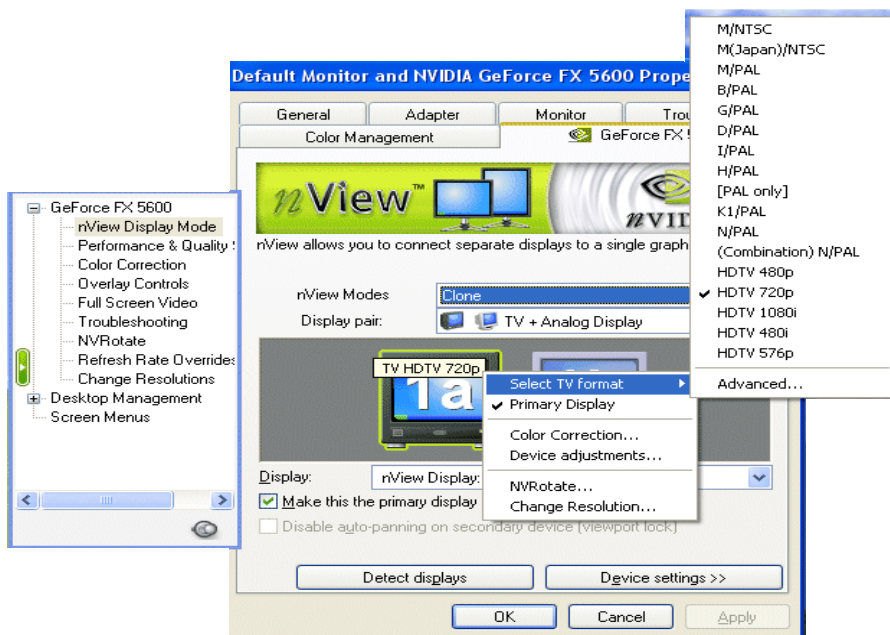
5 Select an HDTV mode.

6 Click **Apply**. A message prompts you to confirm the mode set.

7 Click **Yes**.

8 Continue through all HDTV modes listed and verify the following for each mode that you try:

   a Mode is set properly — free of corruption and distortion.

   b Mode is set to the desired resolution.

   c Display is rendered to the full extents of the display area.

Notes — Clone Mode: Quick Set

• Performing this "quick set" will *either* default to "overscan" mode for HDTV display (HDTV will pan following cursor position.) or the HDTV Overscan Configuration dialog box may be displayed.

• When changing HDTV modes, the primary display will set to the same resolution as the secondary HDTV display.

• Changes in the resolution of the primary display device may affect the secondary HDTV display.

- Changing the primary display to a higher resolution than the secondary HDTV display will cause the secondary HDTV desktop to pan.

- Changing the primary display to a lower resolution than the secondary HDTV display will cause the secondary HDTV display to shrink to the center leaving a black border around the extents of the rendered display.

Clone Mode — Native Resolution

For further details on the concept of native resolution, see "About HDTV Features" on page 87 and the sections it comprises.

1 After installing the NVIDIA driver (Release 50 or higher), right click on your Windows desktop.

2 Click **TV** to open the NVIDIA Display menu and control panel.

3 Select **nView** Display Mode from the NVIDIA Display menu on the left to display the associated page on the right (Figure 7.7).

4 Select **nView Display Mode** from the NVIDIA Display menu on the left to display the associated page on the right. Two monitor icons are shown in this page (CRT/DFP and a TV) — Figure 7.7.

5 Right click on the TV display image and click the **Select TV format** ....

6 Then click **Advanced** to open the another window where you can select HDTV modes, similar to the page shown in Figure 7.2 when selecting a format for a *single* display (Figure 7.1).

7 Click the list in the **Signal format** section.

   The list contains many source types including **PAL**, **NTSC**, and **HDTV** modes. HDTV modes include

   - **480p (720x480)**

   - **480i (720x480)**

   - **720p (1280x720)**

   - **1080i (1920x1080)**

8 Select your desired HDTV mode (Ex. 480p)

9 Click **Apply**. An HDTV Overscan Configuration menu appears.

10 Highlight **Keep the native HDTV resolution** and click **OK**

   Native HDTV resolution will set that resolution and will fill the entire display area of the HDTV display.

11 Click **OK** to set mode. You will be prompted to confirm the mode was set properly.

12 Continue through all HDTV modes listed and confirm each of the following:

- Mode is set properly free of corruption and distortion.
- Mode is set to desired resolution detailed above.
- Display is rendered to the full extents of the display area.
- Display is rendered free of panning.

Notes — Clone Mode: Native Resolution

- When changing HDTV modes, the primary display will set to the same resolution as the secondary HDTV display.
- Changes in the resolution of the primary display device may affect the secondary HDTV display.
- Changing the primary display to a higher resolution than the secondary HDTV display will cause the secondary HDTV desktop to pan.
- Changing the primary display to a lower resolution than the secondary HDTV display will cause the secondary HDTV display to shrink to the center leaving a black border around the extents of the rendered display.

Known Issues — Clone Mode: Native Resolution

Changes settings may revert to the original mode when you click **OK** to close the nView Display mode page.

Clone Mode – Overscan Shift

For details on the concept of "overscan shift," see "Overscan Shift" on page 89.

1 After installing the NVIDIA driver (Release 50 or higher), right click on your Windows desktop.

2 Click **TV** to open the NVIDIA Display menu and control panel.

3 Select **nView Display Mode** from the NVIDIA Display menu on the left to display the associated page on the right (Figure 7.7).

4 Select **nView Display Mode** from the NVIDIA Display menu on the left to display the associated page on the right — Figure 7.7.

Two monitor icons are shown in this page (CRT/DFP and a TV).

5 Right click on the TV display image and click the **Select TV format** ....and click **Advanced** (at the bottom of the list) to open the another window where you can select HDTV modes.

> **Note:** This is the same page shown in Figure 7.2 when selecting **TV Settings** from the NVIDIA Display menu with a *single* HDTV display connected (Figure 7.1).

6 Click the list in the **Signal format** section.

The list contains many source types including **PAL**, **NTSC**, and **HDTV** modes. HDTV modes include:

- **480p (720x480)**
- **480i (720x480)**
- **720p (1280x720)**
- **1080i (1920x1080)**

7 Select a desired HDTV mode.

8 Click **Apply**. An HDTV Overscan Configuration dialog box appears.

9 Click the **Use overscan shift....**option.

10 Click **OK** to set mode. You will be prompted to confirm the mode was set properly.

11 Continue through all HDTV modes listed and confirm each of the following:

- Mode is set properly free of corruption and distortion.
- Mode is set to desired resolution detailed above.
- Display is rendered to the full extents of the display area.
- Display is rendered free of panning.

Notes — Clone Mode: Overscan Shift

- When changing HDTV modes, the primary display will set to the same resolution as the secondary HDTV display.
- Changes in the resolution of the primary display device may affect the secondary HDTV display.
- Changing the primary display to a higher resolution than the secondary HDTV display will cause the secondary HDTV desktop to pan.
- Changing the primary display to a lower resolution than the secondary HDTV display will cause the secondary HDTV display to shrink to the center leaving a black border around the extents of the rendered display.

Known Issue — Clone Mode: Overscan Shift

Changes settings may revert to the original mode when you click **OK** to close the nView Display mode page.

Clone Mode – Underscan

For details on the concept of "underscan," see "Underscan" on page 88.

Note: When using nView Clone mode, the Underscan Supported only with 720p and 1080i. This feature is not required for 480i/480p.

1 After installing the NVIDIA driver (Release 50 or higher), right click on your Windows desktop.

2 Click **TV** to open the NVIDIA Display menu and control panel.

3 Select **nView Display Mode** from the NVIDIA Display menu on the left to display the associated page on the right. You will see two monitor icons in this page (CRT/DFP and a TV) as shown in Figure 7.7.

4 Right click on the TV display image and click the **Select TV format** ....and click **Advanced** (at the bottom of the list) to open the another window where you can select HDTV modes.

    Note: This is the same page shown in Figure 7.2 when selecting **TV Settings** from the NVIDIA Display menu with a *single* HDTV display connected (Figure 7.1).

5 Click the list in the **Signal format** section.

The list contains many source types including **PAL**, **NTSC**, and **HDTV** modes. HDTV modes include:

- **480p (720x480)**
- **480i (720x480)**
- **720p (1280x720)**
- **1080i (1920x1080)**

6 Select an HDTV mode.

7 Click **Apply**. An **HDTV Overscan Configuration** dialog box appears.

8 Click the **Use underscan . . .** option and click **OK**.

A new overscan configuration window appears. This is a warning to tell you that the display resolution is being reduced.

9 You can use the default lower resolution.

    a Click **No**.

    b Click **OK** to confirm mode change.

    c Click **Yes** to confirm that mode was set correctly.

     d Verify that the mode is set properly and free of corruption — should be slightly smaller than display area.

     • Verify that the mode is set to desired resolution (720p – 1088x612 / 1080i – 1600x900)

10 You have the option to fine tune the resolution.

    a Select **Yes**

    b Click **OK** to confirm mode set

    c Click **Yes** to confirm mode set correctly. A Change Resolution page appears where you can use a slider to fine tune the resolution.

    d Verify that the mode is set properly free of corruption — should be slightly smaller than display area.

    e Verify mode is set to desired resolution (720p – 1088x612 / 1080i – 1600x900)

    f Verify resolution slider is functional.

    g Repeat steps **d)** through **f)** for all custom modes.

Note: Custom modes scale to the center of the monitor — which is by design.

Notes — Clone Mode: Underscan

• When changing HDTV modes, the primary display will set to the same resolution as the secondary HDTV display.

• Changes in the resolution of the primary display device may affect the secondary HDTV display.

• Changing the primary display to a higher resolution than the secondary HDTV display will cause the secondary HDTV desktop to pan.

• Changing the primary display to a lower resolution than the secondary HDTV display will cause the secondary HDTV display to shrink to the center leaving a black border around the extents of the rendered display.

Known Issues — Clone Mode: Underscan

• Changes settings may revert to the original mode when you click **OK** to close the nView Display mode page.

• You may not be able to select a custom resolution in nView Clone mode.

Troubleshooting HDTV Configuration

Problem: For 480i/p, 640x480 is the native solution, Can NVIDIA support this resolution?

Answer: Actually, the native resolution for 480i and 480p is 720x480. NVIDIA does fully support 640x480 also. However, Windows XP hides that mode from the user. Note that this is a Windows XP feature and, therefore, cannot be changed by NVIDIA.

To access this resolution, follow these steps:

1 Right click on your Window desktop and select **Properties** from the desktop menu. The Windows Display Properties window appears.

2 Click the **Settings** tab.

3 Click the **Advanced** option.

4 Click the **Adapter** tab.

5 Click **List All Modes** and locate the resolution.

Problem: For 720p/1080i, we cannot find the resolution 1280x720 (720p) and 1920x1080 (1080i).

Answer: You are probably using nView Clone or an nView Span display mode where HDTV is the *secondary* display.

Note: When using nView Clone or an nView Span mode, the secondary display should not be set to a higher resolution than the primary. If, however, that is your current setting, you can solve the problem in one of three ways:

• Make the HDTV be the primary display.

• Use a different display for the primary that can handle higher resolutions

• Do not use the nView Clone or Span modes.

Problem 1: Screen is shrunk. The screen shrink should only be horizontal.

Answer: This is because 720p is 1280 pixels wide, but your desktop is only 1024 wide.

Problem 2: The horizontal edges of the screen are cut. For example, we only see half of the Windows taskbar.

Answer: This means that your HDTV has more than 18% overscan — therefore, some of the 768 lines are not visible. The solution is to use the

Overscan shift setting on the HDTV display's NVIDIA Device Adjustment page.

See "Overscan Shift" on page 89 for a description of this feature.

See "Single Display — Overscan Shift" on page 93 *or* "Clone Mode – Overscan Shift" on page 99 for details on using this option.

_____

Problem 1: The TV is set to full screen display. The Windows desktop display is panning.

Answer: You are not exactly seeing the "panning" feature — but rather the **overscan shift** feature. See "Overscan Shift" on page 89 for a description of this feature.

Problem 2: The top and bottom edges of the desktop are cut. For example, we only see half of the Windows taskbar.

Answer: You need to increase the amount of "overscan shift" by using the **Overscan shift** option from the HDTV display's NVIDIA Device Adjustment page. The amount required will vary, based on the type of HDTV you are using, and is not detectable.

See "Overscan Shift" on page 89 for a description of this feature.

See "Single Display — Overscan Shift" on page 93 *or* "Clone Mode – Overscan Shift" on page 99 for details on using this option.

8

CONFIGURING KEY FORCEWARE GRAPHICS DRIVER FEATURES

This chapter explains how to configure key ForceWare graphics driver features:

Adjusting Desktop Colors

Accessing the Desktop Colors Page

Note: In order to access the Color Correction page, the color setting on the Windows Display Properties Settings page must be set to 16 bit or higher. A setting of "256 colors" will not enable the Color Correction page.

Follow *any one* of these methods to access the Color Correction page (Figure 8.1).

- From the NVIDIA Display menu, click **Color Correction**

- From the nView Display Modes page:

    a Right-click one of the display images *or* click the **Device Settings >>** option.

    b Select the **Color Correction** option.

- From the Overlay Controls or Full Screen Video page, click **Adjust Color**.

Figure 8.1   Color Correction Settings
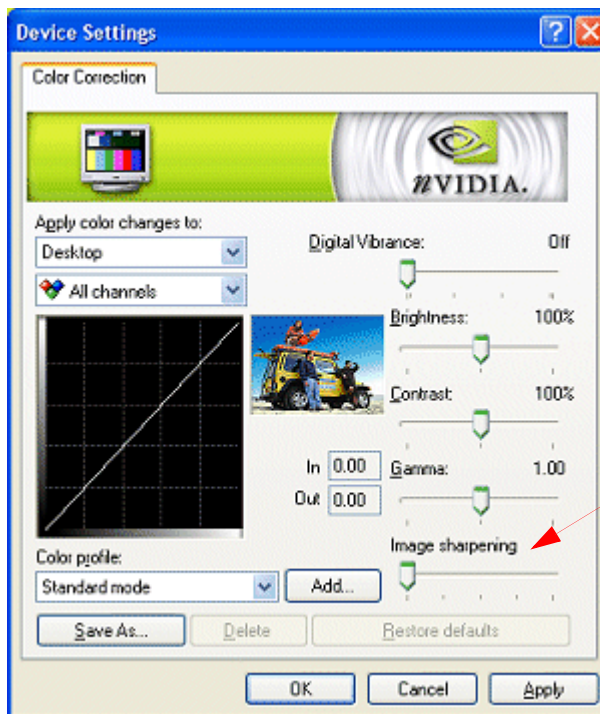
Image Sharpening is available with GeForce FX and newer NVIDIA GPU-based graphics cards.

Color Correction Settings

Digital Vibrance

Note: The **Digital Vibrance Control (DVC)** feature supported by the GeForce2 MX and newer series of NVIDIA GPUs.

DVC, a mechanism for controlling color separation and intensity, boosts the color saturation of an image so that all images — including 2D, 3D, and video — appear brighter and crisper (even on flat panels) in your applications.

Digital Vibrance can be turned *off* or set to different levels from *low* to *high* as shown in Figure 8.1.

Brightness, Contrast, and Gamma

Note: The **Color profile** option on this page must be set to **Standard Mode** in order to use the **Brightness**, **Contrast**, and **Gamma** sliders.

To adjust the **Brightness**, **Contrast**, or **Gamma** values for the selected color channel, click and move the sliders until you see the desired adjustment.

Notice that the color curve graph changes as you adjust values using these sliders, which also reflects in the values of the **Input** and **Output** boxes displayed on the left of the Gamma slider.

Adjusting brightness, contrast, and gamma values helps you compensate for variations in luminance between a source image and its output on a display device. This is useful when working with image processing applications to help provide more accurate color reproduction of images (such as photographs) when they are displayed on your screen.

Also, many 3D-accelerated games may appear too dark to play. Increasing the brightness and/or gamma value equally across all channels will make these games appear brighter, making them more playable.

For related information, see "Color Channels" on page 108 and "Color Curve Graph" on page 108.

Apply Color Changes to...

The **Apply color changes to** list appears at the top of the Color Correction page.

Click the list to display the settings below and then select a setting.

• **All** applies the color correction settings on this page to your Windows desktop and to video playback.

• **Desktop** applies the color correction settings to your Windows desktop.

- **Overlay/VMR** applies color correction settings on this page to video playback that uses overlay hardware.

  Note: Current generation hardware overlay does not support per-component (Red, Green, Blue) color correction, but instead exposes a single. unified color correction channel. Therefore, if you select this setting, only the **All Channels** setting in the color channels list is available. (See Color Channels in the next section.)

- **Full Screen Video** applies color correction settings on this page to any full screen video that is running on your display.

Color Channels

The color channels list appears directly above the color curve graph on the Color Correction page.

Click the color channel list to select a color channel.

You can adjust the **Red**, **Green**, and **Blue** channels by selecting each color separately or by selecting the composite choice **All channels**, which is the default setting.

Note: If you select the **Overlay/VMR** setting from the **Apply color changes to** list (see "Apply Color Changes to..." on page 107), only the **All Channels** setting is available.

When you select a color channel, notice that the following takes place:

- The color appears in the graph of the color correction curve below.

- Moving the **Brightness/Contrast/Gamma** sliders changes the appearance of the colored line/curves in the graph in real time.

For additional information on the graph of the color correction curve, see Color Curve Graph below.

Color Curve Graph

The graph below the color channels list represents the color correction curve. Input values are represented along the x-axis and shown numerically in the **In**(put) edit box. The adjusted output values are represented along the y-axis and the adjusted output values are shown numerically in the **Out**(put) edit box.

If the **Color profile** option is set to **Standard Mode**, this curve changes dynamically as you adjust the **Contrast**, **Brightness**, or **Gamma** values using the sliders.

If the **Color profile** option is set to **Advanced Mode**, you cannot use the Contrast, Brightness, or Gamma sliders but you can modify this curve in real-time by using any *one* of these methods:

- Click the curve to create a control point on it. Repeat the step to create additional points, as needed.

- Click the curve and drag the mouse to modify the curve, which also dynamically modifies the values in the **In**put and **Out**put edit boxes.

- Enter a value that is less than or equal to 1 in the **In**put and/or **Out**put edit boxes.

- Select one or more control points and then press the arrow keys on your keyboard to adjust the curve and numeric values in the **In**put/**Out**put edit boxes.

- To insert several control points, click the curve to select a point and then press **Ins** (Ins key on your keyboard) one or more times, depending on the number of points you want to add, which is limited by any other points that may already exist on the curve.

- To remove a control point, select the point and drag it out of bounds or select the point and press **Del**.

