

Tech Source

GFX-200 Series Installation and Reference Manual

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Chapter 1

INTRODUCTION

1.1 Overview

Thank you for purchasing a Tech Source GFX-200 Series product. This manual discusses the hardware and software installation and some technical reference material for the following products:

- GFX-220 – Two-headed graphics card with 8MB framebuffer per head, supporting both digital flat panel displays and analog monitors.
- GFX-240 – Four-headed graphics card with 8MB framebuffer per head, supporting both digital flat panel displays and analog monitors.

All systems vary to a degree, therefore knowledge of the features of your system and an understanding of UNIX shell scripts are helpful during the installation process.

The Tech Source GFX-200 Series of graphics cards is designed to enhance the capabilities of your Sun Microsystems PCI-based Sun Blade, Ultra desktops and Enterprise servers. The GFX-200 Series is one of the follow-on products to the popular Raptor GFX-8P (PGX32 from Sun Microsystems) graphics card. The GFX-200 Series delivers over double the performance of the GFX-8P.

All GFX-200 Series products support 8-bit and 24-bit visuals (depths) simultaneously and resolutions up to 1920x1080 analog, or 1280x1024 digital (DVI). The resolutions and bit depths are software configurable.

<p>NOTE: GFX-200 Series will be used as a generic name for all the cards in the family throughout this manual.</p>

1.2 Conventions

This manual will follow certain conventions throughout.

Whenever a variable name, command name, directory, or filename is used in a paragraph, they will appear in a `mono-spaced` font.

At times the reader will be instructed to enter commands at a prompt. In this case a transcript of a sample session will be provided where a prompt similar to one the reader might see will be followed by the commands the reader is to enter. The entire transcript will be in a `mono-spaced` font with the prompt in a normal weight and the user's entries in **bold**.

The prompt used in a transcript varies depending on the circumstances. The following are some common prompts and when they are used:

<code>prompt#</code>	used when the user is required to have root privileges
<code>prompt%</code>	used when the user is not required to have root privileges
<code>ok</code>	prompt displayed when the user is in Boot PROM mode

Chapter 2

HARDWARE INSTALLATION

2.1 Installation Instructions

The GFX-200 Series graphics card installation is simple and consists of a few easy steps. These installation instructions presume that you are familiar with the Solaris operating system.

NOTE: Remember which cables go to which connectors. You may want to label the cables and connectors before disconnecting them.

- Step 1: Turn your computer OFF, remove the computer's cover, find an available PCI Local Bus slot, and remove the bracket and screw. Ground yourself by touching the metal part on the case.
- Step 2: Install the GFX-200 Series card firmly into the PCI Local Bus slot. Take care to press it evenly and snugly into the slot. Once you are certain that the card is installed properly into the slot, secure it with the bracket screw.
- Step 3: Secure the computer's cover, attach any previously removed cables, and connect the video cable to your monitor.

Each port on the GFX-220 and GFX-240 cards supports two displays with a custom splitter cable attached to the port. (Please refer to Appendix B for more information on the cables.) The GFX-200 Series cards support both analog and digital displays. It is a matter of choosing the right dual monitor adapter (splitter cable). Two versions of this splitter cable are available.

One provides two standard analog VGA (DB-15) ports; this cable is bundled with the card. For digital displays, a cable with dual DVI ports is available. This cable can be purchased directly from Tech Source, Inc.

If using the DB15 version analog cables, please note that some Sun monitors may require a DB-15 to 13W3 adapter (Refer to Appendix Section B.4).

NOTE: With a GFX-240, connecting an analog splitter cable to one port, and a digital splitter cable to the other port is allowed.

Step 4: Turn ON the monitor before turning ON the computer so that the GFX-200 Series card can auto-detect the proper resolution for your monitor.

NOTE: If the system is currently using a secondary graphics device, read section 3.5 on configuring the console device. The console device is the screen on which the boot up messages appear. A monitor must be connected to the console device before you proceed to Chapter 3 Software Installation.

The GFX-200 Series card is now installed and ready for software installation. Refer to Chapter 3 for installing the GFX-200 Series Driver Software.

2.2 Resolution Settings

For monitors that support the DDC2B/EDID (Display Data Channel) protocol, the GFX-200 Series card will automatically select a compatible resolution. To override this selection, or to change the default resolution for monitors that do not provide DDC information, refer to Section 3.4 and Appendix A.

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The default resolution for the GFX-200 Series card is listed in the table below.

Board	Resolution	Refresh	Bits/Pixels	Sync
GFX-220	Auto Detect	-	8	separate/composite
GFX-240	Auto Detect	-	8	separate/composite

If the monitor does not support the DDC2B/EDID protocol (auto-detect), and the console resolution is not set using methods described in Appendix A, the resolution will default to 1152x900@66Hz.

