TECH-SOURCE INC.

GFX OpenWindows for Solaris 2
Installation Manual

Addendum Information

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Changes made to:

REVISION NUMBER	CHANGES	DATE
A	Initial Release	08-25-98
B	Fix Typos	10-14-98
C	Format change and typo fix	10-19-98
D	Add GFX 8P Dual Channel	01-07-99
E	Typo Fix	03-01-99

PREFACE

This publication documents the Tech-Source Raptor GFX installation. This manual is intended for users who incorporate the Tech-Source Raptor GFX cards into Ultra Sparc workstations.

This is a guide to the installation of the Raptor GFX software. All systems vary to a degree. Knowledge of the features of your system and an understanding of UNIX shell scripts are helpful during the installation process.

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Table of Contents

Table of Contents
(continued)

Table of Contents
(continued)

HARDWARE INSTALLATION

1.1   Overview

The Tech-Source Raptor GFX is a graphics card designed to handle 24-bit true color applications such as Netscape, seismic, geographical information systems (GIS), satellite imaging, pre-press imaging and general desktop use. It can also be used for 8-bit applications such as Insignia's SoftWindows and many legacy applications as well as for high resolution medical imaging applications.

The Raptor GFX cards support a range of resolutions from 640x480 to 1920x1080. The Raptor GFX-8P card can support resolutions up to 1600x1200. The cards can be used alone in a system to perform normal console and desktop duties or they can be added to a system to support additional monitors. Each card drives a single display. The number of displays per workstation is limited only by the number of available PCI slots.

1.2 Installation Instructions

The Raptor GFX installation is simple, requiring only a few easy steps. However, these installation instructions presume that you are familiar with your computer system. You may need to seek assistance from your dealer or consult your computer's operations guide.

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

Step 1: With the power off, remove the computer cover, find an available PCI Local Bus slot and remove the bracket and screw.

Step 2: Install the Raptor firmly into the PCI Local Bus slot. Care should be taken to press it evenly and snugly into the slot. Once you are certain the Raptor is installed properly in the slot, secure it with the bracket screw.

Step 3: Secure the computer's cover, and attach any previously removed cables. Connect the video cable to your monitor. Certain Sun monitors will require the DB-15 to 13W3 connector (Refer to Appendix B.4). The Raptor is now installed and ready to run.

> **NOTE**: If the system is currently using a secondary graphics device, read section 2.6 on configuring the console device. The console device is the screen on which the boot up messages will appear. The monitor must be connected to the console device before proceeding to Chapter 2 Software Installation.

Step 4: Turn on the monitor before the computer so that

the Raptor GFX can autodetect the proper resolution setting's for your monitor.

The Raptor is now installed and ready for device driver and utility installation. Refer to Chapter 2 for installing the Raptor software.

1.3 Resolution Settings

The resolution of the Raptor is software configurable. Refer to the software installation chapter, Appendix A, for more information on changing resolutions.

The default resolution for each Raptor GFX card is listed in the table below.

Board	Resolution	Refresh	Bits/Pixels	Sync
GFX-8M	1024x768	60Hz	8	separate
GFX-4M	640x480	60Hz	8	separate
GFX-8P	Auto Detect	-	24	separate

SOFTWARE INSTALLATION

2.1 Overview

This chapter describes the installation for **GFX OpenWindows for Solaris 2.** This software supports the following cards:

- Raptor GFX 8M
- Raptor GFX 4M
- Raptor GFX 8P
- Raptor GFX 8P Dual Channel

> **Please note that this software must already be installed on your system prior to running X Windows on these cards.**

The software is provided on floppy diskettes, CD-ROM, or by FTP and is composed of two packages:

- `TSIgfxdrv` Solaris 2 device-drivers
- `TSIgfxOW` Loadable DDX modules for accelerated OpenWindows support

2.2 Requirements

The software currently supports the following PCI based systems:

- Ultra 5
- Ultra 10
- Ultra 30
- Ultra 60
- Ultra AX
- Ultra AXi
- Enterprise 250
- Enterprise 450

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

The following are prerequisites for installing **GFX OpenWindows for Solaris 2** software:

- The system is running Solaris 2.5 or higher.
- OpenWindows Version 3.5 or higher has already been installed.
- **Any previous version of TSI software, including Raptor X Servers, has already been uninstalled.** (Please refer to the manual specifically, Raptor X Servers, which accompanied that software for the appropriate uninstall procedure).
- 2MB of disk space is available in "`/usr`".
- One or more of the cards listed in Section 2.1 is presently installed in the workstation.