- To select multiple control points, you can either press down the **Ctrl** key and select the points you want with your mouse, or left click and drag the mouse around the items to create a box that selects the items.

If you have loaded an **ICC profile**, the color correction curves loaded from the ICC profile are displayed in the graph. Use a professional publishing application to perform color matching based on information in the ICC profile.

Image Sharpening

Note: This option is only available on GeForce FX and later NVIDIA GPU-based graphics cards.

Use the Image Sharpening slider to adjust the sharpness of the image quality by amplifying high frequency content.

Color Profile

The Color Profile option displays a list of available color correction profiles.

- Specify **Standard Mode** if you want to adjust color correction settings using the Contrast, Brightness, and Gammas sliders.

- Use **Advanced Mode** if you want to adjust color correction settings by manually inserting, dragging, and removing control points along the curve shown in the graph. See "Color Curve Graph" on page 108.

  Note: When this option is enabled, the **Contrast**, **Brightness**, or **Gamma** slider settings are not available.

- **Custom** settings you may have saved are also shown in this list. To activate a custom profile, select it from the list and click **Apply**.

Add (ICC Profile Mode)

1 Click **Add** to display a dialog box from which you can load an ICC profile that contains color correction curves.

2 Enter the file name of the ICC profile and click **OK** to load the file.

The ICC profile just added now appears in the **Color profile** list.

Note: Once you load this ICC profile, the **Brightness**, **Gamma**, and **Contrast** sliders are disabled.

Other Settings

- **Save as** lets you save the current color settings as a custom setting. Saved settings will then be added to the **Color Profile** list as a **"**custom**"** setting.

- **Delete** lets you delete the custom color setting currently selected in the list.

- **Restore Defaults** restores all color values to the hardware factory settings.

Adjusting Performance and Quality Settings

The following topics are discussed in this section:

Accessing the Performance & Quality Page

To access the Performance & Quality Settings page, click **Performance & Quality Settings** (Figure 8.2) from the NVIDIA Display menu.

If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

Application Profiles

Application profiles refer to saved files containing NVIDIA **OpenGL** and **Direct3D** driver setting specific to applications and generally games.

• **Global Driver Settings**.The Global Driver Settings option (the default application profiles setting) appears when you first open the Performance & Quality Settings page (Figure 8.2).

• **Pre-defined Profiles**. Click the **Application Profiles** list box to view the NVIDIA-supplied pre-defined game-specific profiles (Figure 8.3). You can select any one of these profiles and then click **Apply** for the setting to take effect

Figure 8.2   Performance and Quality Settings Page
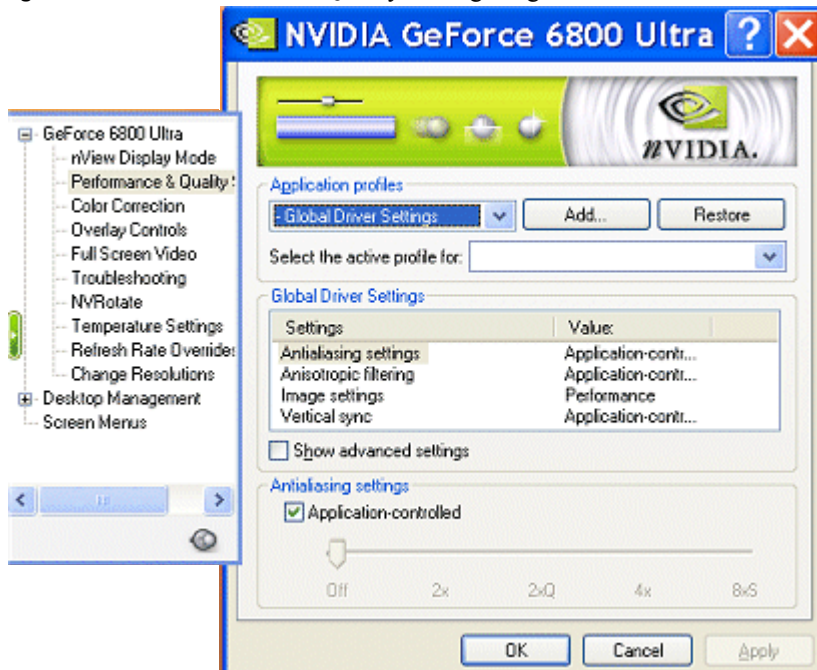
Figure 8.3   Sample List of NVIDIA-Supplied Application Profiles
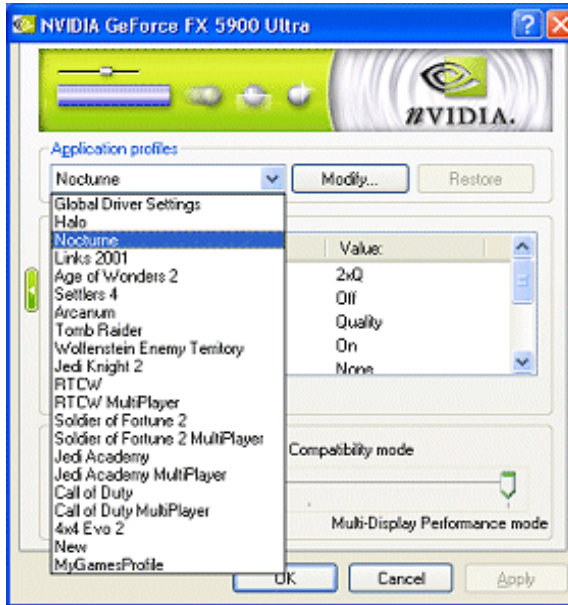
About Global Driver Settings

The list that appear under the **Global driver settings** section contain OpenGL and Direct3D based settings (described in "Global Driver Settings — Default" on page 112 and "Global Driver Settings — Advanced" on page 117), most of which you can modify under these conditions:

• Application profiles list is set to Global driver setting.

• Application profiles list is set to one of the pre-defied profiles supplied by NVIDIA.

• You are adding a new profile.

Note: Certain settings, such as the **Extension limit** advanced setting, cannot be modified.

Global Driver Settings — Default

Note: Availability of options described below may depend on the type of NVIDIA GPU that your graphics card is using and/or the type of graphics card you are using.

Antialiasing Settings

Antialiasing is a technique used to minimize the "stairstep" effect sometimes seen along the edges of 3D objects. Your selection can range from turning antialiasing completely off to selecting the maximum amount possible for a particular application. Use this slider to set the degree of antialiasing to be used in Direct3D and OpenGL applications.

Tips on setting antialiasing modes: Some antialiasing settings require a large amount of video memory. If the mode you requested requires more video memory than available and you see unexpected results, try selecting the next lower mode, and so on, until you achieve the desired result. You may also want to experiment with different screen resolutions, refresh rates, and/or color depths until you arrive at a setting or combination of settings for antialiasing to work.

• **Application-controlled**. If this check box is selected (shown in the left screenshot in Figure 8.4), the configurable options are automatically disabled because the application determines the antialiasing settings.

   Note: To configure options with the slider, you must clear this check box and click **Apply**, as shown in the right screenshot in Figure 8.4.

Figure 8.4   "Antialiasing Settings" with "Application-controlled" enabled and disabled
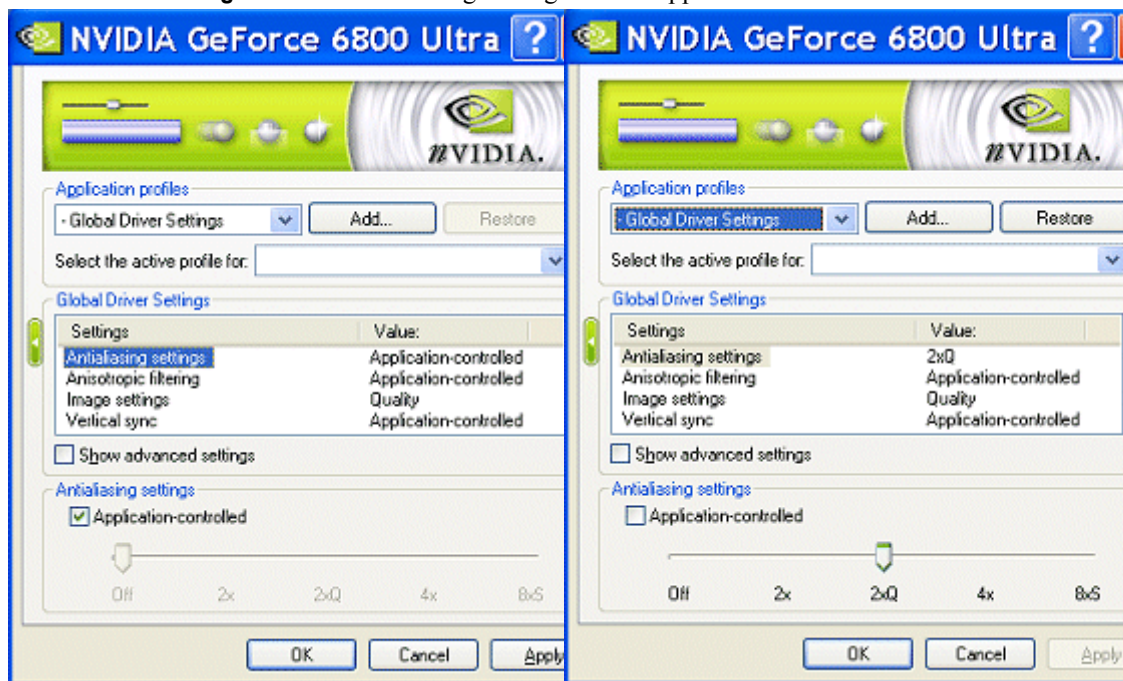
• **Off** disables antialiasing in 3D applications. Select this option if you require maximum performance in your applications.

- **2x** enables antialiasing using the 2x mode. This mode offers improved image quality and high performance in 3D applications.

- **4x** enables antialiasing using the 4x mode. This mode offers better image quality but can slightly reduce performance in 3D applications.

- **6xS** affects only Direct3D applications and enables antialiasing using the 6xS mode. This mode offers better image quality than the 4xS mode.

- **8x** enables antialiasing using the 8x mode. This mode offers better image quality than the 6xS mode for Direct3D applications and better image quality that the 4x mode for OpenGL applications.

- **16x** enables antialiasing using the 16x mode. This mode offers better image quality than the 8x mode.

Anisotropic Filtering

Anisotropic filtering is a technique used to improve the quality of textures applied to the surfaces of 3D objects when drawn at a sharp angle. Use the Anisotropic filtering slider to set the degree of anisotropic filtering for improved image quality. Enabling this option improves image quality at the expense of some performance.

- **Application-controlled**. If this check box is selected (shown in the left screenshot in Figure 8.5), the configurable options are automatically disabled because the application determines the anisotropic filtering settings.

Figure 8.5   "Anisotropic Filtering" — "Application-controlled" enabled and disabled
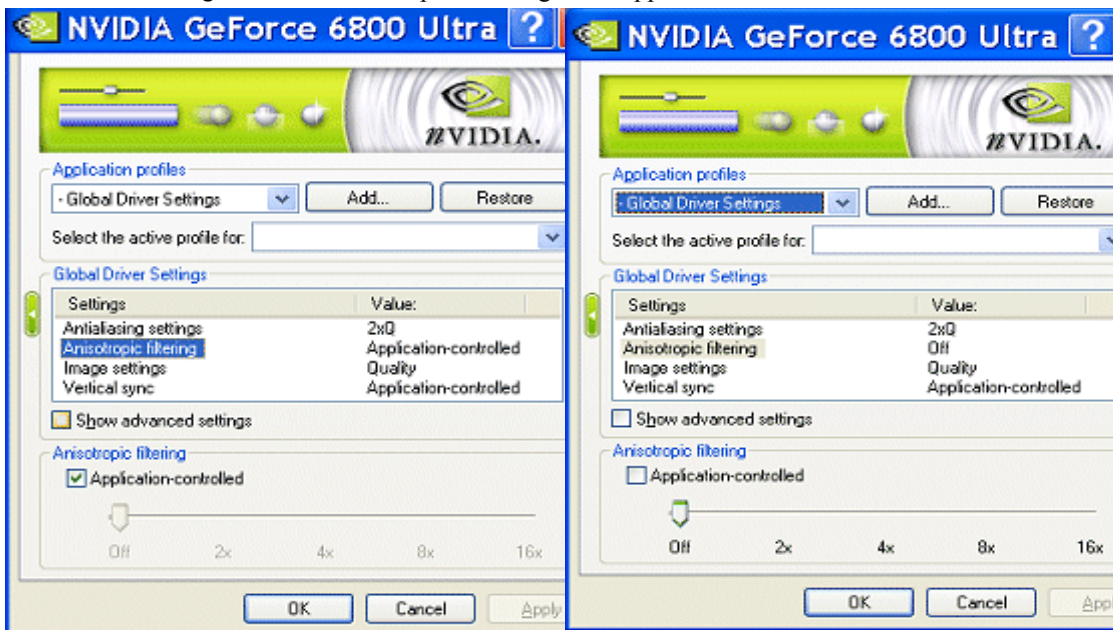
> **Note:** To configure options with the slider, you must clear this check box and click **Apply**, as shown in the right screenshot in Figure 8.5.

* **Off** disables anisotropic filtering.

* **1x** results in maximum application performance.

* **2x** through **8x** results in improved image quality but at some expense to application performance. Higher values yield better image quality while reducing performance.

Image Settings

In the current Release 60 driver, you have full control over the image quality in your applications. The Image Settings slider contains the following settings: **High Performance**, **Performance**, **Quality**, and **High Quality**. The slider shown in Figure 8.6 is set to **Quality**.

Figure 8.6   Image Settings Slider
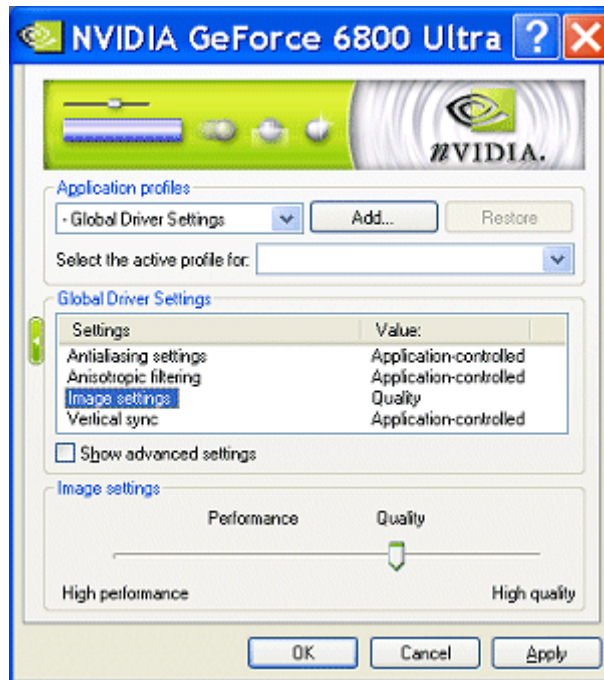
* **High Performance** offers the highest frame rate possible resulting in the best performance for your applications.

* **Performance** offers an optimal blend of image quality and performance. The result is optimal performance and good image quality for your applications.

- **Quality** is the default setting that results in optimal image quality for your applications.

- **High Quality** results in the best image quality for your applications.

  Note: This setting is not necessary for average users who run game applications. It is designed for more advanced users to generate images that do not take advantage of the programming capability of the texture filtering hardware.

  Note: Table 8.1 contains a summary of all the Image Settings and the optimizations they enable. For further details, also see "Anisotropic Optimization" on page 120 and "Trilinear Optimization" on page 121.

Table 8.1   Image Settings and Optimizations

	Image Settings		
	High Quality	**Quality**	**Performance/High Performance**
Trilinear Optimizations *enabled*	N/A (full trilinear)	Optimized trilinear	Highly optimized trilinear
Trilinear Optimizations *disabled*	N/A (full trilinear)	Full trilinear	Full trilinear
Anisotropic Optimizations** *enabled*	N/A (forced *off*)	Trilinear* with base texture	
Bilinear other textures	Bilinear all textures		
Anisotropic Optimization *disabled*	N/A (forced *off*)	Trilinear* all textures	Trilinear* all textures

* Trilinear functionality is subject to Trilinear optimization control.

** Anisotropic optimization *only affects* Direct3D applications.

Vertical Sync

Vertical Sync settings specify how vertical synchronization is handled in OpenGL applications.

- **Off** keeps vertical synchronization disabled unless an application specifically requests otherwise.

- **On** keeps vertical synchronization enabled unless an application specifically requests otherwise.

Global Driver Settings — Advanced

Show Advanced Settings

When you select the **Show advanced settings** check box, additional advanced settings appear in the Global driver settings list. These settings, intended for advanced users, are shown in Figure 8.7 through Figure 8.9 and explained in this section. Clearing the check box removes these additional settings from the list.

Note: Availability of the advanced settings described below may depend on the type of NVIDIA GPU that your graphics card is using and/or the type of graphics card you are using.

Figure 8.7 "List of Advanced Settings — "Force mipmaps" and "Extension limit" Selected
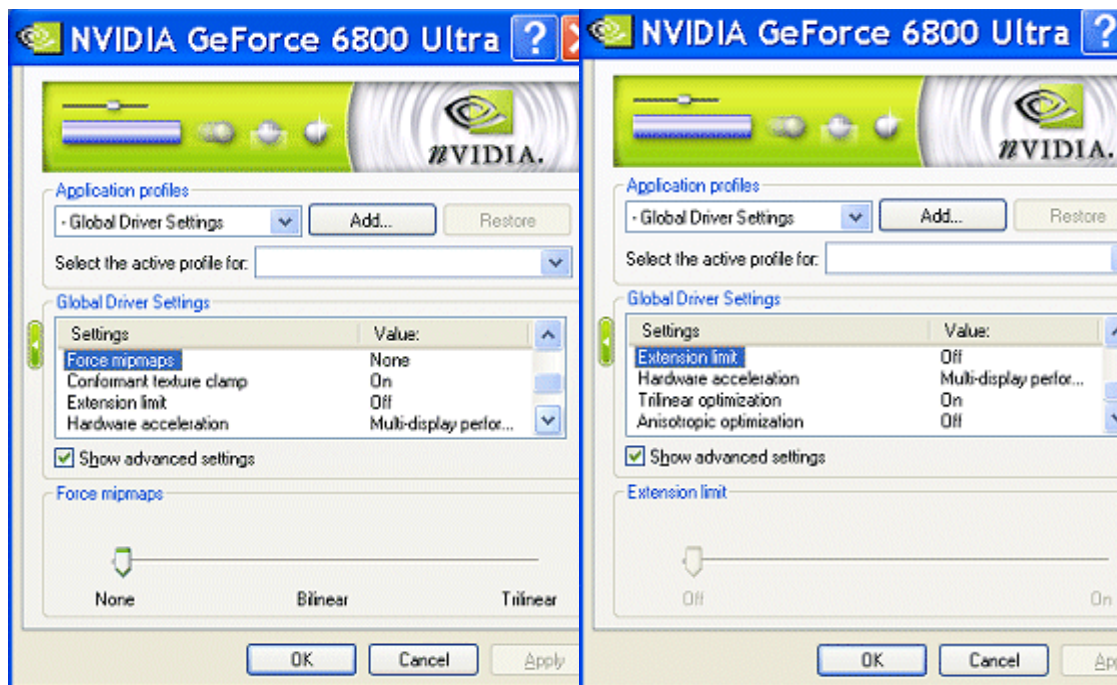
Force Mipmaps

1 Make sure the **Show advanced settings** check box is selected.

2 Select **Force mipmaps** from the Global driver settings list.

3 Then use the slider to enable mipmaps on applications that do not support mipmaps.

- **None** means do not force mipmaps on application that do not support mipmaps.
- **Bilinear** results in better image quality with better performance.
- **Trilinear** results in good image quality with lower performance.