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Chapter 3

SOFTWARE INSTALLATION

3.1 Overview

This chapter describes the software installation method for the “GFX-200 Series Driver Software”, which supports the following Tech Source, Inc. products:

- GFX-220 and GFX-240

NOTE: Please note that this software must be installed on your system prior to running X Windows on these cards.

The software is provided on CD-ROM or by FTP and is composed of the following packages:

- TSImkr 32-bit System Software/Device Driver
- TSImkrx 64-bit System Software/Device Driver
- TSImkrw OpenWindows System Support Software
- TSImkrmn Manual pages

3.2 Requirements

The software currently supports the following Sun PCI based systems:

- Sun Blade 100
- Sun Blade 1000
- Ultra 5
- Ultra 10
- Ultra 30
- Ultra 60

- Ultra 80
- Ultra AX
- Ultra AXi
- Enterprise 250
- Enterprise 450
- Enterprise 2500
- Enterprise 3000

NOTE: If your Sun PCI system is not listed here, please contact Tech Source, Inc.

The following are prerequisites for installing the “GFX-200 Series Driver Software”:

- The system is running Solaris 2.6 or higher.
- OpenWindows Version 3.6 or higher has already been installed on the system.
- At least 2MB of disk space is available in `"/usr"` and `"/."`
- One or more of the cards listed in Section 3.1 are presently installed in the workstation.

NOTE: All device drivers are loadable. No kernel changes are required.

3.3 Installing GFX-200 Series Driver Software

This section describes software installation from a CD-ROM.

3.3.1 CD-ROM Installation

The following are step-by-step instructions for installing the “GFX-200 Series Driver Software” from a CD-ROM.

1. Install a GFX-200 Series card in the computer as described in Chapter 2.

2. Boot the computer with the "-r" (reconfiguration) option. To do this on a typical Sparc workstation, perform the following steps:
 - Power ON the computer.
 - Wait until you see boot messages displaying on the screen, then press and hold the `STOP` (L1) key, and then press the "A" key.
 - At the "ok" prompt, type "boot -r" followed by the <Enter> key.
3. After the system has booted, log in as `root`.
4. Insert the CD-ROM labeled "GFX-200 Series Driver Software-Solaris Edition" into the CD-ROM drive.
5. If `/cdrom/cdrom0` exists, type:

```
prompt# cd /cdrom/cdrom0
```

Skip to step 6. Otherwise, mount the CD-ROM by typing the following:

```
prompt# mount -F hsfs -O -o ro
/dev/dsk/c0t6d0s0 /cdrom
```

```
prompt# cd /cdrom
```
6. The CD-ROM contains an `install_all` script. To install the software, type:

```
prompt# ./install_all
```

This script will ask you a number of yes-or-no questions (generated by Sun's `pkgadd` install script). Answer these questions appropriately.
7. Reboot the system to complete the installation.

3.4 Changing Resolutions on GFX-200 Series Card

After installation you may want to configure the X Window screen resolution, bit-depth, and refresh rate for your monitor. (This resolution is independent of the console resolution described in Appendix A.) The default resolution is accepted by skipping this section. The defaults for the GFX-200 Series products are as follows:

Board	Resolution	Refresh	Bits/Pixels	Sync
GFX-220	Auto Detect	-	8	separate/composite
GFX-240	Auto Detect	-	8	separate/composite

The `mkrconfig` utility can be used any time after installation to change these parameters.

Please see the man page on `mkrconfig` for a detailed description.

The next two sections describe two methods of using `mkrconfig` to configure the GFX-200 Series card.

3.4.1 Interactive Configuration

`mkrconfig` has an interactive menu-style interface (See Figure 3.1). To use this program to configure your GFX-200 Series card, type:

```
prompt# mkrconfig -i
```

NOTE: If X Windows is running on the GFX-200 Series cards(s) to be configured, please exit out of it before running `mkrconfig`. Failure to do so could result in a corrupted screen for the remainder of the X Window session.

NOTE: `mkrconfig -i` should be run only on a terminal whose resolution is at least 1024 x 768.

NOTE: `mkrconfig` will not display correctly if your boot console resolution on the GFX-200 Series card to be configured is 800 x 600 or lower. In this case, please use the non-interactive mode or configure by running `mkrconfig` from a remote machine.

The GFX-200 Series device(s) will be listed in the left column of the configuration screen displayed by `mkrconfig`. (See Figure 3.1).

A description of the commands is as follows:

Up/Down Arrow	selects the desired graphics device to modify
Left/Right Arrow	selects the parameter to modify (e.g. resolution, bit-depth, or sync)
Space Bar	modifies the parameter for the selected graphics device (will bring up a menu when applicable)
`t`	puts a test pattern on the entire display (hit any key to return to the main screen)
`s`	saves current settings and exits
`h`	help
`q`	exits the program without saving any changes

NOTE: As shown in Figure 3.1, the model for all GFX-200 Series devices is identified as GFX-200. This is done deliberately to preserve the identity of individual displays (e.g. `mkr0`, `mkr1`, etc.) regardless of the type of card associated with them.