All device drivers under Solaris 2 are loadable, so no kernel changes need to be made.

2.3 Installing GFX OpenWindows Software

Note: This installation procedure must be repeated if any changes are made to the OS. It is highly recommended that the software be uninstalled prior to making these changes! This includes OS patches.

2.3.1 CD-ROM Installation

The following are step-by-step instructions for installing the **GFX OpenWindows for Solaris 2** software from a CD-ROM.

1.   Install a Raptor GFX card in the computer as described in Chapter 1.

2.   Boot the computer with the `"-r"` (reconfiguration) option. To do this on a SPARCstation, perform the following steps:

   - Power on the computer.
   - Wait until you see boot messages printing on the screen, then press and hold the `Stop` (L1) key, and then press the `'A'` key.
   - At the `"ok"` prompt, type `"boot -r"`.

3.   Login as root on the target install machine, using `/bin/sh` as your shell.

4.   Uninstall any previous version of TSI software in accordance with the instructions supplied with that software.

NOTE: To find out if any previous version of Tech-Source Software exists on the system, type the following:

`prompt#` **`pkginfo | grep TSI`**

The installation will fail if TSI software already exists on the system.

5. Insert the CD-ROM labeled "GFX OpenWindows for Solaris 2" into drive.

6. If **cdrom/cdrom0** exists, type:

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

    Skip to step 7.

    Otherwise, mount the CD-ROM by typing the following:

    ```
    prompt# mount -F hsfs -0 ro\
            /dev/dsk/c0t6d0s0 /cdrom
    ```

    ```
    prompt# cd /cdrom
    ```

7. To install the software, type:

    ```
    prompt# ./install_all
    ```

    During installation, you may be asked a number of yes-or-no questions. Answer 'y' to all of these questions. (See figure 2.1 for reference).

8. Reboot the system to complete the installation.

Figure 2.1

```
# ./install_all
Beginning installation.

Processing package instance <TSIgfxdrv> from </cdrom/cdrom0>

GFX drivers for Solaris 2 (sparc)
(sparc) 1.1

        GFX OpenWindows device driver for Solaris 2 (Ver. 1.1)


This software contains Tech-Source enhanced/modified object from SunSoft,
Inc.

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trademarks or registered trademarks of Sun Microsystems, Inc.

X Window System is a trademark and product of the Massachusetts Institute
of Technology.
```

Figure 2.1 con't.

```
@(#)Copyright 1.1 98/08/17 TSI
## Processing package information.
## Processing system information.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <TSIgfxdrv> [y,n,?] y

Installing Raptor GFX drivers v1.1, for Solaris 2 (sparc) as <TSIgfxdrv>

## Executing preinstall script.
## Installing part 1 of 1.
/kernel/drv/gfxp
/kernel/drv/raptor
[ verifying class <none> ]
## Executing postinstall script.

Installation of <TSIgfxdrv> was successful.

Processing package instance <TSIgfxOW> from </cdrom/cdrom0>

GFX OpenWindows DDX v1.1, for Solaris 2 (sparc)
(sparc) 1.1
Copyright 1998, Tech-Source Inc.
GFX OpenWindows DDX for Solaris 2
Stock #73-0051-01
Using </opt> as the package base directory.
## Processing package information.
## Processing system information.
   2 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.
```