Conformant Texture Clamp

"Texture clamping" refers to how texture coordinates are handled when they fall outside the body of the texture. Texture coordinates can be clamped to the edge or within the image.

1 Make sure the **Show advanced settings** check box is selected.

2 Select **Conformant texture clamp** from the Global driver settings list.

The available slider settings are **On** and **Off**.

Extension Limit

Note: You cannot change this setting.

By default, the driver extension string has been trimmed for compatibility with the application.

Hardware Acceleration

Hardware acceleration settings determine advanced rendering options when using multiple displays and/or graphics cards based on different classes of NVIDIA GPUs.

1 Make sure the **Show advanced settings** check box is selected.

2 Select **Hardware acceleration** from the Global driver settings list.

The available slider settings are shown in Figure 8.8 and explained.

Note: Multi-display hardware acceleration options do not apply when using nView Multiview mode in Windows NT 4.0.

- **Single-display mode**: If you have only one active display, this is the default setting. You can also specify this setting if you have problems with the multi-device modes.

- **nView Clone/Span mode** is the default setting when your nView display mode is set to nView Clone mode *or* one of the nView Span modes. If multiple NVIDIA-GPU based graphics cards in your system are in use with active displays, this setting is replaced by one of the "multi-display" modes described below.

Figure 8.8   List of Advanced Settings — "Hardware acceleration" Selected

- **Multi-display compatibility mode** is available if you have two or more active displays when running in nView Dualview display mode or if you are using different classes of NVIDIA GPU-based cards.

  Note: When this mode is in effect, OpenGL renders in "compatibility" mode for all displays. In this mode, when different classes of GPUs are in use, the lowest common feature set of all active GPUs is exposed to OpenGL applications. The OpenGL rendering performance is slightly slower than in Single-Display mode.

- **Multi-display performance mode** is available if you have two or more active displays when running in nView Dualview mode or if you are using different classes of NVIDIA GPU-based cards.

  Note: When this mode is in effect, OpenGL renders in "performance" mode for all displays. As in "compatibility" mode, when different classes of GPUs are in use, the lowest common feature set of all active GPUs is exposed to OpenGL applications. However, the rendering performance is "faster" than in compatibility mode, although switching or spanning display devices may result in minor transient rendering artifacts.

Anisotropic Optimization

In the current Release 60 driver, you have full control over anisotropic optimizations in Direct3D applications.

1 Make sure the **Show advanced settings** check box is selected.

2 Select **Anisotropic optimization** from the Global driver settings list.

The available slider settings are **On** and **Off** as shown in Figure 8.9.

Figure 8.9   List of Advanced Settings — "Anisotropic optimization" and "Trilinear optimization" Selected
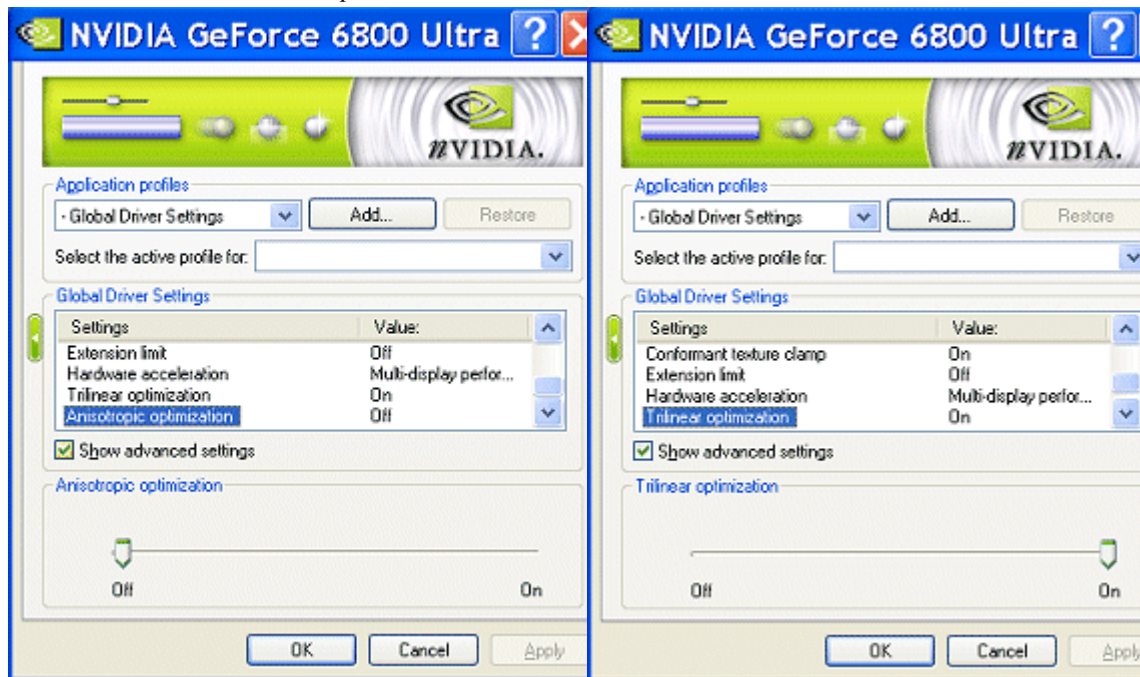
• **On**. enables the NVIDIA display driver to take advantage of its programmability to substitute point-mipmap (bilinear) filtering for linear-mipmap (trilinear) filtering on some texture stages.

The option you specify for "Image settings" determines the texture stages that will be affected. When the Image settings slider is set to **Quality**, the use of point-mipmap filtering is enabled on all but the first texture stage.

Also see Table 8.1, "Image Settings and Optimizations" on page 116.

- **Off** disables anisotropic optimizations resulting in the best theoretical image quality.

  Note: *Anisotropic optimizations are not implemented for OpenGL applications*. Therefore, if you have set Anisotropic Optimization to **On,** the resulting effect will be **Off** when running OpenGL applications.

Trilinear Optimization

In the current Release 60 driver, you have full control over trilinear optimizations in Direct3D and OpenGL applications.

1 Make sure the **Show advanced settings** check box is selected.

2 Select **Trilinear optimization** from the Global driver settings list. The available slider settings are **On** and **Off** as shown in Figure 8.9.

- **On** allows better texture filtering performance with no perceived loss of image quality. You can view the areas of the image that are affected by the trilinear optimization by enabling textures that contain colored mipmap chains that are used in typical diagnostic applications.

  Also see Table 8.1, "Image Settings and Optimizations" on page 116.

- **Off** disables trilinear optimizations and will result in the best image quality.

Changing a Driver Setting

To change a driver setting, follow these steps:

1 Click the **Application profiles** list box to display the profiles and select a profile.

2 The profile driver settings are listed in the driver **Settings** list.

  The check box next to the driver settings indicates whether the driver setting comes from driver or profile.

- If the check box is selected, the setting is part of the profile.

- If the check box is cleared, the setting is part of the driver.

  If you clear a check box, and click **Apply**, then the setting associated with the check box is cleared and removed from the profile.

3 From the **Settings** list, click to select the setting you want you want to modify.

The setting becomes highlighted and notice that its slider appears at the bottom of the page. Figure 8.10 shows the **Image Settings** slider, which was describe in "Image Settings" on page 115.

4 Use the slider to modify the setting, as needed.

For details on each setting, see "Global Driver Settings — Default" on page 112 and "Global Driver Settings — Advanced" on page 117.

5 Click **Apply**.

6 To modify the associated application setting(s) for the profile and/or save the changed setting in the profile and/or, click **Modify** and refer to the "Modifying Pre-Defined Profiles" on page 125.

7 If you want to add a new profile, see "Adding a New Application Profile" on page 122.

Figure 8.10 Performance & Quality Settings — Image Settings Slider

Adding a New Application Profile

You can add new application profiles, which you can also delete.

Figure 8.11 and Figure 8.12 illustrate the steps involved in adding a new profile.

1 Select **Global driver settings** from the Application profiles list.

2 Click **Apply**, if needed.

3 Select a driver setting from the **Global driver settings** list, as shown in the left image in Figure 8.11.

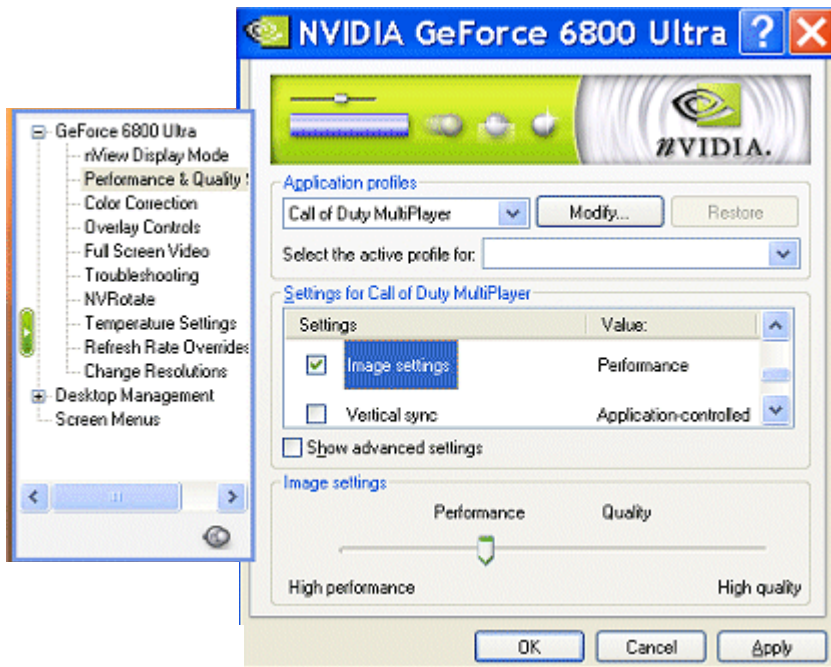**4** Then modify the setting, as needed, using the procedures explained in "Changing a Driver Setting" on page 121.

For details on each setting, see "Global Driver Settings — Default" on page 112 and "Global Driver Settings — Advanced" on page 117.

5 Repeat steps 3 and 4 for each driver setting you want to change for the selected profile.

6 Click **Add** to display the Add Profiles dialog box — the second image of Figure 8.11.

Figure 8.11 Adding a Profile (1)
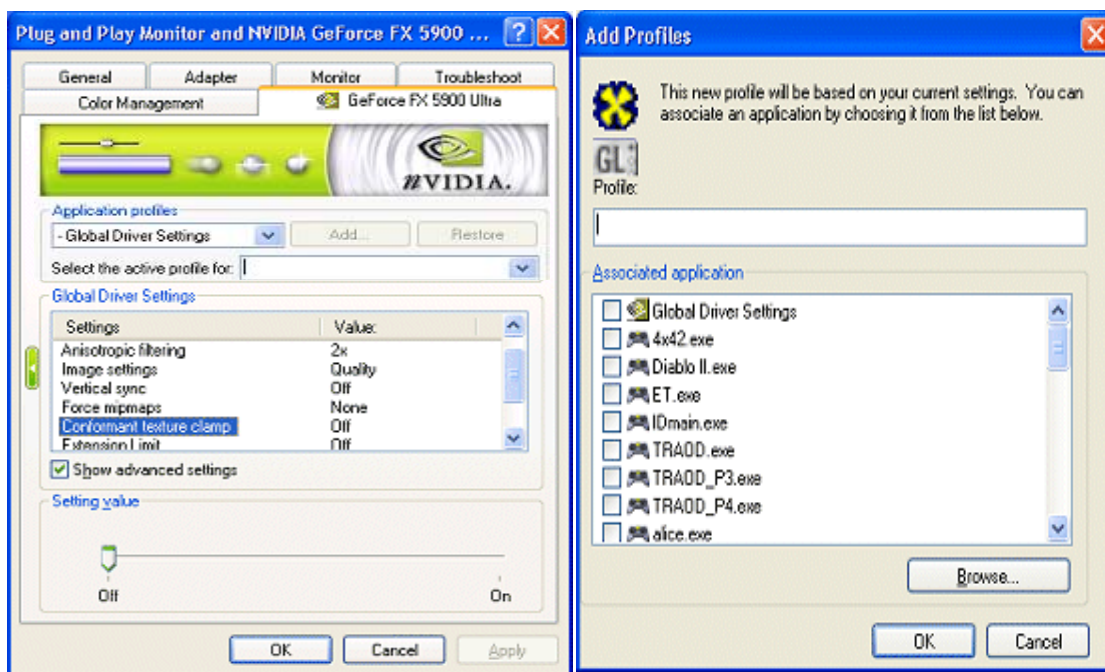
7 In the **Associated applications** list, select the check box associated with one or more of the application(s) you want to associate with the profile you are adding — see the first image in Figure 8.12.

If you want to locate applications not in the current list, click **Browse**.

8 Enter a name for the profile you are adding — the first image in Figure 8.12 shows an example.

9   Click **OK** to display the previous page.

The **Application profiles** list displays the new profile name — the second image in Figure 8.12.

10 To delete a profile you have added, click **Remove**.

Figure 8.12   Adding a Profile (2)
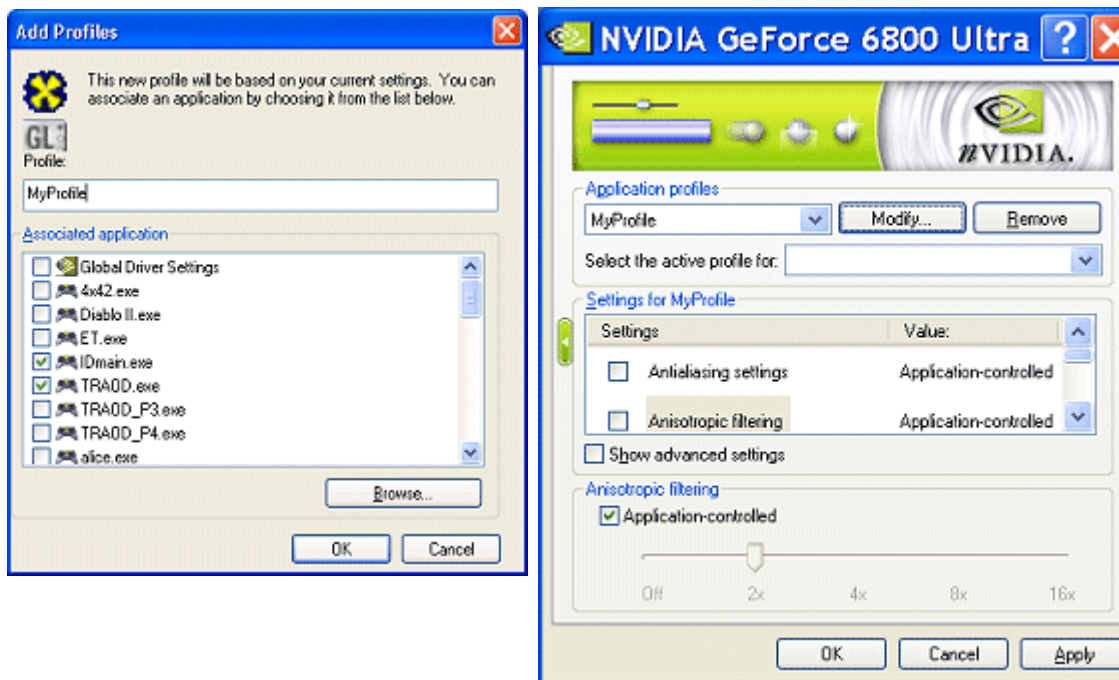
Deleting an Application Profile

Note: You can remove profiles that you have added and/or modified. However, you cannot removed the original NVIDIA-supplied profiles.

When you delete a profile that is associated with a single application, all NVIDIA settings for that application are removed.

Note: To avoid undesirable application performance, select a predefined NVIDIA profile for that application and then click Apply

When you delete a profile that is associated with multiple applications, the NVIDIA settings for all of the associated application are removed.

Note: To avoid undesirable application performance, select a predefined NVIDIA profile for each associated application and then click Apply.

Modifying Pre-Defined Profiles

You can modify pre-defined NVIDIA-supplied application (game) profiles.

Figure 8.13 through Figure 8.17 illustrate the steps involved in modifying a pre-defined profile.