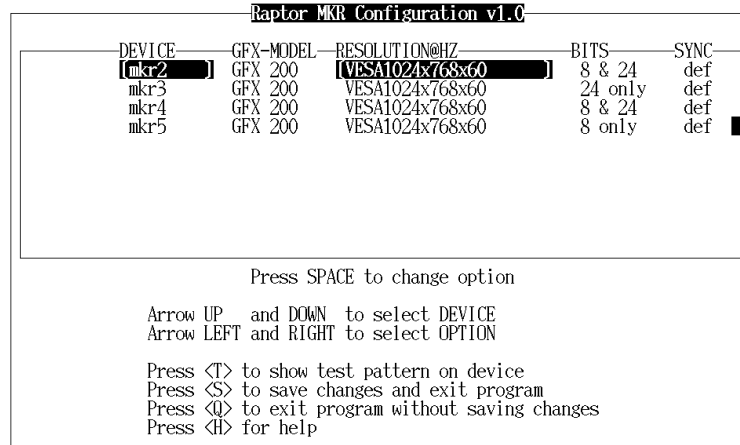


Figure 3.1 GFX-200 Series Configuration Utility

3.4.2 Non-Interactive Configuration

Sometimes it is convenient to configure the GFX-200 Series card non-interactively. This method is especially useful when configuring many systems identically or when the appropriate configuration for the system is already known.

mkrconfig uses the same conventions as Sun's m64config or fbconfig utilities. All of the parameters which are set using the interactive version can be set by specifying the option followed by a desired value. The parameters are:

- dev <device> selects the device to configure
- res <resolution> sets the resolution
- res \? shows resolutions
- file machine | system specifies whether to modify OWconfig from /etc/openwin/ server/etc or

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	<code>/usr/openwin/ server/etc respectively</code>
<code>-depth 8 24</code>	changes the bit depth to 8 only or 8+24 mode
<code>-defaults</code>	resets device to default parameters
<code>-24only true false</code>	forces all windows to use 24-bit visuals. This will disable 8+24 mode and may prohibit some 8-bit applications from working
<code>-cachedpixmap false</code>	Turn off the off-screen cached pixmap feature. Default is <code>true</code> .
<code>-propt</code>	displays current settings
<code>-prconf</code>	displays hardware information
<code>-help</code>	shows usage

NOTE: By default the bit depth will be set to 8/24 for all resolutions.

3.4.2.1 Examples

To configure the resolution on the GFX-200 Series card to 1152x900 @ 66Hz, type the following:

```
prompt# mkrconfig -res 1152x900x66
```

NOTE: If no device is specified, `mkrconfig` configures the console (assuming it is a GFX-200 Series card).

To verify the resolution prior to setting it permanently, add the word "try" after the resolution name. This option will display a test pattern on the screen until a return key is hit. Then the resolution can be accepted or rejected. For example:

```
prompt# mkrconfig -dev /dev/fbs/mkr0  
        -res 1152x900x66 try
```

To set the resolution to 1024x768x60 with a single TrueColor visual (no 8-bit PseudoColor visual):

```
prompt# mkrconfig -res 1024x768x60  
        -24only true
```

To display the current settings for `/dev/fbs/mkr0`:

```
prompt# mkrconfig -dev /dev/fbs/mkr0 -propt
```

3.5 Setting GFX-200 Series Card as the Console (Optional)

This section describes how to configure the GFX-200 Series card to be the console device for your system.

NOTE: If the procedure for your system is not described below, please contact Tech Source, Inc.

3.5.1 GFX-200 Series Card as the Only Framebuffer

3.5.1.1 Ultra 5 and Ultra 10

To use the GFX-200 Series card as the system console on an Ultra 5 or Ultra 10 as the only framebuffer, first disable the onboard card, which comes built into the Ultra 5 and Ultra 10. At

the "ok" prompt, type:

```
ok setenv pcib-probe-list 1,3  
ok reset
```

Once the system is reset, all console messages will be directed to the GFX-200 Series card.

NOTE: To restore the motherboard's 8-bit graphics device as the console for any reason, simply add it back to the `pcib-probe-list` as below:

```
ok setenv pcib-probe-list 1,2,3  
ok reset
```

3.5.1.2 Sun Blade 1000, Ultra 30, Ultra 60, Ultra 80 and other systems without any built-in frame buffers

If no other framebuffer are present in an Ultra 30, Ultra 60, Ultra 80, Sun Blade 1000 or another supported system, then the GFX-200 Series will be the console by default, provided that the board is in a valid, probed PCI slot.

3.5.1.3 Sun Blade 100

By default, the onboard video card is the last item in the `pci-probe-list`. After being properly installed in the system, if the GFX-200 Series card is the only graphics card in the system, it will be probed first, and display head #1 (as shown in Figure B.3.3) will automatically be made the console.