Continued on next page…

Figure 2.1 con't.

```
This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <TSIgfxOW> [y,n,?] y

Installing GFX OpenWindows DDX v1.1, for Solaris 2 (sparc) as <TSIgfxOW>

## Executing preinstall script.
## Installing part 1 of 1.
/etc/dt/config/Xservers.gfx
/opt/TSIgfxOW/ddxTSIgfx.so.1.Z
/opt/TSIgfxOW/etc/OWconfig.gfx
/usr/openwin/bin/gfxres
/usr/sbin/GFXconfig
/usr/openwin/server/etc/RES.DAT
/usr/openwin/server/etc/TSIScreenConfig
/usr/openwin/server/etc/TSIScreenConfig.example
/usr/openwin/server/etc/gfxres.help
 [ verifying class <none> ]
## Executing postinstall script.

Installation of <TSIgfxOW> was successful.
```

> Note: During the installation you may receive the following message if only one type of Raptor GFX is installed in your system:
>
> ```
> "drvconfig: Driver (device) failed to attach."
> "Warning:  Driver (device) successfully added
> to system but failed to attach."
> ```
>
> `device` represents either `gfxp` or `raptor`.

2.3.2 FTP Installation

To complete an installation from FTP files, you must first obtain the packages from Tech-Source FTP site.

Please contact Tech-Source Technical Support for the correct packages and their location on the site.

Follow the directions in the README, which is included with the downloaded file for proper installation.

2.4 New Devices

A new device name is created in the `/dev/fbs` directory for each Raptor card. It is `raptor#,` for Raptor GFX-M series cards, or `gfxp#` for the Raptor GFX-8P cards, where `#` represents an instance number assigned by the operating systems. For example, `raptor0` or `gfxp0` could be the name of one of the Raptor GFX devices in the system.

2.5 Changing Resolution on Raptor GFX

After installation you will need 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 the appendix.) The default resolutions may be accepted by skipping this section. The defaults for Raptor GFX are as follows:

Board	Resolution	Refresh	Bits/Pixels	Sync
GFX-8M	1024x768	60Hz	8	separate
GFX-4M	640x480	60Hz	8	separate
GFX-8P	Auto Detect	-	24	separate

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

NOTE: You must be superuser to execute this program.

Please see the man page on GFXconfig for a detailed description.

The next two sections describe two methods of using GFXconfig to configure the Raptor GFX card.

2.5.1 Interactive Configuration

GFXconfig has an interactive menu-style interface (see Figure 2.2). To use this program to configure your Raptor GFX card, type the following:

```
prompt# GFXconfig –I
```

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

The Raptor GFX device(s) will be listed in the left column. A description of the commands is as follows:

`Up/Down Arrow`	selects the desired Raptor device to modify
`Left/Right Arrow`	selects the parameter to modify (e.g.resolution, bit-depth, or sync)
`Space Bar`	modify the parameter for the given Raptor GFX 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

Figure 2.2 Raptor GFX Configuration

```
+---------------------------Raptor GFX Configuration---------------------------+
| +--DEFAULT--DEVICE-NAME--GFX-MODEL--RESOLUTION@HZ-------------BITS--+         |
|    ->     raptor3      GFX 8M     VESA1024x768@60            8     |         |
|           raptor4      GFX 4M     VESA1024x768@60            8    ▮         |
| |                                                                 |         |
| |                                                                 |         |
| |                                                                 |         |
| |                                                                 |         |
| |                                                                 |         |
| |                                                                 |         |
| +-----------------------------------------------------------------+         |
|                      Press SPACE to change option                           |
|                                                                             |
|              Arrow UP   and DOWN  to select DEVICE                           |
|              Arrow LEFT and RIGHT to select OPTION                           |
|                                                                             |
|              Press <T> to show test pattern on device                       |
|              Press <S> to save changes and exit program                     |
|              Press <Q> to exit program without saving changes               |
|              Press <H> for help                                             |
|                                                                             |
|                                                                             |
+-----------------------------------------------------------------------------+
```