Figure 8.13 Modifying a Profile (1)
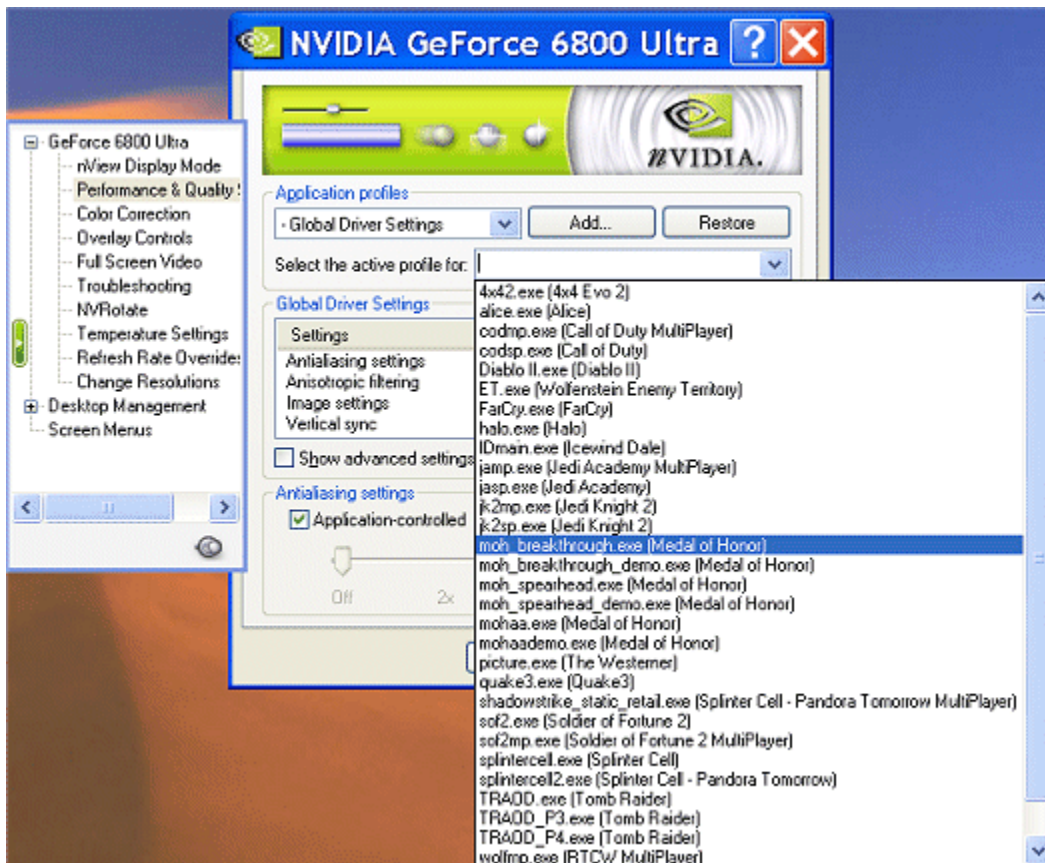
1 To modify an application (game) profile, you can do one of the following:

- Select the application profile directly from the **Application profiles** list *or*

- Select the last active profile for the application from the **Select the active profile for** as shown in Figure 8.14. Notice that the profile name appears in the **Application profiles** list as shown in Figure 8.14.

Notice that the **Modify** button is enabled, as shown in Figure 8.14.

Figure 8.14 Modifying a Profile (2)
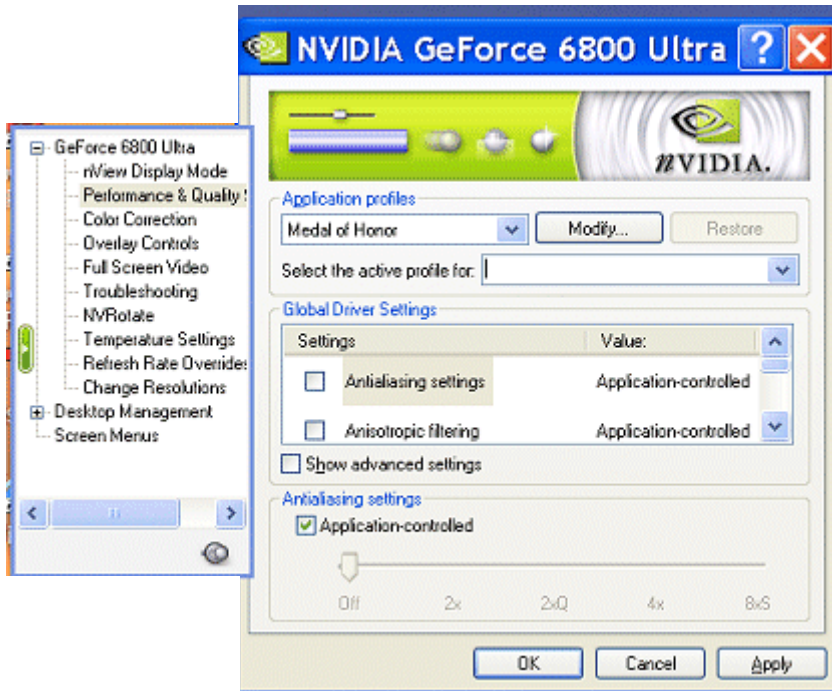
2 Modify one or more driver settings from the Global driver settings list, as needed, using the procedures explained in "Changing a Driver Setting" on page 121.

3 Click **Apply**.

4 Click **Modify**.

Two options — **Modify** and **Save As..**.— appear as shown in the first image in Figure 8.15.

Note: If you want to associate specific application (game) executable files with the modified profile, click **Modify** and follow all the steps — **a** through **f** below. If you *do not* want to associate specific application (game) executable files with the modified profile, simply click **Save As. . . .** (follow steps **e** and **f** below).

a Click **Modify** to display the Modify Profile dialog box.

b In the **Associated application** list, select one or more applications (check box) you want to associate with the profile you are modifying, as shown in the second image in Figure 8.15.

If you want to locate and select applications not in the current list, click **Browse**.

Figure 8.15 Modifying a Profile (3)
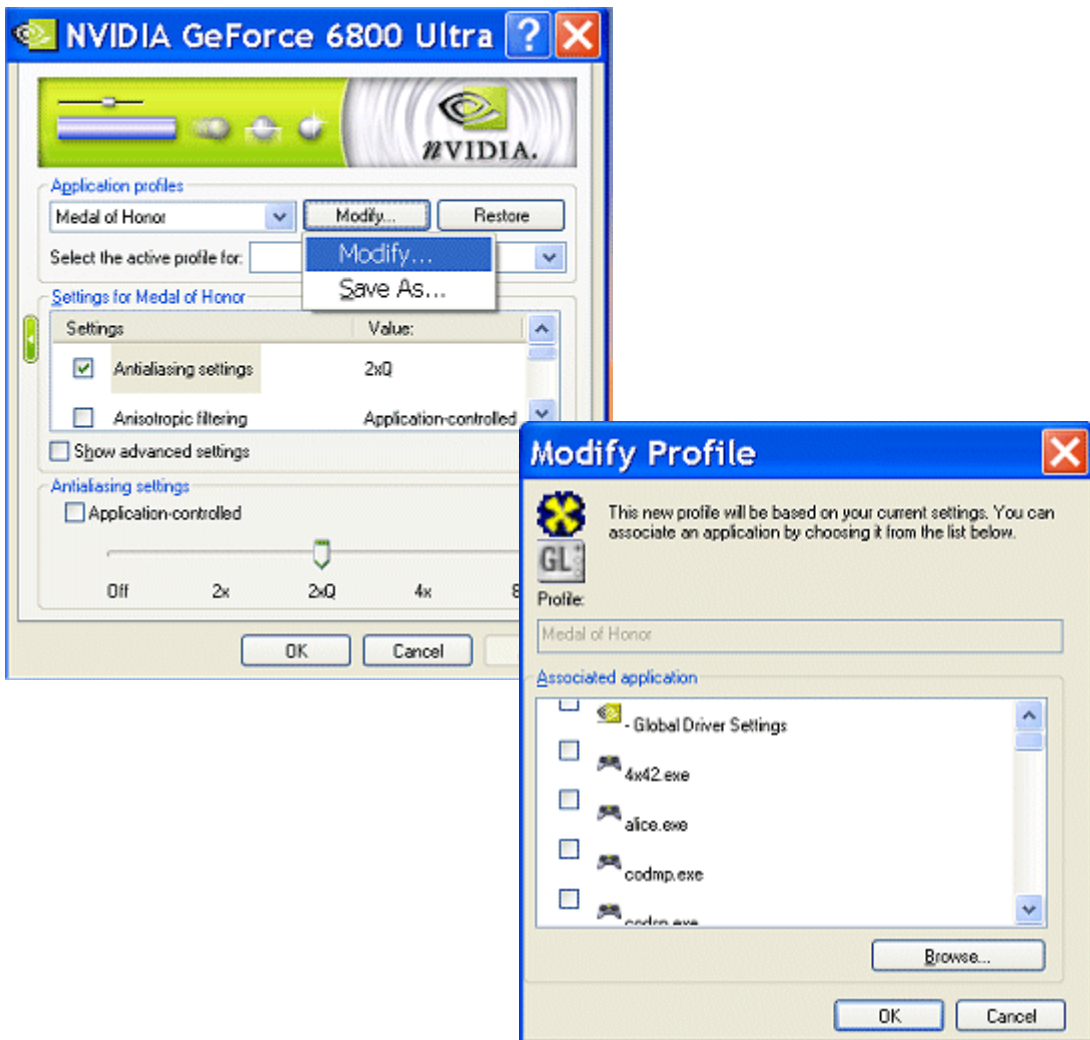
c   Click **OK** when done to return to the previous page.

d   To save the modified profile, click **Modify** and then click **Save As..**.

e   From the **Save Settings** dialog box, you can either retain the existing name or rename the profile.

Figure 8.16 shows the profile being renamed.

Figure 8.16 Saving a Modified Profile
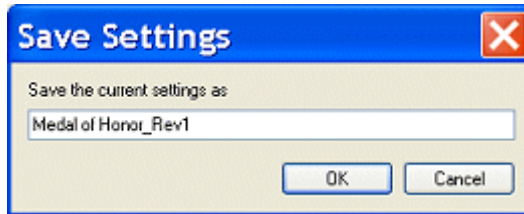
 f Click **OK** to return to the previous page.

  Figure 8.17 shows a renamed profile in the Application profile list.

Figure 8.17 Renamed Profile in Application Profiles List
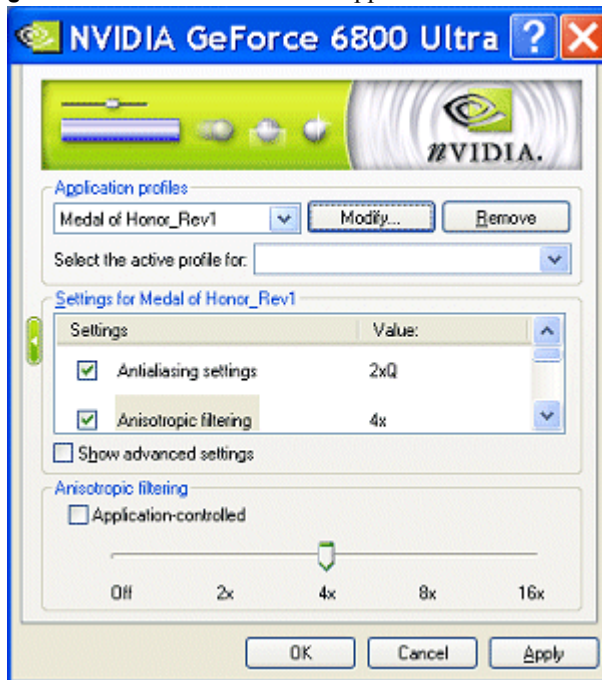
 g To restore a modified profile, select the profile and then click **Restore** to restore the profile to its original settings.

Using Overlay Controls

Use the Overlay Controls settings to adjust the quality of video or DVD playback on your display.

Note that these settings affect videos that are created using the hardware overlay, but have no effect on videos created using software overlays, or a "blit" process such as VMR.

Note: If any settings changes you make have no effect on the video overlay after you click **Apply**, close the video overlay and then re-open it.

Accessing the Overlay Controls Page

1 First, open the DVD or video application that you want to view.

2 Click **Overlay Controls** from the NVIDIA Display menu to open the Overlay Controls page (Figure 8.18).

Figure 8.18 Overlay Controls — Windows XP/2000
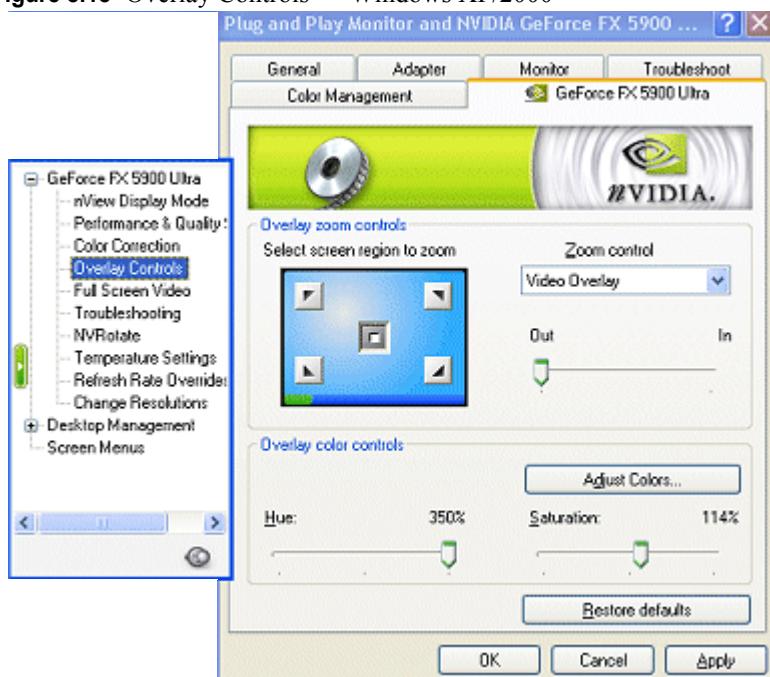
If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

Figure 8.18 shows an Overlay Controls page for Windows XP/2000.

Overlay Zoom Controls

Zoom Control

Zoom control lets you zoom into the rendered video. Use the drop-down menu to select the display type to zoom and use the quadrant selection to select the screen region to zoom.

- **Video Overlay** sets the zoom selection to the display on which the overlay video is rendered.

- **Both** applies the zoom selection to both the device on which the overlay video is rendered *and* the full screen display you selected for the video mirror feature (see "Using Full Screen Video Settings" on page 131).

   Note: Video players that cannot detect the presence of Video Mirror may not update the zoom factor immediately while displaying a still frame.

Out/In

The Out/In slider lets you zoom in on or out of the selected portion of the video playback screen.

Screen Region to Zoom

Select the area of the video screen on which you would like to zoom by clicking the area. You can then zoom to that portion of the screen by moving the **Out/In** slider control, below.

Overlay Color Controls

Hue and Saturation

You can independently control the hue and saturation to achieve optimal image quality when playing back videos or DVD movies on your computer.

Adjust Colors

See "Adjusting Desktop Colors" on page 106.

Restore Defaults

Click this option restore all color values to the hardware factory settings.

Check Here If You Are Having Problems with Your TV Tuner

Under Windows 9*x,* selecting this check box forces the overlay software to use busmastering.

Note: It is recommended that you leave this setting *unchecked* unless you experience problems with video playback, such as image corruption or you cannot see a video image.

Using Full Screen Video Settings

Note: If you have only one display connected to your computer and active, you will not see the Full Screen Video menu option on the NVIDIA Display menu. However, you will have access to the Overlay Controls menu option.

Use the Full Screen Video settings page (Figure 8.19) to adjust the quality of video or DVD playback on your display device(s). Note that the settings on the Full Screen Video page affect videos that are created using the hardware overlay. These settings have no effect on videos created using software overlays, or a "blit" process such as VMR.

Note: If any settings changes you make do not take effect (e.g., the controls have no effect on the video) after you click **Apply**, close the video overlay application and then re-open it.

About the Full Screen Video Mirror Feature

The full screen "video mirror" feature allows a video or DVD application to mirror its playback in full-screen mode on any one of the connected display devices.

Note: The full screen "video mirror" feature is

- Not available under Windows NT 4.0.

- Supported by any NVIDIA GPU-based *multi-display* graphics card.

Accessing the Full Screen Video Page

1 First, make sure you have at least two display devices connected to your computer. If you have only one display connected, you will not see the Full Screen Video menu option on the NVIDIA Display menu.

2 On the nView Display Mode page, set nView mode to a multi-display mode, such as **Clone** or **Dualview**.

3 Open the DVD or video application and click **Full Screen Video** from the NVIDIA Display menu.

Figure 8.19 and Figure 8.20 show Full Screen Video settings pages.

Figure 8.19 Full Screen Video Settings — Disabled

Full-Screen Video Settings

Full Screen Device

Select the display device on which you want video to be played back in full-screen mode.

Note: After selecting any of these Full Screen Device settings, you may need to exit and restart your video application for the settings to take effect.

• **Disable** (Figure 8.19) disables Video Mirror (including the Full screen video zoom controls).

• **Primary display/Secondary display** settings (Figure 8.20) are *only* available under **nView Clone modes**.

   To enable Full-Screen Device functionality in nView Clone mode, click either **Primary display** or **Secondary display** as the full screen device.

- **Auto-select** (Figure 8.20) is *only* available under **nView Dualview and Span modes**. Auto-select enables full-screen device functionality, which creates the full-screen mirror on the display device on which there is no overlay. This implies that if the video being played is dragged to the other display, the full-screen mirror image will automatically switch displays.

Figure 8.20 Full Screen Video — Settings for nView Dualview/Span and Clone Modes
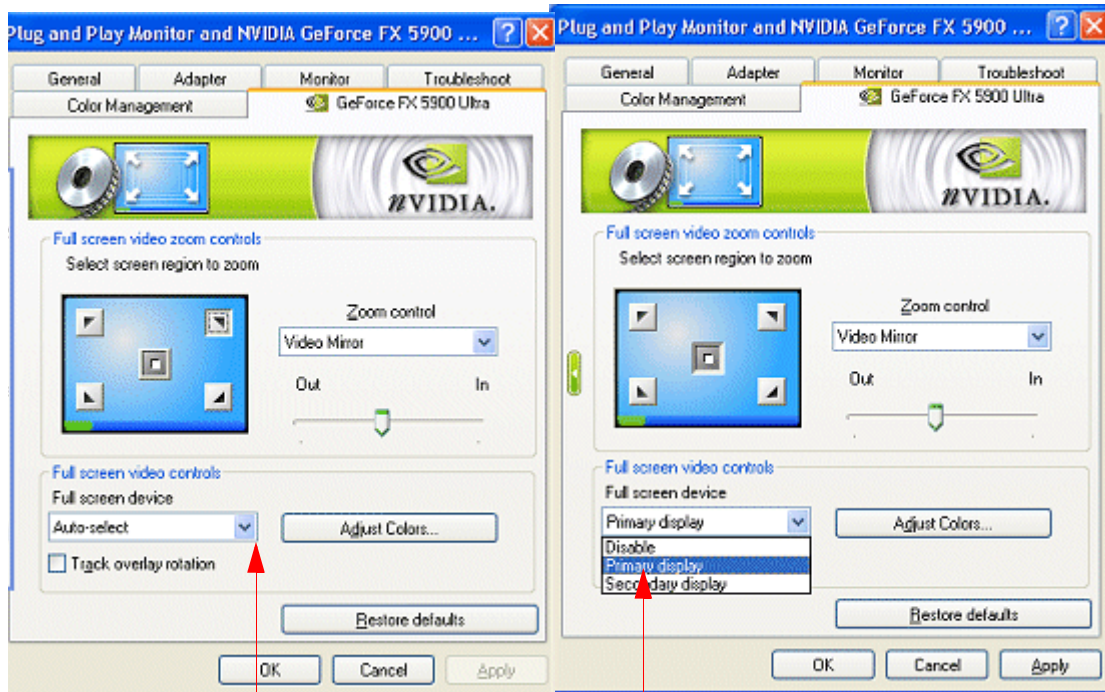
"**Auto-select**" option is available in **nView Dualview and Span modes**.