However, any graphics card or head can be made the console. Follow the procedure below to set the console manually.

1. At the `ok` prompt, type the following to display a list of the installed graphics devices:

```
ok show displays
a) /pci@1f,0/SUNW,m64B@13
b) /pci@1f,0/pci@5/SUNW,Expert3D-Lite@1
c) /pci@1f,0/pci@5/pci@1/TSI,mkr@c
d) /pci@1f,0/pci@5/pci@1/TSI,mkr@8
e) /pci@1f,0/pci@5/pci@1/TSI,mkr@4
f) /pci@1f,0/pci@5/pci@1/TSI,mkr@0
q) NO SELECTION
Enter Selection, q to quit:
```

2. Type a letter at the prompt to select the graphics card you want to be the default console display.

In this example, type `a` to select the onboard M64 graphics device.

```
Enter Selection, q to quit: a
/pci@1f,0/SUNW,m64B@13 has been selected
Type ^Y ( Control-Y ) to insert it in the
command line.
e.g. ok nvalias mydev ^Y
```

3. Set the selected device as the console device by typing:

```
ok setenv output-device <Control-Y>
```

4. Power off the system.
5. Connect your monitor cable to the onboard VGA connector on your system back panel.
6. Power on the system.

3.5.2 GFX-200 Series Card with a Secondary Framebuffer

The GFX-200 Series card can be made the console device when other secondary framebuffers are present in the system.

To configure the GFX-200 Series card as the console when UPA or other framebuffers are in the system, the `output-device` variable in NVRAM must be changed to the actual path of the desired GFX-200 Series card. This path can best be determined by searching for the string "TSI" in the `/ tree` at the "ok" prompt.

For example, to find the PCI devices, at the "ok" prompt, type the following:

```
ok show-devs
```

You should see at least one entry containing the string "TSI", ie. "TSI,mkr@#", where '#' will be a digit representing the PCI slot containing the GFX-200 Series card.

Use this entry as the console device for your desired GFX-200 Series card.

For example, if the path is `/pci@1f,4000` to the device "TSI,mkr@#", then type the following command:

NOTE: Replace '#' with whatever your GFX-200 Series device requires.

```
ok setenv output-device /pci@1f,4000/TSI,mkr@#  
ok reset
```

Once the system is reset, all console messages will be directed to the GFX-200 Series card.

NOTE: To restore the default graphics device as the console for any reason, simply set the `output-device` variable back to its default value of `screen` as below:

```
ok  setenv output-device screen
ok  reset
```

3.5.2.1 Other PCI Framebuffers

To make the GFX-200 Series card the console device when other PCI framebuffers are present in the system, it may be necessary to change the `pcia-probe-list` to probe the GFX-200 Series slot before that of the secondary framebuffer (in addition to making the changes in 3.5.1.1., if applicable).

Determine the slot numbers that correspond to these framebuffers, then ensure that the GFX-200 Series device slot number precedes that of the secondary framebuffer in the `pcia-probe-list`.

For example, if the GFX-200 Series device is located in slot 3, and the secondary framebuffer is located in slot 1, then update the `pcia-probe-list` so that slot 3 is probed BEFORE slot 1.

A possible configuration may resemble the following:

```
ok  setenv pcia-probe-list 3,2,1,4
ok  reset
```

Once the system is reset, all console messages will be directed to the GFX-200 Series card.

Chapter 4

OPENWINDOWS

4.1 Overview

This section describes how to start up OpenWindows on the GFX-200 Series cards. The GFX-200 Series device name will be `mkr#`, where `#` represents the device instance number.

4.1.1 GFX-200 Series Card as the Console

If the GFX-200 Series device is the console, type:

```
prompt# openwin
```

4.1.2 GFX-200 Series Card as the Secondary Framebuffer

If the PGX card is the console and the GFX-200 Series device is the second card, to start OpenWindows on both cards, in multiscreen mode, type:

```
prompt# openwin -dev /dev/fbs/m640 \  
              -dev /dev/fbs/mkr0
```

The order of the devices corresponds to the order of the screens.

<p>NOTE: In the above example, the <code>mkr</code> device number is 0. This may be different in your configuration. Please check in <code>/dev/fbs/</code> or <code>dmesg</code> for the correct device numbers.</p>
--

4.2 Common Desktop Environment (CDE)

If you have installed CDE and would like CDE to appear on the GFX-200 Series display, you may need to modify your `/etc/dt/config/Xservers` file.

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If the file `/etc/dt/config/Xservers` does not exist, please copy it from the `/usr/dt/config` directory. Type:

```
prompt# cp /usr/dt/config/Xservers \
        /etc/dt/config
```

If the directory does not exist, type:

```
prompt# mkdir /etc/dt/config
prompt# cp /usr/dt/config/Xservers \
        /etc/dt/config
```

If the GFX-200 Series card is the console device, then there is no need to modify the `Xservers` file.