Noninteractive Configuration

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

`GFXconfig` uses the same convention as Sun's `m64config`
utility. All of the parameters which are set using the interactive
version can be set by specifying the correct flag followed by a
desired value. The parameters are:

      `-dev <device>`   device to configure

`-res  <resolution>`	resolution name
`-res \?`	show resolutions
`-file <file>`	configuration file; `system` or `machine`
`-depth <depth>`	bit depth (8 or 24, default 24)
`-defaults`	reset device to default parameters
`-24only <true/false>`	forces all windows to use 24-bit visuals. This may prohibit some 8-bit applications from working
`-gfile <gamma file>`	gamma file
`-gvalue <gamma value>`	gamma value
`-propt`	display current settings
`-prconf`	display hardware information
`-help`	show usage

NOTE: By default, the bit depth will be set to 8/24 for resolutions of 1280x1024 and less, or 8 only, for higher resolutions.

2.5.2.1 Examples

To configure the resolution on the Raptor GFX to 1152x900x66, type the following:

```
prompt# GFXconfig -res 1152x900x66
```

> NOTE: If no device specified, GFXconfig assumes that the Raptor GFX device is either `/dev/fbs/gfxp0` or `/dev/fbs/raptor0`.

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#      GFXconfig -res 1152x900x66 try \
             -dev /dev/fbs/gfxp0
```

To change to bit depth of 8/24 on `/dev/fbs/raptor1`:

```
prompt#      GFXconfig -dev /dev/fbs/raptor1 \
             -depth 24
```

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

```
prompt#      GFXconfig -res 1024x768x60 \
             -24only true
```

To see the current settings for `/dev/fbs/gfxp0`:

```
prompt#      GFXconfig -propt \
             -dev /dev/fbs/gfxp0
```

2.6 Setting Raptor GFX as the Console (Optional)

This section describes how to configure the Raptor GFX as the console device in your system.

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

2.6.1 GFX as only framebuffer

2.6.1.1 Ultra 5 and Ultra 10

To use the Raptor GFX as the system console on an Ultra 5 or Ultra 10 as the only framebuffer, first disable the 8-bit card, which comes built in to 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 Raptor GFX card.

> 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
> ```

2.6.1.2 Ultra 30 and Ultra 60

If no other framebuffers are present in an Ultra 30 or Ultra 60, then the Raptor GFX will be the console by default, provided that the board is in a valid probed PCI slot.

2.6.2 GFX with a secondary framebuffer

The Raptor GFX can be made the console device when other secondary framebuffers are present in the system.

2.6.2.1 PGX onboard graphics (Ultra 5 and Ultra 10 only)

See Section 2.6.1.1

> NOTE: The PGX onboard card and Raptor GFX card(s) can only coexist in the system if the PGX card is the console. Otherwise the PGX card must be disabled by following the procedure in 2.6.1.1

2.6.2.2 UPA framebuffers (Creator 3D series)

To configure the Raptor GFX card as the console when UPA framebuffers are in the system, the output-device variable in EEPROM must be changed to the actual path of the desired Raptor GFX cards. This path can best be determined by searching for the string "TECH-SOURCE" in the / tree at the "ok" prompt.

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

```
ok    cd  /pci@1f,4000
ok    ls
```

When you are in the correct location, you should see at least one

entry containing the string "`TECH-SOURCE`", ie. "`TECH-SOURCE,raptor@#`", where '`#`' will be a digit representing your Raptor GFX's slot location.

Use this entry as the console device for your desired Raptor. For example, if the path is (as above) "`/pci@1f,4000`" to the device "`TECH-SOURCE,raptor@#`" , then type the following command:

> NOTE: Replace '#' with whatever your Raptor device requires.