"**Primary display**" and "**Secondary display**" options are available in **nView Clone mode**.

Track Overlay Rotation

If you want to link the degree of rotation you specified in the NVRotate page (*see* "Using NVRotate Settings" on page 139*)* for the video overlay on the primary display to the secondary display, select the **Track overly rotation** check box (Figure 8.21) and click **Apply**.

This means that the degree of rotation you choose on the NVRotate page is reflected on both the Primary and Secondary display devices.

Adjust Colors

See "Adjusting Desktop Colors" on page 106.

Full Screen Video Zoom Controls

Zoom Control

Zoom Control lets you zoom into the rendered video. Use the drop-down menu to select the display type to zoom and use the quadrant selection to select the screen region to zoom.

- **Video Mirror** (Figure 8.21) sets the zoom selection to the full screen device you selected for video mirror rendering on this page.

Figure 8.21 Full Screen Video — Zoom Control Video Mirror Settings
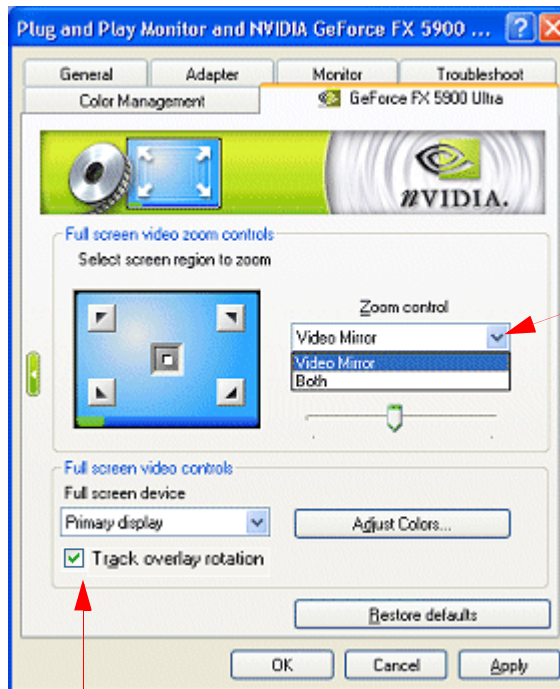
Zoom controls apply to the display device being used for the "**video mirror**" feature.

Select the **Track overly rotation** check box to link the degree of rotation you specified on the NVRotate page for the video overlay on the primary display to the secondary display.

- **Both** applies the zoom selection to both the full screen device you previously selected for video mirror rendering *and* the display on which the overlay video is being rendered. (See "Using Overlay Controls" on page 129.)

Note: Video players that cannot detect the presence of Video Mirror may not update the zoom factor immediately while displaying a still frame.

Out/In

The Out/In slider lets you zoom in on or out of the selected portion of the video playback screen.

Screen Region to Zoom

Select the area of the video screen on which you would like to zoom by clicking the area. You can then zoom to that portion of the screen by moving the **Out/In** slider control, below.

- **Out/In** slider lets you zoom in on or out of the selected portion of the video playback screen.

- **Restore Defaults** restores all color values to the hardware factory settings.

Troubleshooting Full Screen Video Problems

- If any settings changes you make do not take effect (e.g., the controls have no effect on the video) after you click **Apply**, close the video overlay application and then re-open it.

- Some applications have their own overlay color control settings. If you run one of these applications and try to use the NVIDIA color settings, both the application's color settings and the NVIDIA color settings can change the overlay attributes. This can result in an inaccurate indication of the overlay settings, or unexpected overlay settings for an overlay application. To prevent this problem, use the overlay application's color settings.

Troubleshooting Settings

Accessing the Troubleshooting Page

To access the Troubleshooting page, click **Troubleshooting** from the NVIDIA Display menu.

If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

Figure 8.22 shows the Troubleshooting page.

Adding the NVIDIA Settings Menu Icon to the Windows Taskbar Notification Area

Figure 8.22 Troubleshooting Settings
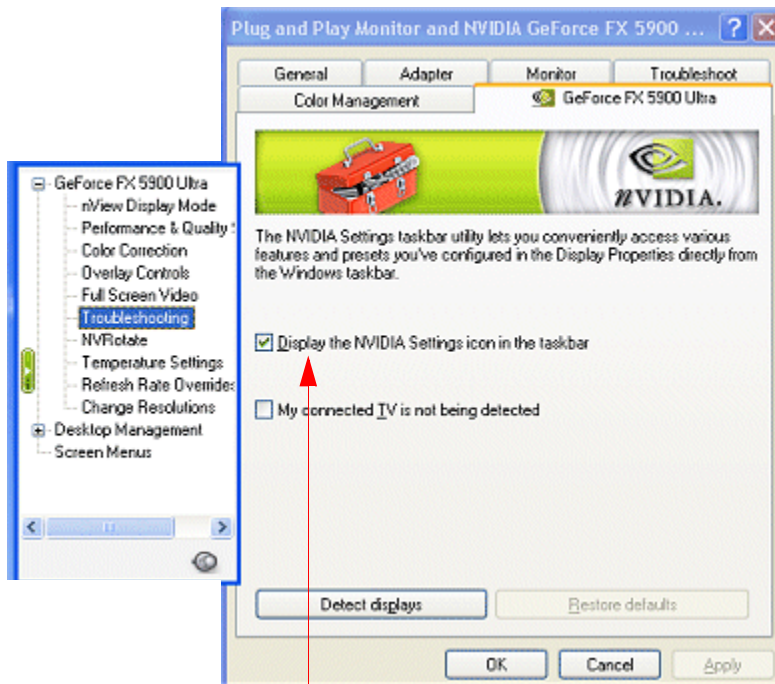
Select this check box to add the NVIDIA Settings menu icon
to the Windows taskbar notification area.

When you select the **Display the NVIDIA Settings icon in the taskbar** check box, the NVIDIA Settings menu icon is added to your Windows taskbar notification area. You can then click this icon to display and use the NVIDIA Settings menu to apply any of the NVIDIA graphics driver settings (which are normally configurable from the NVIDIA Display menu) *on the fly*. This menu also contains options for restoring default settings and accessing the Windows Display Properties page.

You can access the following settings through the NVIDIA Settings menu icon:

• **Screen Resolution**

• **Screen Refresh Rate**

• **Color Quality**

• **nView Display Mode**

- **Performance and Quality Settings**
- **Custom Color Settings**
- **Rotation Settings**
- **Desktop Color Settings**
- **NVIDIA Display control panel**
- **nView Desktop Manager**

Procedure

To add the NVIDIA Settings menu icon to the Windows taskbar notification area, follow these steps:

1 From the Troubleshooting page, select the check box labelled **Display the NVIDIA Settings icon in the taskbar** and click **Apply**.

The icon is added to the Windows taskbar as shown in Figure 8.23.

Figure 8.23 NVIDIA Settings Menu Icon Displayed in the Windows Taskbar Notification Area

Windows Taskbar   ⌐NVIDIA Settings menu icon

2 From the Windows taskbar notification area, simply right click the NVIDIA Settings menu icon to display the menu.

3 Select the options you want from the menu that appears. Figure 8.24 and Figure 8.25 show sample NVIDIA Settings utility menus.

Figure 8.24 NVIDIA Settings Sample Menus with Four (4) Connected Graphics Cards
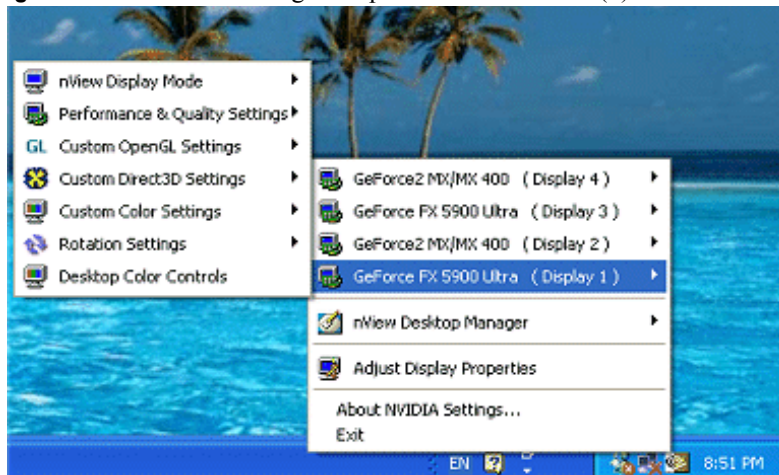
Figure 8.25 NVIDIA Settings Menus
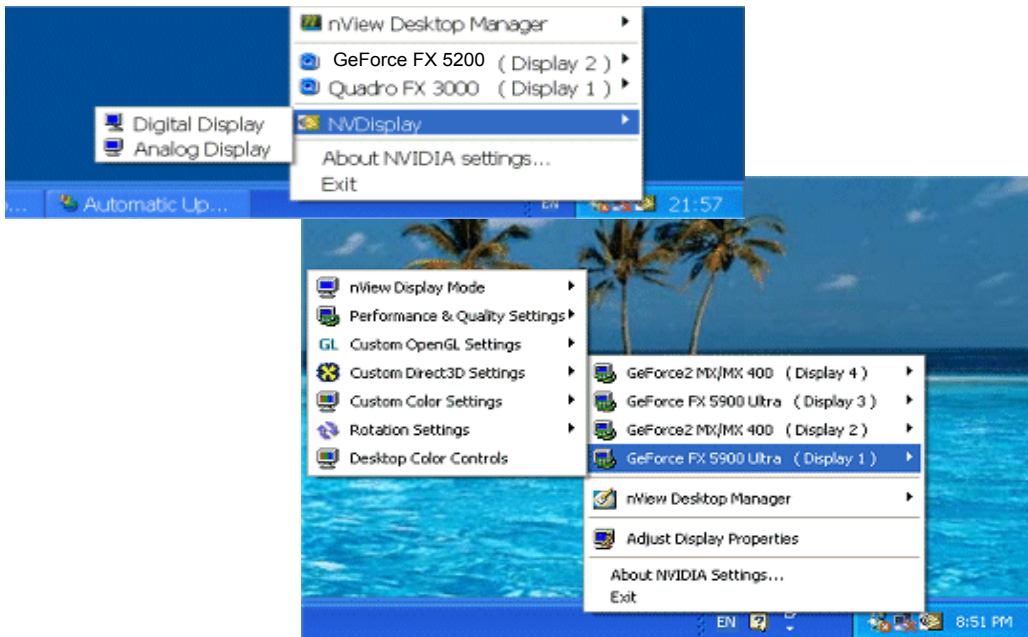
Detecting a Connected TV Display

If you have a TV connected to your computer, the check box "**My connected TV is not being detected**" appears on the Troubleshooting page (Figure 8.22).

Enabling this option forces the detection of a TV connected to the graphics card, even though the NVIDIA Display control panel does not show that one is currently connected. This is useful in situations where the particular TV model attached does not properly load the signals that allow the graphics card to detect its presence.

1 To enable the TV options, select the check box and click **Apply**.

2 Restart your computer when prompted. Once you log back in, you can use the TV controls.

Detecting Displays

Click **Detect Displays** to detect all display devices connected to your graphics card.

Note: Use this feature if you have plugged in any display devices after the NVIDIA Display control panel was opened.

Using NVRotate Settings

The NVRotate settings (Figure 8.26) let you view your Windows desktop in **Landscape** or **Portrait** mode. You can rotate your desktop by 90, 180, or 270 degrees.

Note: NVRotate is supported on GeForce2 MX and later series of NVIDIA GPUs.

Note: If you are using the Video Mirror feature, you can also use the NVRotate feature to rotate the overlay video. If you want to apply the specified rotation to both the primary and secondary displays, use the **Track overlay rotate** setting on the **Full Screen Video** page. For details, see "Using Full Screen Video Settings" on page 131.

Figure 8.26 NVRotate Settings — Landscape Mode

To rotate your desktop, you can click one of these **arrow buttons** OR select one of these **options**.
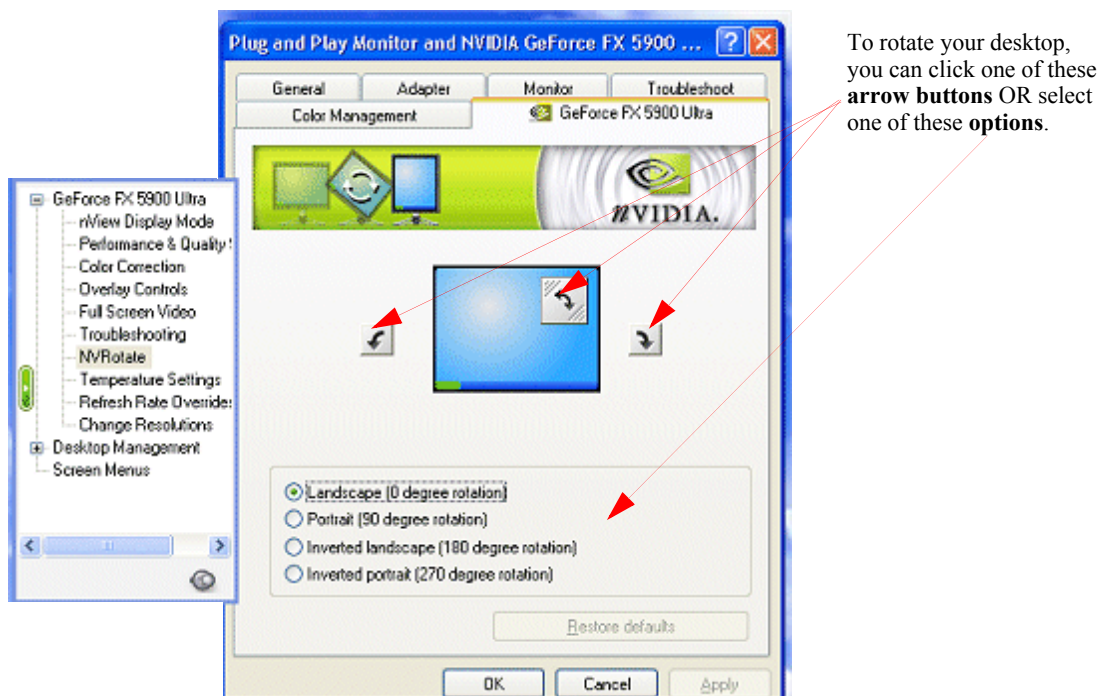
Accessing the NVRotate Settings Page

To access the NVRotate page, click **NVRotate** from the NVIDIA Display menu.

If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

Figure 8.26 through Figure 8.28 show the NVRotate settings.

Before You Use NVRotate Settings

- Rotation requires an additional video buffer equal to the settings for the rotated device. For systems with limited video memory, this can restrict the modes for which rotation can be supported.

- In nView **Clone** mode, both display devices are rotated.

- In Dualview mode, either of the display devices can be rotated provided there is enough memory to perform the rotation operation.

- Only 3D games and applications that include support for rotation will work in rotated modes.

- Because rotated modes consume additional system and graphics resources, you might experience slower video performance and poorer graphics quality under the following conditions:

  - You are using slower GPUs, such as those in the NVIDIA GeForce2 or older series.

  - Other demands are placed on the NVIDIA graphics driver, such as moving the application window across the desktop.

- Because rotated modes consume additional system and graphics resources, you might experience slower video performance and poorer graphics quality under the following conditions:

  - You are using slower GPUs, such as those in the NVIDIA GeForce2 MX or older series.

  - Other demands are placed on the NVIDIA graphics driver, such as moving the application window across the desktop.

Enabling NVRotate Settings

The following desktop rotations options are available:

- **Landscape** is the "default" mode (Figure 8.26).

- **Portrait** results in a 90 degree rotation (Figure 8.27).

- **Inverted Landscape** results in a 180 degree rotation (Figure 8.28).

- **Inverted Portrait** results in a 270 degree rotation (Figure 8.28).

- **Restore Default** results in the default "Landscape" mode (Figure 8.26).

Click **OK** after selecting an option for the rotation change to take effect.

Figure 8.27 NVRotate Settings — Portrait Mode
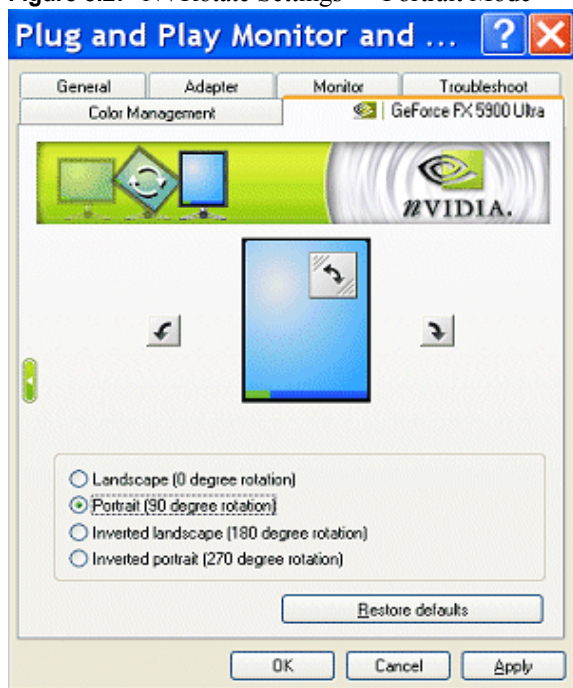
Figure 8.28 NVRotate Settings — Inverted Landscape and Inverted Portrait Modes
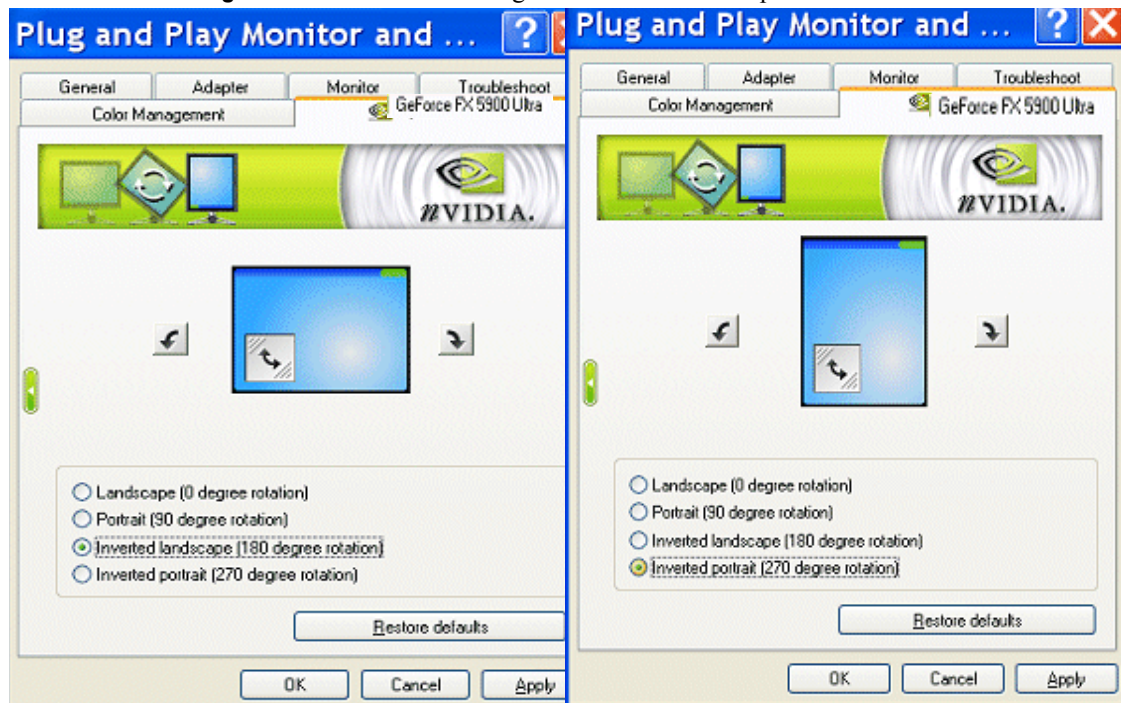
You can click one of the two arrow buttons shown on the NVRotate page to perform the rotation.