The sample `Xservers.mkr` file which is provided, assumes that the GFX-200 Series card is the only framebuffer on which to start CDE:

```
:0 Local local_uid@console root \
/usr/openwin/bin/Xsun :0 -dev \
/dev/fbs/mkr0 -nobanner
```

NOTE: If the name of your GFX-200 Series device is something other than `mkr0`, please substitute the correct name in the file.

You may add any other desired command line arguments to the end of this line. For example, you may start CDE on multiple displays. To do this, list each display device following the convention above. The following configuration displays CDE on the display named `/dev/fbs/mkr0` and uses the device named `/dev/fbs/m640` (the built in graphics device on Sun Ultra 5/10 systems) as a secondary framebuffer:

```
:0 Local local_uid@console root \
/usr/openwin/bin/Xsun :0 -dev /dev/fbs/mkr0 \
-dev /dev/fbs/m640
```

Chapter 5

ADVANCED FEATURES

5.1 Overview

The GFX-200 Series card has several advanced features available through the X Server. They are:

- 8/24-bit simultaneous visuals
- Off-screen pixmap caching
- OpenGL support

5.2 8/24 Simultaneous Visuals

The 8/24 mode supports 8 and 24-bit visuals simultaneously. This addresses the classic colormap flashing issue with a 24-bit visual while providing the 8-bit visual that is required by some legacy applications, such as SoftWindows.

The available visuals are PseudoColor and TrueColor. PseudoColor is the default visual.

5.3 Cached Pixmap

All GFX-200 Series cards support off-screen pixmap caching. Cached pixmaps are those which are stored in the off-screen memory. These off-screen pixmaps allow faster transfer rates to and from on-screen windows.

The available off-screen memory depends on the amount of video memory, the current resolution, and depth settings. For example, consider the GFX-200 Series card, which has 8MB of video memory per head. If it is running at 1024x768 resolution with a depth of 8-bits, 768K is used for on-screen memory. That leaves 7.2MB available for pixmaps. In 24-bit and 8+24-bit modes, the on-screen memory that is used is 4 times larger than

what is used in the 8-bit mode.

The largest pixmaps are stored in off-screen memory. If a larger pixmap replaces a smaller pixmap in the off-screen memory, the smaller pixmap will move to system memory and remain there even after the larger pixmap is destroyed.

5.4 OpenGL Support

OpenGL support is provided through the Direct Pixel Access (DPA) Extension. To use this function, OpenGL v1.1.1 or higher must already be installed on your system.

NOTE: In OpenGL v1.1.1 for Solaris, there is a bug in the DPA PCI 24-bit support that causes the red and blue colors to be swapped. There is a patch from Sun (Patch ID 106022-07) that fixes this problem. It is fixed in OpenGL v1.1.2.

Chapter 6

REMOVING GFX-200 SERIES DRIVER SOFTWARE

6.1 Overview

To find out if any “GFX-200 Series Software” exists on your system, type:

```
prompt# pkginfo | grep TSImkr
```

If you see any response to the command, then you have some “GFX-200 Series Driver Software” currently installed.

To uninstall the “GFX-200 Series Driver Software”, enter the following command:

For Solaris 2.6, type:

```
prompt# pkgrm TSImkrmn TSImkrw TSImkr
```

For Solaris 7 and Solaris 8, type:

```
prompt# pkgrm TSImkrmn TSImkrw TSImkr TSImkrx
```

<p>Warning: This uninstall procedure may not work with older versions of the TSI software. It is important to use the procedure provided with the previous version.</p>
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Chapter 7

TECHNICAL ASSISTANCE

7.1 Who to Call for Help

If you need help, please call our Technical Support Team at (800) 330-8301, or directly at (407) 262-7100 between the hours of 9:00am and 6:00pm EST.

Please have the software part number, version, and serial number for your GFX-200 Series card(s) available when contacting Tech Source, Inc. in order to expedite support.

NOTE: Technical Assistance will be available only for products under standard or extended warranty.

7.2 Email Address

Our email address is hotline@techsource.com. International customers should use email or our fax line at (407) 339-2554.

7.3 Website

Detailed product information, FAQ's, bug lists, and patches are available on our website located at:

<http://www.techsource.com>

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Appendix A

CHANGING THE CONSOLE RESOLUTION

A.1 Overview

The GFX-200 Series card can be configured to be the console in a typical Sparc workstation. Every GFX-200 Series card type has its own default console resolution and default depth as shown in the following table:

Board	Resolution	Refresh	Bits/Pixels	Sync
GFX-220	Auto Detect	-	8	Separate/composite
GFX-240	Auto Detect	-	8	Separate/composite

It is possible to change the default resolution on all GFX-200 Series cards. The procedures described in this appendix are:

- EDID Auto-Detect feature
- Output Device Method
- Video-Mode Method
- Video-Timing Method

This appendix includes a troubleshooting section describing possible problems and answers associated with changing the console resolution.