```
ok    setenv output-device   \
      /pci@1f,4000/TECH-SOURCE,raptor@#
ok    reset
```

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

> 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
> ```

2.6.2.3 Other PCI framebuffers

To make the Raptor GFX 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 Raptor GFX's slot before that of the secondary framebuffer (in addition to making the changes in 2.6.1.1., if applicable).

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

2-16

For example, if the Raptor GFX 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 Raptor GFX card.

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OPENWINDOWS

3.1 OpenWindows Operation

Raptor GFX device name can be either `gfxp` or `raptor` depending upon whether it is a GFX-P or a GFX-M respectively. In the subsequent examples, we will use only `gfxp#` as the device name, although the same description and commands apply to `raptor#` as well.

The following subsections describe how to start up OpenWindows on the Raptor GFX cards.

3.1.1 Raptor GFX as the console

If the Raptor GFX is the console, type:

```
prompt#  openwin
```

3.1.2 Raptor GFX as the secondary framebuffer

If the PGX card is the console and Raptor GFX is the second card, to start OpenWindows on both cards, type:

```
prompt#  openwin -dev /dev/fbs/m640 \
         -dev /dev/fbs/gfxp0
```

The order can be swapped to suit the ordering of screens, left to right.

3.1.3 Multiple Raptor GFX cards

To start OpenWindows on two Raptor GFX devices, `gfxp0` and `gfxp1`, type:

```
prompt#  openwin –dev /dev/fbs/gfxp0 \
           -dev /dev/fbs/gfxp1
```

> NOTE: In the above example, the `gfxp` device numbers are 0 & 1. These may be different in your configuration. Please check in `/dev/fbs/` or `dmesg` for correct device numbers.

3.2 Common Desktop Environment

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

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

The sample `Xservers.gfx` file which is provided assumes that the Raptor GFX is the only framebuffer on which to start CDE:

```
:0 Local local_uid@console root \
/usr/openwin/bin/Xsun :0 -dev \
/dev/fbs/gfxp0 -nobanner
```

> Note: If for some reason the name of your Raptor GFX device is something other than `gfxp0`, 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/gfxp0` 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/gfxp0 \
-dev /dev/fbs/m640
```

3.3 xdm

The Raptor GFX cards also support the X Display Manager (`xdm`). A sample configuration file is provided as:

```
/usr/openwin/lib/X11/xdm/Xservers
```

If you had an Xservers file already in place, the Raptor GFX software installation will have saved it as

```
/usr/openwin/lib/X11/xdm/Xservers.nogfx
```

By default, the installation will have added the following line, which assumes that the Raptor GFX is the only framebuffer on which to start `xdm`:

```
:0 Local local /usr/openwin/lib/xdm/StartOW :0 \
-dev /dev/fbs/gfxp0
```

You may add any other desired command line arguments to the end of this line.

For example, you may start `xdm` on multiple displays. To do this, list each display device following the convention above. The following configuration displays `xdm` on the display named `/dev/fbs/raptor0` 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 /usr/openwin/lib/xdm/StartOW :0 \
-dev /dev/fbs/raptor0 -dev /dev/fbs/m640
```

ADVANCED FEATURES

4.1 Overview

The Raptor GFX has several advanced features available through the X server. They are:

- 8/24 bit simultaneous visuals (8M and 8P only)
- Off-screen pixmap caching
- OpenGL support

4.2 8/24 Simultaneous Visuals

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

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

The resolutions up to 1280x1024 are in 8/24 mode unless set explicitly using `GFXconfig`. All resolutions over 1280x1024 default to 8 bit.

4.3 Cached Pixmaps

All Raptor GFX cards support offscreen pixmap caching. Cached pixmaps are those that are stored in Raptors offscreen memory. These offscreen pixmaps allow faster transfer rates to and from screen windows. The default minimum size of pixmaps allocated in this manner is 4096 pixels (width x height).

Raptor GFX cards are available in 4MB and 8MB configurations. The available offscreen memory depends on the amount of video memory (4MB or 8MB) and the current resolution and depth settings. For example, on a Raptor GFX card with 8MB of video memory and running at 1024x768 resolution with depth of 8 bits, 768K is used for onscreen memory. The rest of the 7.2MB is available for pixmaps. In 24 bit configuration, the onscreen memory that is used is 4 times what is used in the 8 bit configuration.

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.

4.4 OpenGL Support

OpenGL support is provided through the DPA Extension. To utilize this functionality, it is required that OpenGL v1.1.1 or higher be already 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 106022-04) that fixes this problem. It is fixed in OpenGL v1.1.2.

UNINSTALLING GFX OPENWINDOWS

5.1 Uninstalling GFX OpenWindows

To uninstall the two packages comprising the GFX OpenWindows software, enter the following command:

```
prompt# pkgrm TSIgfxOW TSIgfxdrv
```

> **Warning** This uninstall procedure is **not** for use with older versions of the TSI software. It is important to use the procedure which was provided with the previous release to uninstall a previous release.

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Technical Assistance

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.

Email Address

Our electronic mail address is "**hotline@techsource.com".**
International customers should use e-mail or our fax line at (407) 339-2554.

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

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

As described in Section 2.6, the Raptor GFX card can be configured to be the console on the UltraSparc machine. Every Raptor GFX card type has its own default console resolution and default depth as shown in the following table:

Board	Resolution	Refresh	Bits/Pixels	Sync
GFX-8M	1024x768	60Hz	8	separate
GFX-4M	640x480	60Hz	8	separate
GFX-8P	Auto Detect	-	24	separate

It is possible to change the console resolution on all Raptor GFX cards. The procedures are described in this appendix. They are:

- EDID Auto-Detect feature (Raptor GFX-8P only)
- Output Device Method (Raptor GFX-8P only)
- Video-Mode Method
- Video-Timing Method

> **Note: The Raptor GFX 8M requires Boot Prom level 1.2 in order to change the console resolution.**

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

A.1.1 Reasons for changing the console resolution

Normally, the default console resolution is sufficient for most users. Some reasons why it may be required to change the default resolution are described below:

- If you change the X Windows depth from the default listed in the table, it is recommended that the console depth is configured to match the X Windows depth **(GFX-8P only)**.

- 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:

- In order to run the X Windows environment in 8/24 mode, set the console resolution to 24 bit-depth.

NOTE: At this time, only the GFX-8P is capable of changing the console bit-depth.

- By default, console resolutions 1280x1024 and lower will automatically be set to 24 bit. Higher resolutions will default to 8-bit mode.

- It is recommended to use `GFXconfig -i` to test a resolution before configuring the console to that resolution.

A.1.3 EDID Auto-Detect feature (Raptor GFX- 8P only)

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

With this protocol, the GFX 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 Raptor GFX to communicate with it.

Failing the above method, the card will default to 1152x900x66.

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

A.2 `output-device` Method (Raptor GFX-8P only)

It is possible to specify the console resolution of a Raptor GFX card via the `output-device` environment variable by using 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 a valid list), and use the corresponding entry as the console resolution.

For example, to use VESA1024x768x75 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

A.3.1 GFX-8P

At the `ok` prompt in Boot PROM mode, the console resolution can be easily set on **Raptor GFX-8P** cards by using one of the 34 preinstalled resolution modes. These resolution settings are identified by video modes 0-33.

> NOTE: Use video modes 0-25 to select a console depth of 24 bits, or video modes 26-33 to select a console depth of 8 bits.

0	640x480@60
1	640x480@72
2	640x480@75
3	640x480@85
4	800x600@60
5	800x600@72
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@75
24	1280x1024@76 *
25	1280x1024@85
26	1600x1000@66 *
27	1600x1000@76 *
28	1600x1200@60
29	1600x1200@65
30	1600x1200@70
31	1600x1200@75
32	1600x1200@76
33	1600x1200@80 *

* This resolution supports composite sync. Early versions of the Raptor GFX-8P support only separate sync without the use of an adapter. Future versions of the card will support separate and composite sync.

A.3.2 All Raptor GFX cards (except GFX-8P)

At the ok prompt in Boot PROM mode, the console resolution can easily be set on all Raptor GFX cards (except the GFX-8P) by using one of the 29 preinstalled resolution modes. These resolution settings are identified by video modes 0-28:

0	VESA640x480x60
1	VESA640x480x72
2	VESA640x480x75
3	VESA640x480x85
4	VESA800x600x60
5	VESA800x600x72
6	VESA800x600x75
7	VESA800x600x85
8	VESA1024x768x60
9	VESA1024x768x70
10	VESA1024x768x75
11	VESA1024x768x85
12	VESA1152x900x60
13	SUN1152x900x66 *
14	VESA1152x900x70
15	VESA1152x900x75
16	VESA1152x900x85
17	VESA1280x1024x60
18	VESA1280x1024x75
19	VESA1280x1024x85
20	VESA1600x1200x60
21	VESA1600x1200x65
22	VESA1600x1200x70
23	VESA1600x1200x75
24	VESA1600x1200x80

NOTE: Modes 25-28 are valid for the Raptor GFX-8M only.

25	VESA1900x1080x60
26	VESA1920x1200x60
27	VESA1920x1200x70
28	VESA1920x1200x76

* This resolution supports composite sync.

The numbers 0-28 correspond to the video mode. Use `nvedit` to choose one of these values for the `video-mode` variable in NVRAM.

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

For example, to set the console resolution to 1024x768 @ 60Hz, video-mode 8, type the following set of commands:

```
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. Therefore, this method 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: This 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.**

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

(Add the values together to select more than one)

NOTE: To obtain the timing parameters required to use this method, please contact Tech-Source with your monitor's requirements.
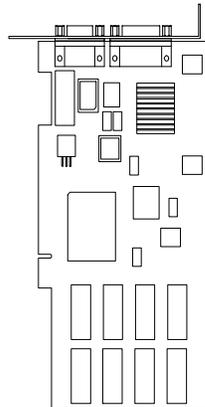
A.5 Troubleshooting

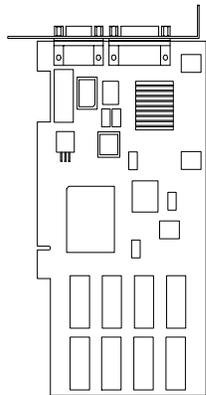| Problem	Solution
Used the method described in Appendix to configure the console resolution, but the card still defaults to something other than the resolution specified.	A priority scheme is used to determine the boot console resolution. The GFX firmware checks the various methods in the order of priority that is 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 the order of decreasing priority: 1. `output-device` method (Section A.3) **(GFX-8P only)** 2. `video-timing` method (Section A.6) 3. `video-mode` method (Section A.5) 4. DDC2B/EDID (Section A.1.3) (**GFX-8P only)** 5. Default resolution for the card
The chosen resolution on the Raptor GFX-8P is compatible with my monitor, but there is still no video.	Early versions of the GFX-8P card require an adapter (See section B.4) in order to support composite sync.

Appendix B

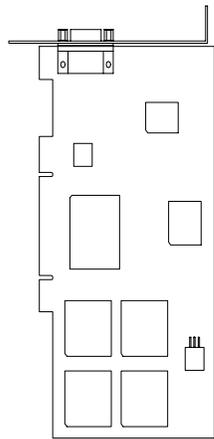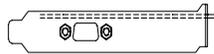# *Card Specifications*

B.1 Raptor GFX 4M PCI Card and Specifications

Frame Buffer:	4 Megabytes VRAM
Hardware Cursor:	3 color, 64 x 64 bitmap
Color Lookup Table(s):	256 entries
PCI Interface:	33 MHZ, 32-bit
Video Interface:	Red, Green, Blue, at RS-343 (75 ohm)
Video Sync:	Composite or Separate
Video Connector:	15 pin High Density D-SUB (VGA) 15 pin Macintosh connector not available
Temperature Rating:	0^0 to 50^0C operating -40^0 to 75^0C non-operating
Humidity Rating:	20 to 80% (non-condensing)
Power Rating:	5V @ 2 Amps (max)
Physical:	178mm x 107mm (7.0" x 4.2")