Or you can click the semi-circular arrow on the top right of the screen image and drag it in the direction of the rotation.

Adjusting Temperature Settings

Note: The Temperature Settings page is available with GeForce FX and newer NVIDIA GPUs *and* on certain older NVIDIA GPUs only if the option has been enabled on your computer.

Temperature settings let you adjust the temperature of the selected NVIDIA GPU on your computer.:

Accessing the Temperature Settings Page

To access the Temperature Settings page, click **Temperature Settings** from the NVIDIA Display menu.

If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46. Figure 8.29 shows the Temperature Settings page.

Figure 8.29 Temperature Settings
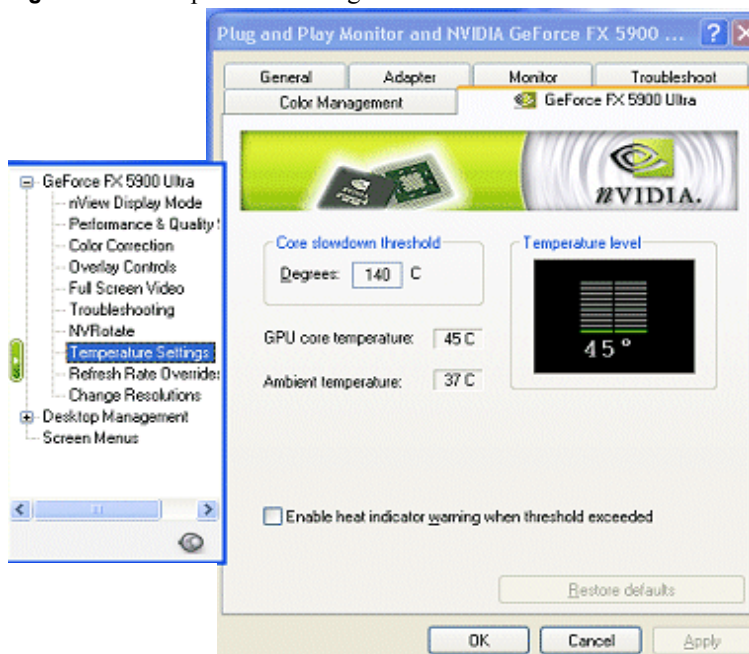
Temperature Settings

Temperature Level (GPU Core Temperature)
Displays the current temperature of the selected NVIDIA GPU in your system.

Core Slowdown Threshold
Enter the value at which you want the NVIDIA GPU to slow itself down to prevent overheating.

When this value matches the **GPU core temperature** value, a dialog box automatically appears warning of the condition and the actions that have been taken to prevent possible overheating and damage to any particular GPU(s) in your system.

Note: The recommended value for this setting is the default that is preset. Any changes to this value should be made with extreme caution.

Ambient Temperature
Ambient temperature is the current temperature of the area surrounding the selected NVIDIA GPU in your system. This temperature varies greatly, depending on other heat sources located near the GPU.

Enable Heat Indicator Warning When Threshold Exceeded
When the value of the NVIDIA GPU Core Temperature matches the Core Slowdown Threshold value, the Heat Indicator dialog box automatically appears describing the situation and the actions that have been taken to prevent possible damage to any particular GPU(s) in your system.

Using Refresh Rate Overrides

The Refresh Rate Overrides page lets you select refresh rate overrides to be used in OpenGL, Direct3D, and desktop applications.

Accessing the Refresh Rates Overrides Page

To access the Refresh Rate Overrides page (Figure 8.30),click **Refresh Rate Overrides** from the NVIDIA Display menu.

If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

Refresh Rates Overrides Settings

Applications Control Refresh Rates

When enabled, this option allows the application to select its own refresh rate (Figure 8.30).

Figure 8.30 Refresh Rate Overrides — Applications Control Refresh Rate *Enabled*
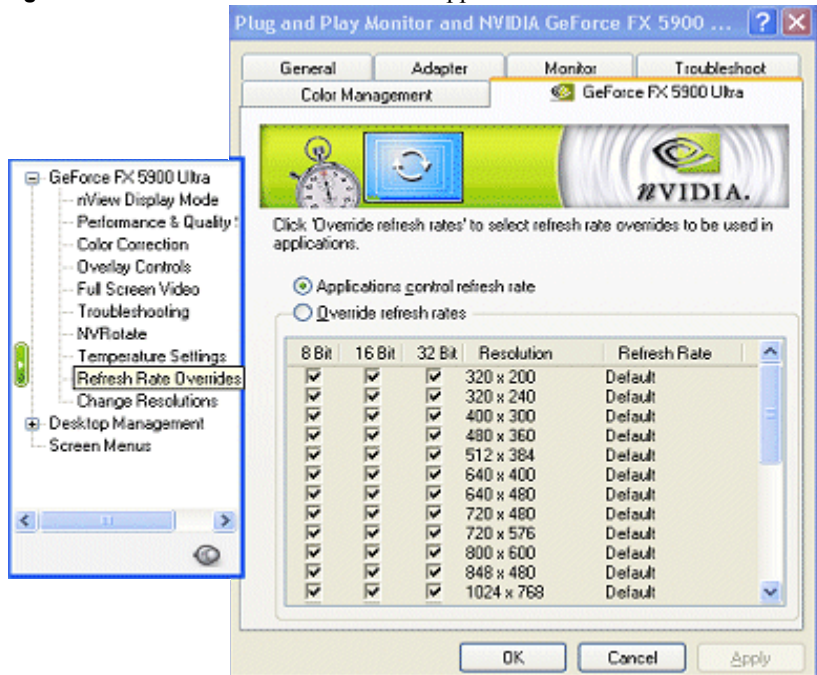
Default means that the application's refresh rate is used. Any other value means to set the refresh rate to the value for full-screen applications.

Override Refresh Rates

If you want to select refresh rate overrides to be used in applications, select the **Override refresh rates** check box and click **Apply** (Figure 8.31).

Notice that the list values becomes enabled so you can select individual refresh rates for each resolution and combination of bit depths, as shown in Figure 8.31.

Figure 8.31 Refresh Rate Overrides — Override Refresh Rate Option *Enabled*
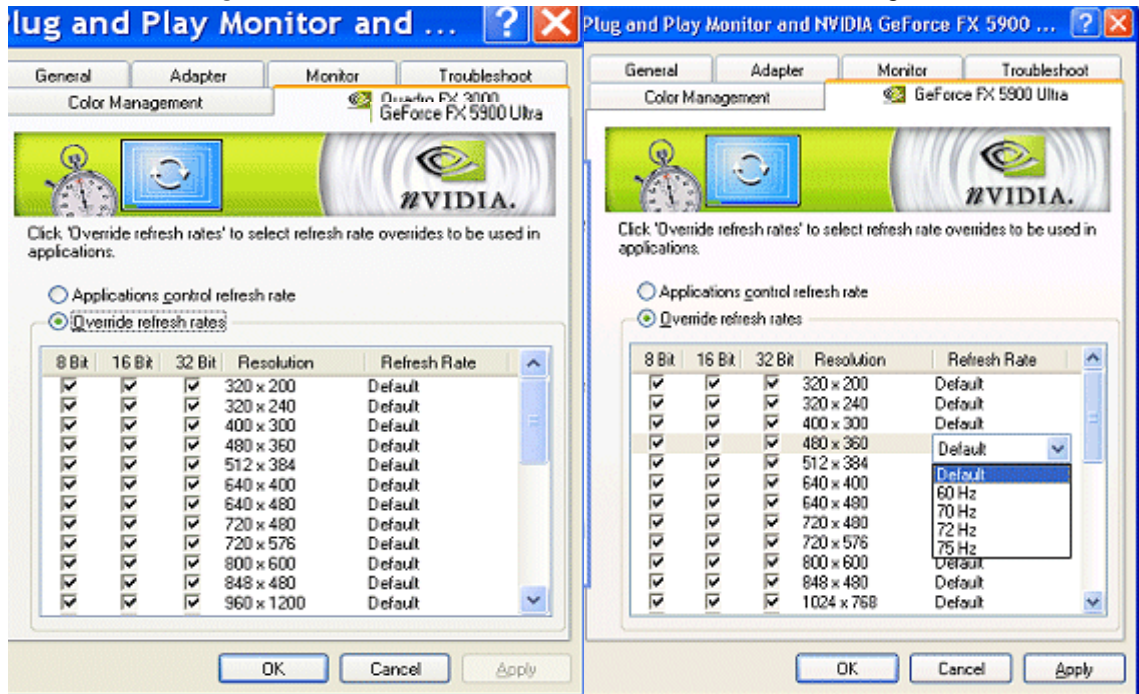
To override a refresh rate, follow these steps:

1 From the Refresh Rate column, click the word **Default** on the line that contains the Resolution for which you want to change the refresh rate.

A list box of values appears, as shown in Figure 8.31.

2 From the list, select the refresh rate you want for the associated value in the Resolution column.

3 If you want to eliminate any of the three bit depths in the row, simply click to disable (remove the check mark from) that bit depth.

4 Click **Apply**.

Changing Screen Settings

The Change Resolution page (Figure 8.32) lets you configure screen resolution, color quality, and screen refresh rates for each of your connected display devices.

Accessing the Change Resolution Page

To access the Change Resolution page, click **Change Resolution** from the NVIDIA Display menu.

If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

Figure 8.32 shows the **Change Resolutions** page.

Figure 8.32   Accessing Change Resolution Settings from the NVIDIA Display Menu
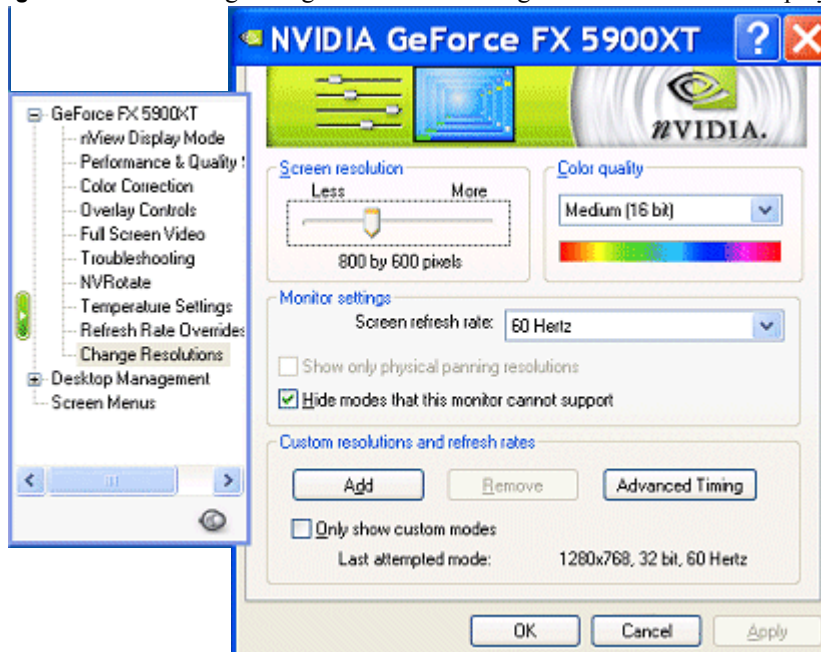
Screen Resolution and Color Quality

• **Screen Resolution** lets you display available screen resolution settings for the display device. Move the slider to select a different screen resolution.

- **Color quality** lets you displays available color settings for the currently selected screen resolution of the display device. Use the slider to select a different color setting.

Monitor Settings

- **Screen refresh rate** displays available refresh rates for the currently selected screen resolution of the display device. Click the list to select a different refresh rate.

- **Show only physical panning resolutions**. Check this box to allow modes smaller than traditional Windows desktop modes to be set on the selected display. This can cause the visible area of the display to possibly appear zoomed or to pan around the desktop, depending on the capabilities of the display.

- **Hide modes that this monitor cannot support** specifies whether to include modes that are not supported by your display.

  CAUTION: Choosing a mode that is inappropriate for your display may cause severe display problems and could damage your hardware.

Custom Resolutions and Refresh Rates

Adding Custom Resolution

1 Click **Add** to display the dialog box shown in Figure 8.33.

2 Enter requested information in the fields provided.

3 Click **Add** and **OK**.

  When you enable the **Only show custom modes option** on the Change Resolution page, the modes you just added will be available for use.

Figure 8.33 Add Custom Resolution Dialog Box.
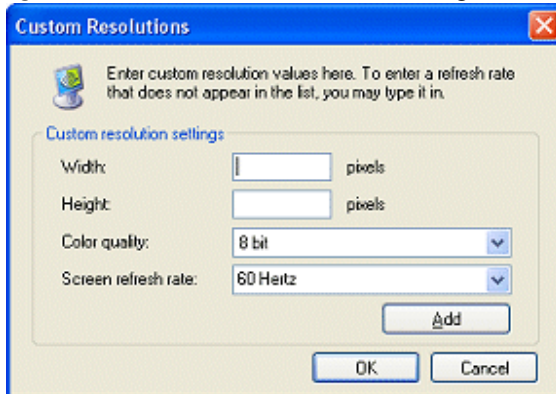
Remove Custom Resolution

Once you have added one or more custom resolutions, you can click **Remove** from the main Custom Resolutions page (Figure 8.32) to remove any of the added resolutions.

Properties

Click **Properties** to show all available customized modes for the currently selected screen resolution (Figure 8.34).

Only Show Custom Modes

Click **Only show custom modes** to make *only* customized display modes available.

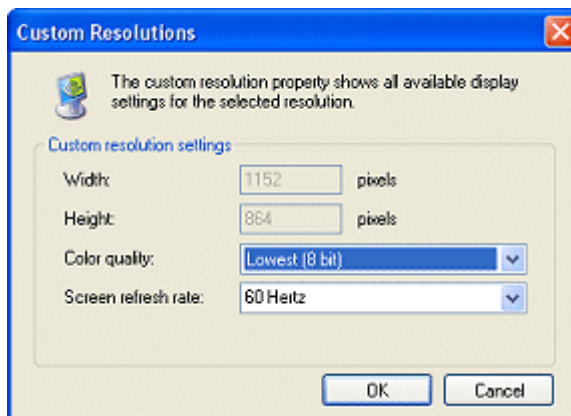**Note:** When you enable this option, the Screen resolution, Color quality, and Screen refresh rate options may become unavailable (greyed out).

Figure 8.34 .Custom Resolution Settings

Advanced Timing

Note: The Advanced Timing button is not accessible (appears gray) for certain NVIDIA GPU-based graphics cards with a DVI connector in use. DVI timing adjustment is supported for NV3*x*-based graphics cards only if they have an external TMDS, such as the SiliconImage 164. If the graphics card uses the internal TMDS, then the **Advanced Timing** button is not accessible. However, graphics cards that use the internal TMDS can support refresh rates below 60 Hz using the current NVIDIA Release 60 driver.

Note: To use the **Advanced Timing** page, you must be an *advanced user* and familiar with the concepts of display timing standards and parameters. For additional details, refer to the following documents that explain monitor timing standards:

> *VESA and Industry Standards and Guidelines for Computer Display Monitor Timing (DMT)* published by the Video Electronics Standards Association (VESA)

> *Coordinated Video Timing Standard* published by VESA

> *EIA Standard: A DTV Profile for Uncompressed High Speed Digital Interfaces* published by the Electronic Industries Alliance

1 Click **Advanced Timing** to open the Advanced Timing configuration page (Figure 8.35) where you can select display timing standards and custom parameters.

2 Click the **Timing** list and select one of the display timing standards (such as DMT, GTF, CVT, and EDID) or custom timing parameters. These settings are explained below.

   • **General Timing Formula (GTF)** is an older but widely used timing standard. However, newer display are switching to the CVT standard.

   • **Discrete Monitor Timings (DMT)** timing is a set of pre-defined VESA timings. VESA updates this standard every year. If DMT timing is available for a specific mode, the NVIDIA display driver normally selects it instead of GTF.

   • **Coordinated Video Timings (CVT)** became the VESA standard on March 2003. CVT supports higher resolutions better than other timing standards.

   • **Coordinated Video Timings-Reduced Blanking (CVT-RB)** improves on the CVT standard. CVT-RB offers reduced horizontal and vertical blanking periods and allows a lower pixel clock rate and higher frame rates.

Figure 8.35 .Advanced Timing Settings
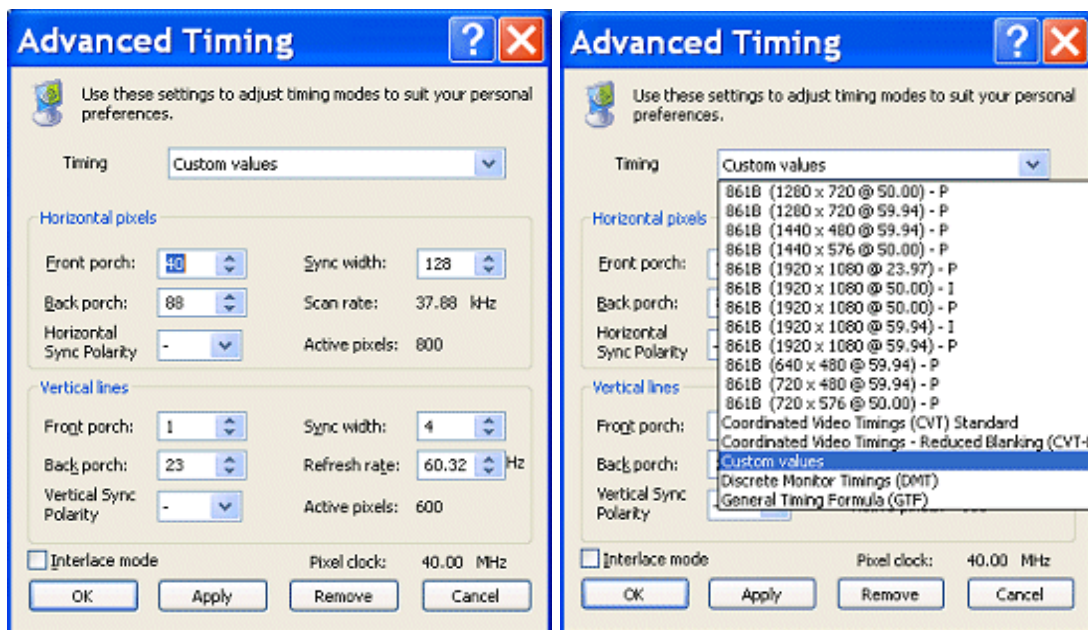
- **EDID Timing** is the preferred timing standard defined by the display's **Extended Display Identification Data (EDID)** value. EDID is a standard data structure that defines the display device's model number, timing, and other settings.