A.1.1 Reason for Changing the Console Resolution

Normally the default console resolution is sufficient for most users. An example of when you might be required to change the default resolution is described below:

- If the monitor does not "sync up" at the default console resolution, it may be necessary to choose a different console resolution.

A.1.2 Guidelines for Changing the Console Resolution

There are some general guidelines to follow when changing the default console resolutions. They are as follows:

- By default, all console resolutions will automatically be set to 8-bit mode.
- It is recommended that you use `mkrconfig -i` to test a resolution before configuring the console to that resolution.

A.1.3 EDID Auto-Detect Feature

If you are using a monitor with DDC2B/EDID protocol the default resolution will be determined using the Auto-Detect feature.

With this protocol, the GFX-200 Series card first checks the Standard Timing Identifiers (taking the first one supported) then tries to match the Established Timings.

NOTE: The monitor must be turned ON prior to booting the system in order for the GFX-200 Series card to communicate with it. **Some adapters and cables may block this signal.**

If the Auto-Detect feature fails the card will default to 1152x900 @ 66 Hz.

Other methods described in this appendix will override any information obtained via EDID.

A.2 Output-Device Method

To specify the console resolution of a GFX-200 Series card via the `output-device` environment variable, use the format `screen:rAxBxC` where:

A is the desired horizontal resolution,
B is the desired vertical resolution,
C is the desired refresh rate.

The system will check these values against an internal list of resolutions (see section A.3 for valid list) and use the corresponding entry as the console resolution.

For example, to use VESA 1024x768x75 as the console resolution, type the following at the `ok` prompt:

```
ok setenv output-device screen:r1024x768x75  
ok reset
```

NOTE: The new console resolution will take effect following the reset, and will hold the resolution information until the `output-device` variable is changed manually.

A.3 Video-Mode Method

At the "`ok`" prompt in Boot PROM mode, the console resolution can be easily set on GFX-200 Series cards by using one of the 37 preinstalled resolution modes. These resolution settings are identified by video modes 1-37.

NOTE: The default console of all video modes is 8 bits.

1	640x480@72
2	640x480@75
3	640x480@85
4	800x600@60
5	800x600@72

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6	800x600@75
7	800x600@85
8	1024x768@60
9	1024x768@70
10	1024x768@75
11	1024x768@77 *
12	1024x768@85
13	1024x800@85 *
14	1152x900@60
15	1152x900@66 *
16	1152x900@70
17	1152x900@75
18	1152x900@76 *
19	1152x900@85
20	1280x800@76 *
21	1280x1024@60
22	1280x1024@67
23	1280x1024@67 *
24	1280x1024@75
25	1280x1024@76 *
26	1280x1024@85
27	1600x1000@66 *
28	1600x1000@76 *
29	1600x1200@60
30	1600x1200@65
31	1600x1200@70
32	1600x1200@75
33	1600x1200@85
34	1600x1280@76*
35	1920X1080X60
36	1920X1080X72*
37	1920X1080X80

NOTE: The resolution followed by a * uses composite sync.

NOTE: Please refer to Appendix C for a description of `nvedit` commands.

Appendix A – Changing the Console Resolution

```
ok nvedit
  0: 8 value video-mode
  1: <ctrl-c>
ok nvstore
ok setenv use-nvramrc? true
ok reset
```

NOTE: The last three commands enable the NVRAM. Without these lines, the changes you make with `nvedit` will be ignored.

A.4 Video-Timing Method

If all of the previously described methods fail for your configuration, it is possible to specify the exact timing numbers for a particular resolution. The last method for setting the console resolution also uses `nvedit`. This method is more involved and requires knowledge of all timing parameters for the desired resolution, and is only meant for monitors whose resolutions are not available in the `video-mode` method. Please refer to Appendix C for detailed instructions on using `nvedit`.

NOTE: The video-timing method should be used **only** if the previous methods have been unsuccessful.

For example, to set the console resolution to 1280x1024@76Hz, type the following:

```
ok nvedit
  0: : video-timing " 1280, 384, 32, 64,
    1024, 43, 3, 8, 135000000, 0" ;
  1: <ctrl-c>
ok nvstore
ok setenv use-nvramrc? true
ok reset
```

NOTE: The syntax is very important. The spaces must be present exactly as they appear in the example.

NOTE: The last three commands enable the NVRAM. Without these lines, the changes you make with `nvedit` will be ignored.

The following is a brief description of the 10 parameters used in this method.

- horizontal resolution (in pixels)
- horizontal blanking total
- horizontal front porch
- horizontal sync width
- vertical resolution (in lines)
- vertical blanking total
- vertical front porch
- vertical sync width
- dotclock in Hz
- sync value:

0	separate sync
256	sync on green
512	positive vertical sync pulse
1024	positive horizontal sync pulse
2048	composite sync

The sync values can be added together to select more than one of the above.