B.2 Raptor GFX 8M PCI Card and Specifications

Frame Buffer:	8 Megabytes VRAM
Hardware Cursor:	3 color, 64 x 64 bitmap
Color Lookup Table(s):	256 entries
PCI Interface:	33 MHZ, 32-bit
Video Interface:	Red, Green, Blue, at RS-343 (75 ohm)
Video Sync:	Composite or Separate
Video Connector:	15 pin High Density D-SUB (VGA) 15 pin Macintosh connector not available
Temperature Rating:	0^0 to 50^0C operating -40^0 to 70^0C non-operating
Humidity Rating:	20 to 80% (non-condensing)
Power Rating:	+5V @ 3.0 Amps (max)
Physical:	178mm x 107mm (7.0" x 4.2")

B.3 Raptor GFX 8P PCI Card and Specifications

Frame Buffer:	8 Megabytes VRAM
Hardware Cursor:	3 color, 64 x 64 bitmap
Color Lookup Table(s):	256 entries
PCI Interface:	33 MHZ, 32-bit
Video Interface:	Red, Green, Blue, at RS-343 (75 ohm)
Video Sync:	Separate, Composite sync using special adapter
Video Connector:	15 pin High Density D-SUB (VGA)
Temperature Rating:	0^0 to 50^0C operating -40^0 to 70^0C non-operating
Humidity Rating:	10 to 95% (non-condensing)
Power Rating:	+5V @ 1.5 Amps (max)
Physical:	168mm x 107mm (6.625" x 4.2")

B.4 Raptor GFX 8P Dual Channel PCI Card and Specifications
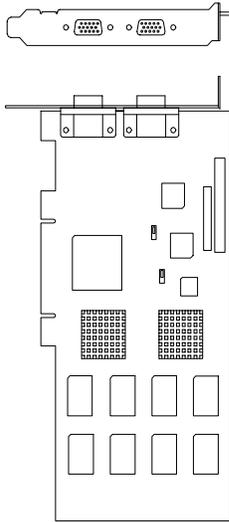
Frame Buffer:	8 Megabytes SGRAM (per channel)
Hardware Cursor:	3 color, 64 x 64 bitmap (per channel)
Color Lookup Table(s):	256 entries (per channel)
PCI Interface:	33 MHZ, 32-bit
Video Interface:	Red, Green, Blue, at RS-343 (75 ohm)
Video Sync:	Separate, Composite, Sync on Green
Video Connector:	15 pin High Density D-SUB (VGA) (per channel)
Temperature Rating:	0^0 to 50^0C operating -40^0 to 70^0C non-operating
Humidity Rating:	10 to 95% (non-condensing)
Power Rating:	+5V @ 3 Amps (max)
Physical:	229mm x 107mm (9.0in x 4.2in)

B.5 Special Adapter for Sun Monitors

The Raptor GFX cards 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.
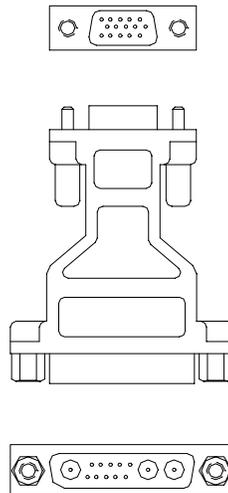
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USING NVEDIT TO MODIFY NVRAM

C.1 Overview

This section discusses the use of NVRAM. The NVRAM is used for setting resolutions in the next two methods. To edit the NVRAM, begin **nvedit** at the `ok` prompt. There are several commands which you must use to edit the variables in NVRAM:

<Backspace>	delete the character preceding the cursor
<ctrl-l>	list NVRAM current values
<ctrl-p>	move to the previous line
<ctrl-n>	move to the next line
<ctrl-b>	move to the previous character
<ctrl-l>	move to the next character
<ctrl-u>	delete to the beginning of the line
<ctrl-k>	join the current and next line
<ctrl-u><ctrl-k>	delete the current line
<ctrl-c>	exit NVRAM editor (back to the ok 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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