  Note: Manufacturer-defined EDIDs are available only on Plug-and-Play (PnP)-compatible displays.

  Note: The NVIDIA driver may place black borders around the displayed image, as needed.

- Other parameters such as **861B (1920 x 1080 @ 59.94) -I** and **861B (1920 x 1080 @ 59.94) -P**

  861B refers to an EIA/CEA standard and would apply to certain 861 High Definition television **(HDTV)** displays.

  -P means "progressive scanning," which is a method of sending an image to your display where all the scan lines are updated in each frame --- in other words, all of the scan lines are displayed sequentially. This method, used in modern computer displays, generally reduces flicker in the displayed image and results in smoother motion for videos.

  -I means "interlaced scanning," which is another method of sending the image to your display where even scan lines are drawn during the first field in a frame and odd scan lines are drawn during the second field in the

frame. Another way to explain this method is that two passes are used to paint an image on the screen. On the first pass, every other line is painted and on the second pass, the rest of the lines are painted.

Unlike the "progressive scanning" method, where all the scan lines are updated in each frame, interlaced scanning results in a higher frame rate but usually causes image flicker.

- **Custom values**. If you are an advanced user and would prefer to enter custom timing values in the fields provided on this page, follow these steps:

  (a) Select **Custom values** from the Timings list and click **Apply**.

  (b) Enter the values you want in the various fields provided and then click **Apply**.

  (c) When the confirmation prompt appears, click **Yes**. Your custom settings are now in effect.

  (d) To remove the custom settings you selected, click **Remove**. To remove the custom settings you selected, click Remove.

  Note: The driver may place black borders around the displayed image, as needed.

- **Horizontal pixels** group box contains horizontal advanced timing settings.

  - **Sync width**. Click the list to specify the width of the horizontal blanking period during which the synchronization pulse triggers horizontal re-scanning.

  - **Front porch**. Click the up or down arrow to specify the horizontal blanking period that occurs between the end of the active period and the beginning of the synchronization pulse.

  - **Back porch**. Click the up or down arrow to specify the blanking period that occurs between the end of the synchronization pulse and the next active period.

  - **Horizontal sync polarity**. Click the up or down arrow to specify the direction of rapid, transient change in the amplitude of a signal from the baseline during the horizontal synchronization pulse.

    If the horizontal synchronization polarity is positive (+), the value of the horizontal synchronization pulse is higher than the baseline value.

    If the horizontal synchronization polarity is negative (-), the value of the horizontal synchronization pulse is lower than the baseline value.

    Note: You can select the horizontal synchronization polarity independently of the vertical synchronization polarity.

- **Scan rate** indicates the measure of how many scan lines a monitor can display in one second, expressed in kHz (generally somewhere between 20 and 180 kHz).

  Note: In the case of an analog display (CRT) it is limited by the speed at which the monitor can move the electron beam horizontally across the screen and then return it to the beginning of the next line.

  Note: This value should not exceed the monitor's maximum horizontal scan frequency.

- **Active pixels** indicates the number of all visible pixels in one horizontal line.

- **Vertical lines** group box contains vertical advanced timing settings.

  - **Sync width**. Click the up or down arrow to specify the blanking period during which the synchronization pulse is active.

  - **Front porch**. Click the up or down arrow to specify the vertical blanking period that occurs between the end of the active period and the beginning of the synchronization pulse.

  - **Back porch.** Click the up or down arrow to specify the blanking period that occurs between the end of the synchronization pulse and the next active period.

  - **Vertical sync polarity**. Click the up or down arrow to specify the direction of rapid, transient change in the amplitude of a signal from a baseline during the vertical synchronization pulse.

    If the vertical synchronization polarity value is positive (+), the value of the vertical synchronization pulse is higher than the baseline value.

    If the vertical synchronization polarity value is negative (-), the value of the vertical synchronization pulse is lower than the baseline value.

    Note: You can select the vertical synchronization polarity independently of the horizontal synchronization polarity.

  - **Refresh rate** indicates how many times per second the electron beam in the picture tube is moved from top to bottom in the case of a CRT (analog display), or more generally, the frequency at which the entire screen is refreshed. Specify the frequency at which your entire screen is refreshed, or retraced, to prevent the image from flickering.

    Note: This frequency is limited by the monitor's maximum horizontal scan rate and the current resolution, as higher resolution implies more scan lines.

    Note: The value should not exceed the monitor's maximum vertical scanning frequency.

  - **Active pixels** indicates the number of all visible pixels in one vertical line.

- **Interlaced mode** refers to interlaced scanning, which is a method of sending the image to your display where even scan lines are drawn during the first field in a frame and odd scan lines are drawn during the second field in the frame.

  Note: Also see the explanation for **-I** (interlaced scanning) on page 8-150.

  Unlike the progressive scanning method, where all the scan lines are updated in each frame, interlaced scanning results in a higher frame rate but usually causes image flicker.

- **Pixel clock** indicates how many millions of pixels are output per second. In other words, this is the frequency at which the display receives pixels from the graphics card. The value typically lies within a range 10 to 360 MHz, or the DAC maximum value.

Editing the NVIDIA Display Menu

Use the **Screen Menus** page to remove infrequently used NVIDIA menu items, which you can restore later.

Accessing the Screen Menus Page

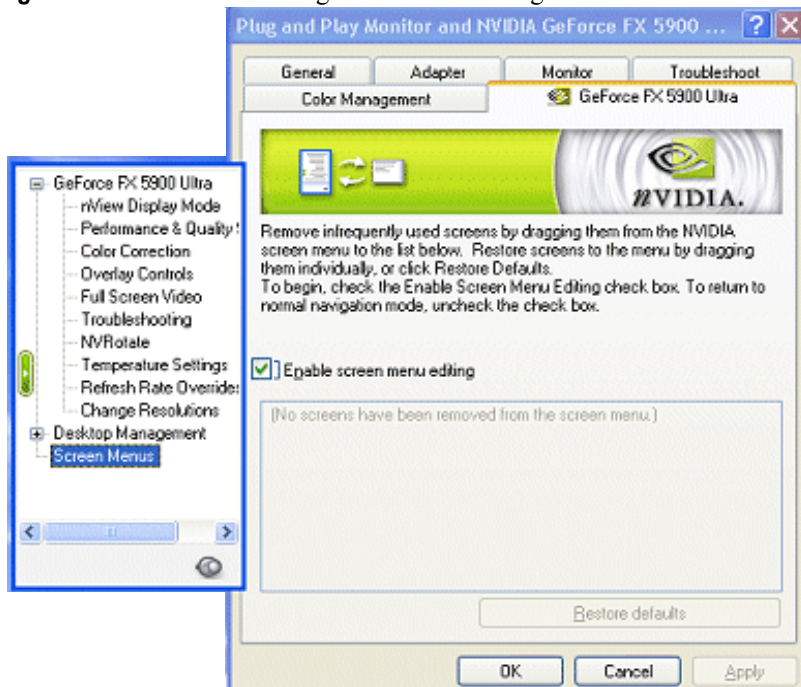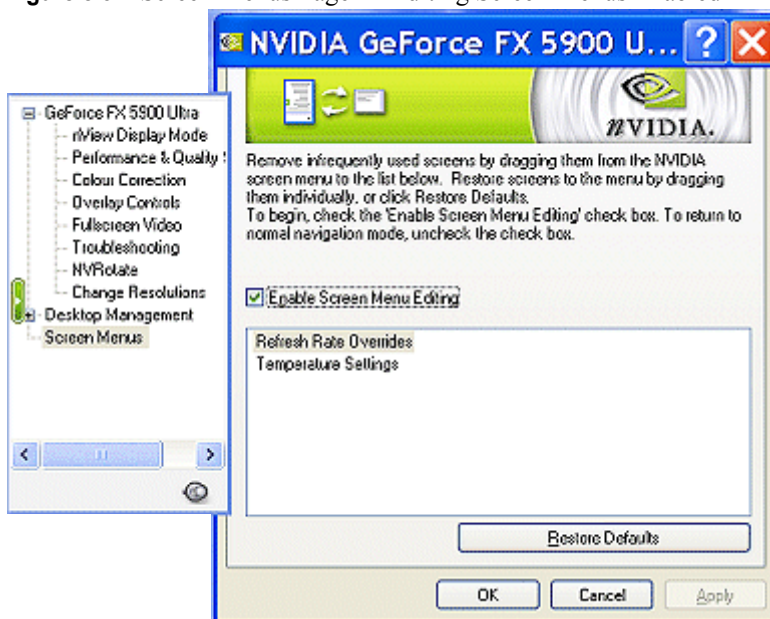To access the **Screen Menus** page, click **Screen Menus** from the NVIDIA Display menu (Figure 8.36).

If you need help in accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.

Using Screen Menu Editing

1 To use the screen menu editing feature, select the **Enable screen menu editing** check box and click **Apply** (Figure 8.36).

2 Remove infrequently used screens by dragging them from the NVIDIA screen menu to the list box shown below the check box.

  The example in Figure 8.37 shows the **Refresh Rate Overrides** and **Temperature Settings** pages temporarily removed from the NVIDIA Display menu.

3 To restore the menu options back to the NVIDIA menu, drag them back to the menu, or click **Restore Default**.

4 To return to normal navigation mode, clear the **Enable screen menu editing** check box and click **Apply**.

Figure 8.36 Screen Menus Page — Default Settings

Figure 8.37 Screen Menus Page — Editing Screen Menus Enabled

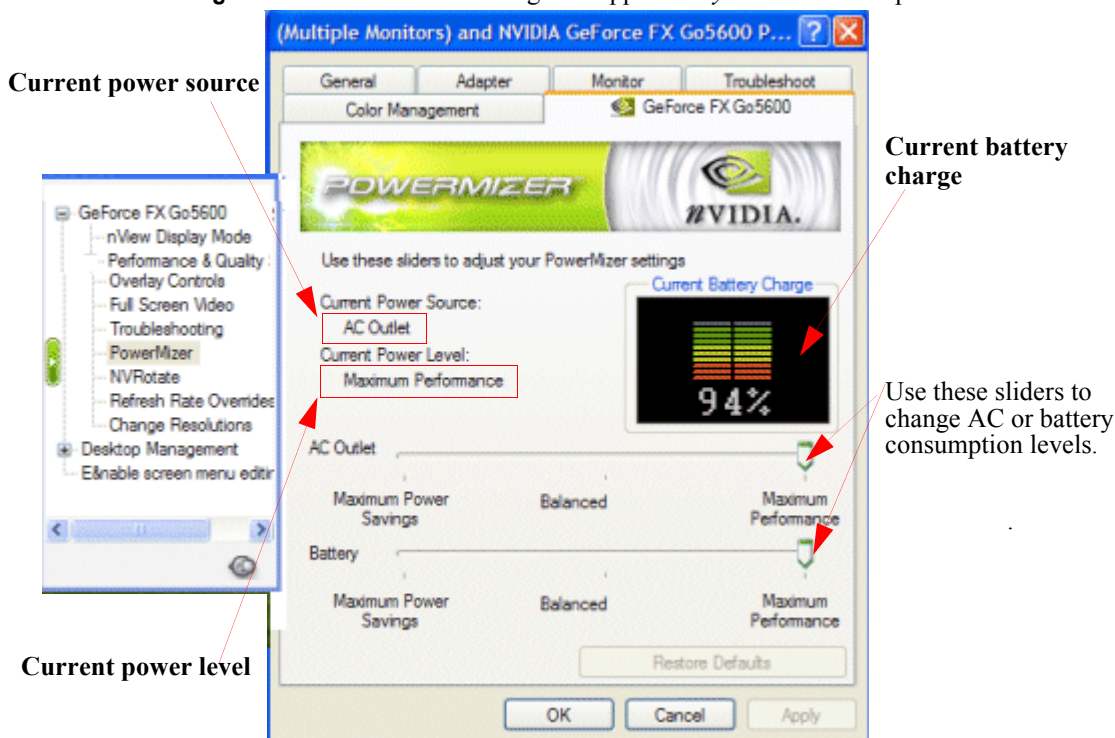# Adjusting PowerMizer Settings — *Only* for Mobile Computers

When using a mobile (notebook or laptop) computer, the NVIDIA PowerMizer™ page lets you regulate the power consumption of your NVIDIA GPU.

Accessing the PowerMizer Page

To access the PowerMizer page, click **PowerMizer** from the NVIDIA Display menu. (If you need help accessing the NVIDIA Display menu, see "Accessing the NVIDIA Display Control Panel Pages" on page 46.)

Figure 8.38 shows the **PowerMizer** page.

Figure 8.38   PowerMizer Settings — Applies *only* to Mobile Computers

Current power source

Current battery charge

Use these sliders to change AC or battery consumption levels.

Current power level

PowerMizer Settings

Current Battery Charge

This is the current battery charge being used by your mobile computer.

Current Power Source

Current power source can be either **AC Outlet** or **Battery**. In this example (Figure 8.38) it is AC Outlet.

Current Power Level

The current power level can apply to either **AC outlet** or **Battery**, depending on the power source being used by your computer.

- **AC Outlet**. Adjust the power consumption from the AC power source relative to performance by setting one of the following:

  - **Maximum power savings**

  - **Maximum performance**

  - **Balanced**

- **Battery**. You can choose any one of the following options:

  - Conserve battery life by setting **Maximum Power Savings**, but at some decrease in performance.

  - Use the full graphics performance of your NVIDIA GPU by selecting **Maximum Performance.**

  - Choose a compromise between the two settings by using **Balanced**.

A

USING TWO NVIDIA GPU-BASED GRAPHICS CARDS

This appendix contains the following major topics:

Before You Begin

This appendix discusses an example of using two *multi-display* NVIDIA GPU-based graphics cards in one computer running Windows XP.

Note: When running Windows with multiple cards (i.e., two or more NVIDIA GPU-based graphics card are installed in your computer), the same NVIDIA driver (version) must be installed for each card.

Before Installing the NVIDIA ForceWare Graphics Display Driver

1 Make sure you have an AGP slot and a PCI slot on your computer.

2 Install the appropriate NVIDIA GPU-based PCI and AGP cards.

3 Make sure the graphics cards are securely seated in their slots.

4 Connect the appropriate display devices to each card, making sure that the cable connectors are *securely* attached to the graphics cards.

5 Turn on your display devices.

Examples and Setup

The examples in this appendix show the following NVIDIA-based graphics cards and configurations.

• The **GeForce FX 5900 Ultra GPU-based graphics card** is an AGP graphics card supporting multi-display nView functionality.

• The **GeForce4 MX GPU-based graphics card** is a PCI graphics card supporting nView multi-display functionality.

  Note: Depending on the number of PCI slots in your computer, you can install more than one PCI graphics cards. These examples use only one PCI graphics card.

GeForce FX 5900 Ultra — Installing the NVIDIA ForceWare Graphics Display Driver

1 Start up your computer.

Your desktop will appear on one of the display devices attached to one of your graphics cards. The Found New Hardware Wizard appears.

2 Click the last option labeled **Install from a list or specific location (Advanced)** to select it.

3 Click **Next**.

4 Click the last option labeled **Don't search. I will choose...** to enable it and click **Next**.

5 From the Common hardware types: list, double-click the **Display adapters** choice.

6 On the next window that appears, make sure that none of the choices is highlighted. If one is, click it to remove the highlight.

7 Click **Have Disk**.

8 Click **Browse** and locate the path containing NVIDIA ForceWare graphics display driver you want to install.

9 Click the NVIDIA **.inf** file and then click **Open**.

10 Click **OK** on the Install From Disk window.

11 Then click the name of your NVIDIA GPU-based graphics card that appears on the Model list and click **Next**.

12 Copying files will take a couple of minutes while you wait.

13 Click all prompts to continue the process.

14 Click **Finish** when that option appears

15 If there is a prompt to restart your computer, click to do so.

16 Respond to the prompts to restart your computer.

GeForce FX 5900 Ultra — Attaching the Secondary Display for nView Dualview Mode

1 From your desktop, open the Display Properties Settings page.

Three display screen images appear, one of which is active (attached) while the other two are not active, meaning connected but not attached.

In this example (Figure A.1), display device numbered **1** appears active, connected, and attached to the GeForce FX 5900 Ultra graphics card. Display **2** (connected to the GeForce4 MX) and display **3** (connected to the GeForce FX 5900 Ultra graphics card) are not active (appear as grayed screen images) because they have not yet been attached.

2 Click **Identify** to identify the display device.

3 Notice that the display's number, as represented on the Settings page, appears briefly on that display device's desktop (Figure A.2).