NOTE: To obtain the timing parameters required to use the video-timing method, please contact Tech Source with your monitor's requirements.

A.5 Troubleshooting

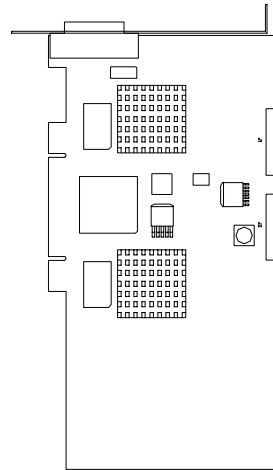
Problem	Solution
Used the method described in the Appendix to configure the console resolution, but the card still defaults to something other than the resolution specified.	<p>A priority scheme is used to determine the boot console resolution. The GFX-200 Series firmware checks the various methods in the order of priority discussed below. If it finds the resolution from the current method, it uses it; otherwise, it goes down the priority list to find the resolution information. Finally, if there is no resolution information, it uses the default resolution. The resolution-setting methods are enumerated in order of decreasing priority:</p> <ol style="list-style-type: none">1. <code>output-device</code> method (Section A.2)2. <code>video-timing</code> method (Section A.4)3. <code>video-mode</code> method (Section A.3)4. DDC2B/EDID (Section A.1.3)5. Default resolution for the card

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Appendix B

CARD SPECIFICATIONS

B.1 GFX-220 (Dual Head PCI Card)



Frame Buffer: 8 MB SGRAM per head, 16 MB total

Hardware Cursor: 3-color, 64x64 bitmap per head

Horizontal Sync Signals: 31.5 kHz – 110 kHz

Vertical Refresh Rates: Up to 85 Hz

Dot Clock Max: 250 MHz

PCI Interface: 66/33 MHz, 32-bit, Ver. 2.1

Video Interface: Analog RS-343 (75 ohm)
TMOS (DVI)

Video Sync: Separate, Composite, SOG

Video Connector: LFH-60 (15 pin D-shell, VGA or DVI-I, using splitter cable)

Temperature Rating: 0^o to 60^oC operating
-40^o to 75^oC non-operating

Humidity Rating: 10 to 95% (non-condensing, non-operating)
20 to 80% (non-condensing, operating)

Power Rating: +5V @ 3 Amps (max)

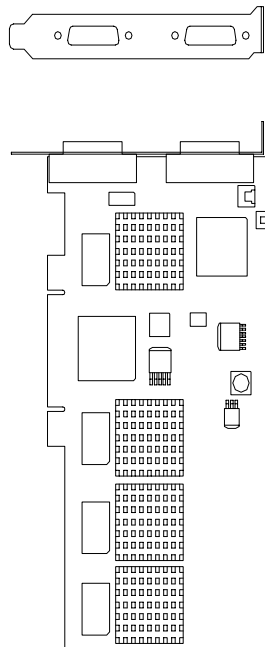
PCB Dimensions: 4.5" x 8.0" x 0.7"
11.43 cm x 20.32 cm x 1.78 cm

Boot Support: IEEE 1275 Compliant FCode

Maximum Resolution

Per Channel: 1920 x 1080 @ 60 24 bpp (analog)
1920 x 1200 @ 70 8 bpp (analog)
1280 x 1024 @ 75 24 bpp (digital)

B.2 GFX-240 (Quad Head PCI Card)



Frame Buffer: 8 MB SGRAM per head, 32 MB total

Hardware Cursor: 3-color, 64x64 bitmap per head

Horizontal Sync Signals: 31.5 kHz – 110 kHz

Vertical Refresh Rates: Up to 85 Hz

Dot Clock Max: 250 MHz

PCI Interface: 66/33 MHz, 32-bit, Ver. 2.1

Video Interface: Analog RS-343 (75 ohm)
TMOS (DVI)

Video Sync: Separate, Composite, SOG

Video Connector: LFH-60(x2) (15 pin D-shell, VGA or DVI-I, using splitter cable)

Temperature Rating: 0^o to 60^oC operating
-40^o to 75^oC non-operating

Humidity Rating: 10 to 95% (non-condensing, non-operating)
20 to 80% (non-condensing, operating)

Power Rating: +5V @ 3 Amps (max)

PCB Dimensions: 4.5" x 8.0" x 0.7"
11.43 cm x 20.32 cm x 1.78 cm

Boot Support: IEEE 1275 Compliant FCode

Maximum Resolution Per Channel: 1920 x 1080 @ 60 24 bpp (analog)
1920 x 1200 @ 70 8 bpp (analog)
1280 x 1024 @ 75 24 bpp (digital)

B.3 GFX-200 Series Cabling

B.3.1 Connecting the Monitors

Attach the GFX-200 Series dual-monitor adapters (splitter cables) to the connectors on the bracket of your GFX-200 Series card. Make sure the connectors are firmly in place. The other end of each adapter has connectors to plug into two displays.

Please refer to illustrations in Figures B.3.1 and B.3.2.

B.3.1.1 Analog Monitors

For analog monitors use the “Analog VGA dual-monitor adapter.” Analog monitors typically use the HD-15 connectors to connect to the graphics card. Connect the monitor cable into one of the two connectors of the dual-monitor adapter. Refer to Figure B.3.1 for an illustration of this connection. Make sure the other end of each monitor cable is properly connected to its monitor. See your monitor manuals for more information.

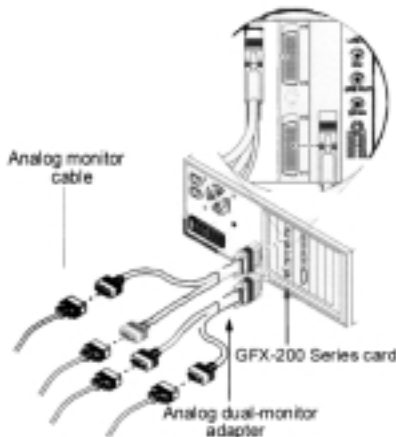


Figure B.3.1

B.3.1.2 Digital Monitors

Only digital LCD flat panel displays with DVI interface are supported. These displays must have a DVI-D or DVI-I input connector. The digital dual-monitor adapters are (sold separately) available from Tech Source and have cables that plug directly into the monitors. In other words, these long adapters replace the original cables that may have been provided with the digital monitor(s). Refer to Figure B.3.2 for an illustration.

Make sure all connectors are firmly in place.

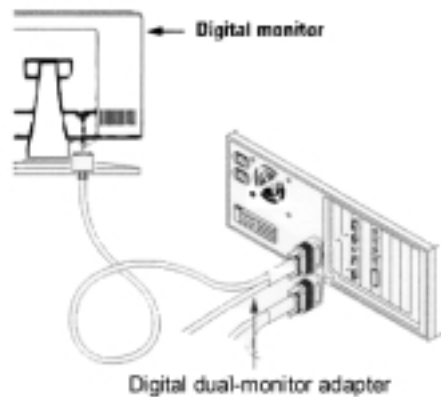


Figure B.3.2

NOTE: Monitors are numbered consecutively based on which connector each is attached to (Refer to Figure B.3.3). Numbering starts with the primary display – the one that first displays information when you restart your computer. If another graphic card is installed in your computer, display numbering may be different.

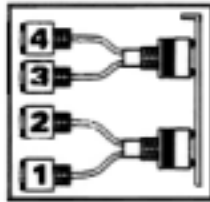


Figure B.3.3

NOTE: Your dual-monitor adapter can only be used with the type of monitor it's intended for (Refer to Figure B.3.4). Analog adapters are included with GFX-200 Series products. Digital adapters are sold separately. For more information on digital adapters for your GFX-200 Series product, contact Sales at sales@techsource.com or directly at 407-262-7100.

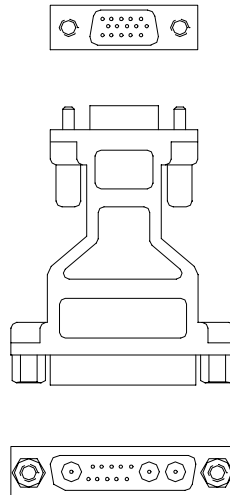
GFX-200 Series adapters that support digital monitors use DVI-D connectors – these adapters don't use P&D or MDR-20 connectors.



Figure B.3.4

B.4 Special Adapter for Some Sun Monitors

The GFX-200 Series have a VGA connector for video output. Some Sun monitors and cables require a 13W3 to VGA adapter such as the 1396 adapter shown below. This adapter provides composite sync on 13W3 connection.



Appendix C

USING NVEDIT TO MODIFY NVRAM

C.1 NVRAM Edit Commands

This section discusses the use of NVRAM. The NVRAM is used to set the resolution in the Video-Mode and Video-Timing methods. To edit the NVRAM, begin `nvedit` at the `ok` prompt. There are several commands that you must use to edit the variables in NVRAM:

<Backspace>	deletes the character preceding the cursor
<Ctrl-l>	lists NVRAM current values
<Ctrl-p>	moves to the previous line
<Ctrl-n>	moves to the next line
<Ctrl-b>	moves to the previous character
<Ctrl-f>	moves to the next character
<Ctrl-u>	deletes to the beginning of the line
<Ctrl-k>	joins the current and next line
<Ctrl-u><Ctrl-k>	deletes the current line
<Ctrl-c>	exits the NVRAM editor (back to the <code>ok</code> prompt)

The changes will only take effect if they are stored using the **`nvstore`** command entered at the `ok` prompt. Once the changes are stored, the NVRAM must be enabled before the system will execute it. This is done by setting the environment variable `use-nvramrc?` to `true`. Please `reset` the system to make the changes effective.

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