Figure A.1   Display Properties Settings — **3** Display Devices with **1** Attached
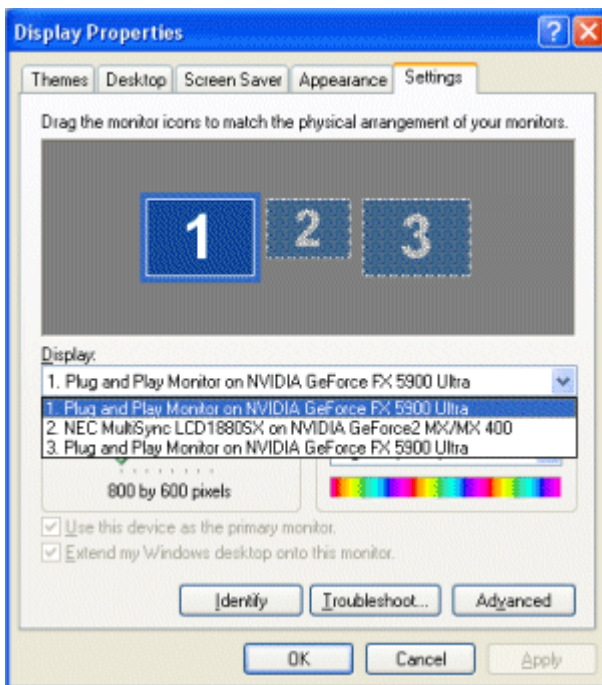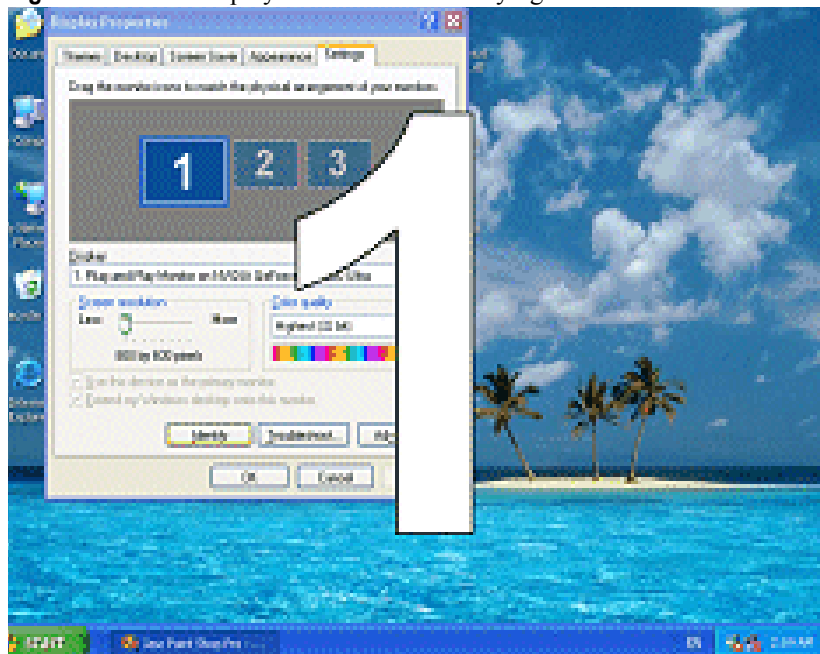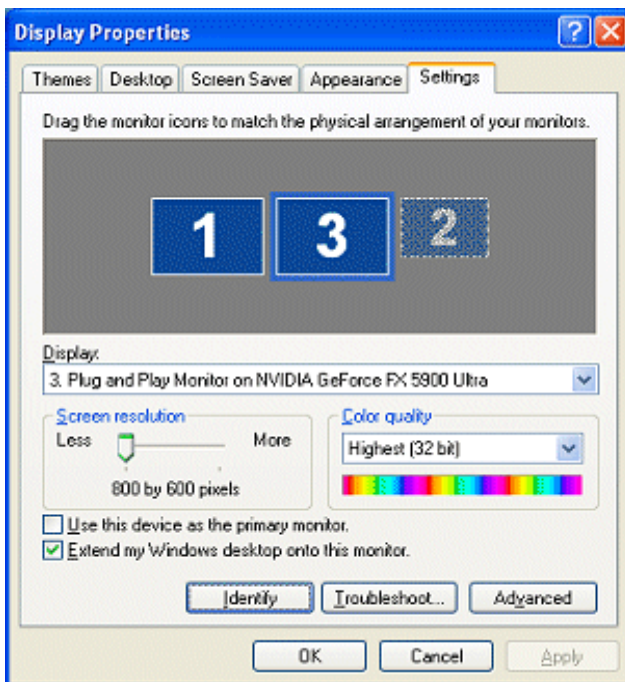
Figure A.2   One Display Device With Identifying Number

4 From the Settings page, right click the inactive screen image numbered display **3** (connected to the GFX 5900 Ultra card), click **Attached**, and click **Apply**.

   Figure A.3 show that display **3** is now enabled and attached.

5 Click **Identify** to identify the attached display devices (**1** and **3**) on their desktops.

   Notice that the attached display devices' numbers, as represented on the Settings page, appear briefly on those display devices' desktops (Figure A.4).

Figure A.3   Display Properties Settings — **3** Display Devices with **2** Attached

Figure A.4   Two Display Devices With Identifying Numbers
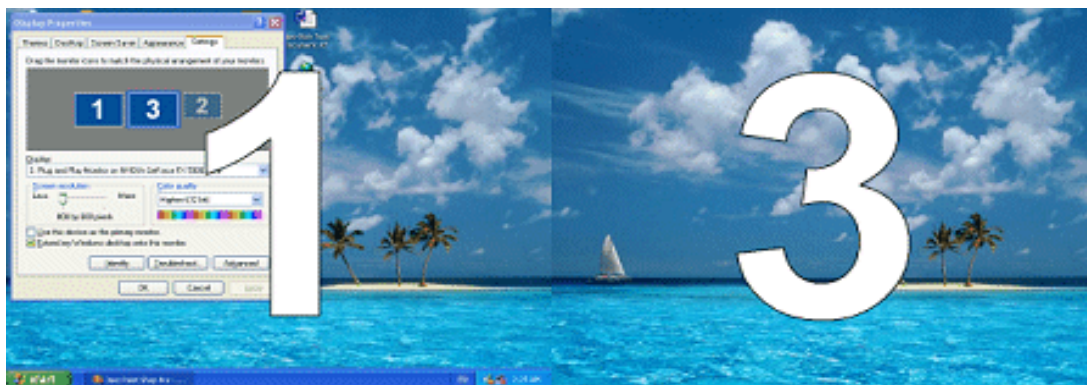
GeForce4 MX — Installing the NVIDIA ForceWare Graphics Display Driver

1   From the Windows Display Properties Settings page, right click the display image **2** (connected to the GeForce4 MX-based graphics card) and click **Properties**.

2   Click the **Adapter** tab and click **Properties**.

3   Click the **Driver** tab and then click **Update Driver** to display the Hardware Update Wizard.

4   Click the last option labeled **Install from a list or specific location (Advanced)** to select it.

5   Click **Next**.

6   Click the last option labeled **Don't search. I will choose...** to enable it and click **Next**.

7   Enable the check box labeled **Show compatible hardware**, if it is not checked already.

8   On the Model list, if it appears, click the NVIDIA-based graphics card for which you are about to install the NVIDIA driver. In this example, it is GeForce4 MX.

9   Click **Have Disk**.

10 Click **Browse** and locate the path containing NVIDIA ForceWare graphics display driver you want to install.

11 Click the NVIDIA **.inf** file and then click **Open**

12 Click **OK** on the Install from Disk window.

13 Click the name of your NVIDIA GPU-based graphics card (in this example, GeForce4 MX).

14 Click **Next**.

15 Click all prompts to continue the process...

16 Copying files will take a couple of minutes while you wait.

17 Click **Finish** when that option appears and then click **Close** to close the Driver window.

18 Respond to the prompts to restart your computer.

Attaching Displays for GeForce4 MX — nView Dualview Mode

1 When you have returned to your desktop, right click on the desktop to display the desktop menu and click **Properties** and the **Settings** tab.

Notice that all four of the connected display devices are now represented by numbered display images, as shown in Figure A.5.

Remember that we already attached display devices 1 and 3 for the GeForce FX 5900 Ultra-based graphics card. Now we will enable display devices 2 and 4 for the GeForce4 MX-based graphics card.

2 Right click display image **2**, click **Attached** and click **Apply**. The associated display device becomes enabled and displays a desktop.

3 Right click on display image **4**, click **Attached** and click **Apply**. The associated display device becomes enabled and displays a desktop.

Figure A.5 and Figure A.6 show the associated Display Properties Settings page and the resulting desktops on the numbered display devices.

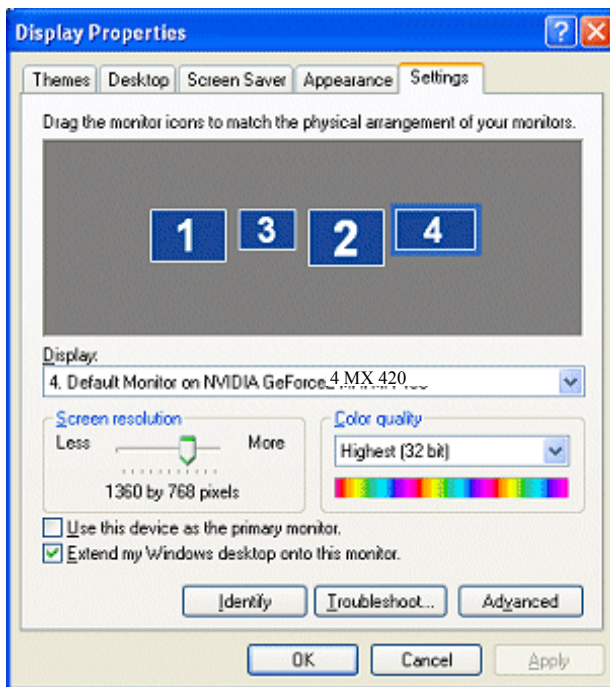**Figure A.5**   Display Properties Settings — 4 Attached Display Devices

Figure A.6   Four Display Devices With Identifying Numbers

> **Note:** Attaching all the displays implies that nView Dualview mode is enabled. If you check the nView Display Mode page for either of the NVIDIA-based graphics cards that are installed, you will see that nView Dualview mode is enabled.

4 From the Windows Display Properties Settings page, right click any of the four display images.

5 Click **Properties** and then click the NVIDIA GPU ab to open the associated page.

6 Click the **nView Display Mode** menu option. Notice that the nView Modes list is set to **Dualview**.

Enabling nView Span and Clone Modes — Detaching the Secondary Display Device

> **Note:** In the following steps, we'll switch from Dualview to Span or Clone mode for each of the two NVIDIA GPU-based graphics cards. You will notice that the secondary displays become detached (disabled) because nView Span and Clone modes do not detect the secondary display device as separate display devices.

1 Right click on either display image **2** or **4**, representing the GeForce4 MX-based graphics card.

2 Click **Properties** and then click the NVIDIA GPU-labeled tab to open the associated NVIDIA GPU (GeForce4 MX) page.

3 Click the **nView Display Mode** menu option.

4 Click the nView Modes list and select **Horizontal Span**, then click **Apply**/

5 Wait while the display devices adjust modes.

The resulting Windows Display Properties Settings page and desktop are shown in Figure A.7 and Figure A.8.

Figure A.7   Display Properties Settings — **4** Display Devices with **2** Attached
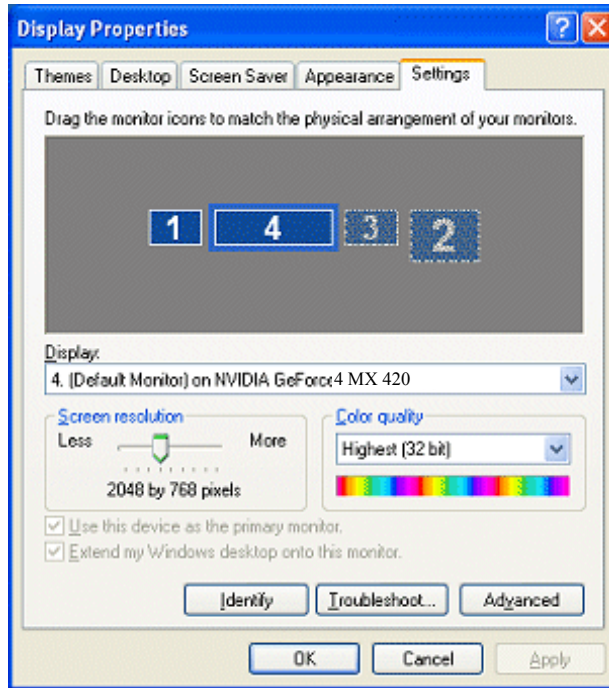
Figure A.8   Two Display Devices With Identifying Numbers

Note: You can repeat steps 4 and 5 and chose Vertical Span or Clone mode. The result will be similar to what is shown in Figure A.7 and Figure A.8 in that the secondary displays become detached because nView Span and Clone modes do not detect the secondary display device as a separate display device.

Viewing Multiple NVIDIA GPU-based Graphics Cards from the NVIDIA Display Menu

You can view multiple NVIDIA GPU-based graphics cards from the NVIDIA Display menu and easily access the corresponding NVIDIA Display control panel pages to configure advanced display settings for each graphics card. See "Configuring Key ForceWare Graphics Driver Features" on page 105.

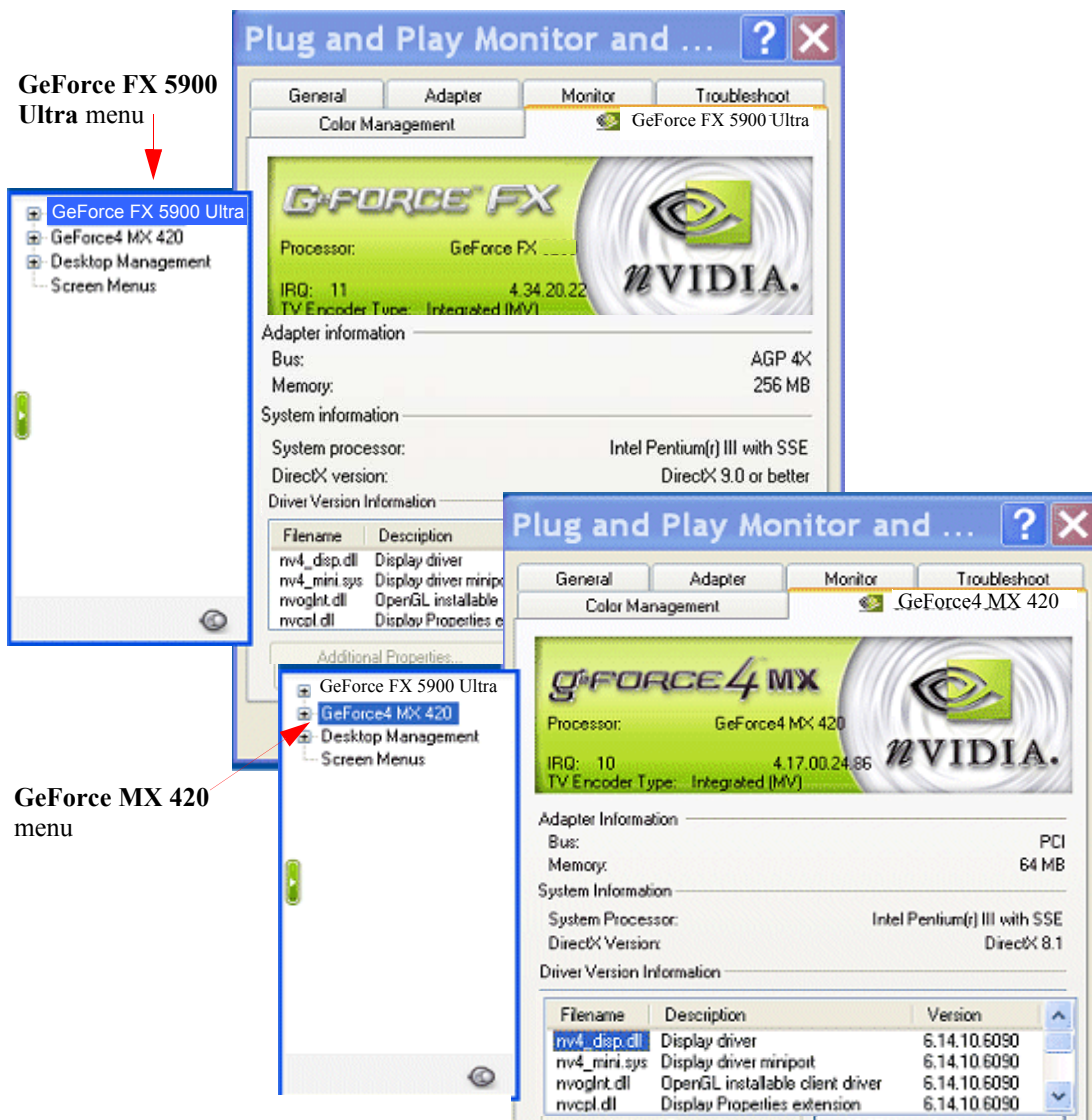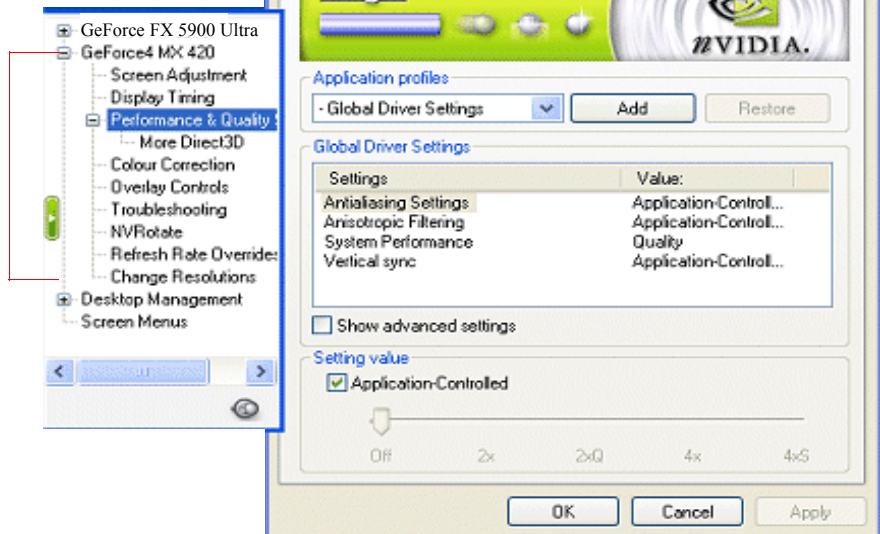**Figure A.9**   NVIDIA Display Menu — GeForce FX 5900 Ultra and GeForce4 MX 420 Options

GeForce FX 5900 Ultra menu

GeForce MX 420 menu

Figure A.10 NVIDIA Display Menu Showing Both GeForce FX 5900 Ultra and
GeForce4 MX Graphics Cards

Viewing Multiple Card Configurations Using the NVIDIA Settings Menu Icon

You can view the multi-GPU configurations through the NVIDIA Settings menu icon on the Windows taskbar. If you don't have the NVIDIA Settings menu icon enabled, see "Adding the NVIDIA Settings Menu Icon to the Windows Taskbar Notification Area" on page 136.

1 Right click the NVIDIA Settings menu icon on your Windows task bar. A menu of configuration options appears, as shown in Figure A.11.

Notice that both GeForce FX 5900 Ultra and GeForce4 MX 420 GPU-based graphics cards are shown in the menu.

2 To see the configuration options for each GPU-based graphics card, point to the GPU names on the menu (Figure A.11) and then move the cursor to any of the options that appear on the next menu level.

Figure A.11 NVIDIA Settings Taskbar Menu Displaying NVIDIA GeForce FX 5200 Ultra-based and GeForce4 MX-based Graphics Cards