Tech Source

**Raptor Drivers for HP-UX
Installation and Reference
Manual**

Addendum Information

Date Released   June 22, 2005

Changes made to:

REVISION NUMBER	CHANGES	DATE
A	Initial Release	03-01-01
B	T-Class support on HP-UX 10.20	08-19-04
C	Support for HP-UX 11.0 and 11i	04-30-04
D	Removed support for Raptor 2500T and added support for Raptor 2500T-DL	06-22-05

more U.S. patents, foreign patents, and/or pending patent applications.

PREFACE

This publication documents the Tech Source, Inc. Raptor Drivers for HP-UX Installation for use with the Tech Source, Inc. Raptor cards. This manual is intended for users who incorporate the Tech Source, Inc. Raptor cards into Hewlett Packard's workstations/servers. This is a guide to the installation of the Raptor Drivers for HP-UX software. All systems vary to a degree. Knowledge of the features of your system is helpful during the installation process.

WARRANTY

The Raptor cards are warranted for one (1) year from date of shipment. During the warranty period, Tech Source, Inc. will, at its discretion, repair or replace a defective system product at its expense. Freight charges associated with the repair or replacement of products under warranty are to be shared by Tech Source, Inc. and the customer. All customers, domestic and international, shall bear the freight charges for the product return.

Tech Source, Inc. shall bear the outbound freight charges up to $13.00 (USD) per returned product, whether domestic or international. Any additional freight charge shall be the responsibility of the customer. We suggest that you contact your dealer first with any questions you may have about the product. Unlimited technical support (via telephone/facsimile/email) is provided for one (1) year from date of shipment. The installation of any Tech Source, Inc. hardware/software product is the sole responsibility of the customer.

Tech Source, Inc. offers a continuing hardware/software support program that provides telephone consultation and any required hardware repair after the expiration of the warranty period. This is a billable annual maintenance contract. Contact Tech Source, Inc. for the available maintenance plans.

Customers will be charged an hourly rate plus materials ($300.00 USD minimum) for repairs and/or maintenance performed by Tech Source, Inc. that are not covered by a Tech Source, Inc. warranty or maintenance contract.

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Chapter 1

INTRODUCTION

1.1 Overview

Thank you for purchasing a Tech Source, Inc. Raptor graphics card for use with your HP workstation/server. This manual describes the installation of the Raptor graphics hardware and software on Hewlett Packard workstations/servers (B, C & J class.)   This software comprises of device drivers for the following Raptor graphics cards.

- Raptor 2000
- Raptor 1100T
- Raptor 2100T
- Raptor 2500T-DL

All the Raptor graphics cards are supported under HP-UX 10.20 and 11.0. HP-UX 11i drivers are only available for Raptor 1100T, Raptor 2100T and Raptor 2500T-DL.

All systems vary somewhat, therefore some knowledge of the features of your system and a basic understanding of HP-UX are helpful during the software installation process.

From this point forward, Tech Source, Inc. will be referenced as Tech Source or TSI and all Raptor models will be referred to as Raptor cards.

The Raptor Drivers for HP-UX software is provided on a CD-ROM. It consists of:

- Tech Source Raptor device-drivers for HP-UX
- X Windows loadable DDX for Raptor 2000
- X Windows loadable DDX for Raptor 2100T, Raptor 1100T and Raptor 2500T-DL

1.2 Conventions

This manual will follow certain conventions throughout.

Whenever a variable name, command name, directory, or file name 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 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:

`prompt#`   used when the user is required to have root privileges

`prompt%`   used when the user is not required to have root privileges

Chapter 2

HARDWARE INSTALLATION

2.1 Hardware Configurations Supported

The Raptor graphics cards have been tested on and currently supports the following PCI based HP workstations/servers running in single and multi-screen configurations.

- HP B-class
- HP C-class
- HP J-class

The Section 2.2 discusses the installation of the various Raptor cards in the host machine (HP workstation/server.) The Raptor flat panel subsystems have additional instructions on how to connect the graphics card to the DFP (digital flat panel.) These are discussed in Section 2.3.

2.2 Installation of All Raptor Graphics Cards

The Raptor card installation is simple and consists of a few easy steps.

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

Step 1: Shut down the system, turn the power OFF, remove the system'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 Raptor card firmly into the PCI Local Bus slot. Take care to press it evenly and snugly into the slot. Once you are certain the card is installed properly in the slot, secure it with the bracket screw.

Step 3:   Secure the system's cover, attach any previously removed cables, and connect the video cable to your monitor.

The Raptor card is now installed and the system is ready for software installation as discussed in Chapter 3. If installing a display subsystem (one of the Raptor FPS products), please read Section 2.3.

> **NOTE:** At most, one Raptor card can be installed in a 64-bit PCI slot on a HP C-360 workstation. If multiple Raptor cards are required, install remaining cards into 32-bit slots.

2.3 Raptor 2100/2500 FPS Installation
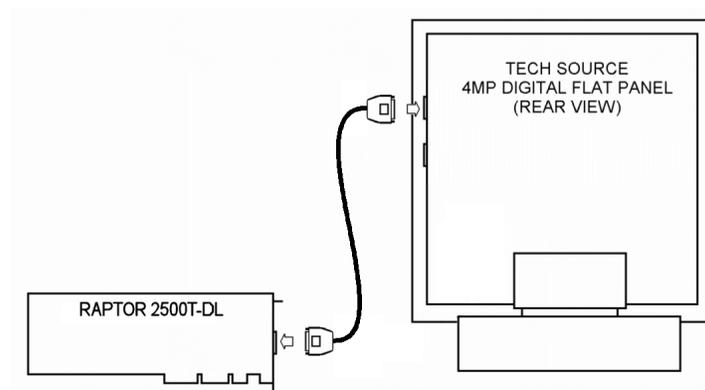
Figure 2-1 – Raptor 2100 Digital Flat Panel Subsystem

Tech Source offers two flat panel subsystems: the Raptor 2100FPS with a resolution of 2048x2048 (4MP), and the Raptor 2500FPS with a resolution of 2560x2048 (5MP). Each subsystem is comprised of one LCD flat panel (4MP or 5MP), one Raptor 2500T-DL graphics card, and a standard Dual-Link DVI cable to connect them together.

On the back of the Raptor LCD panel are two DVI inputs, labeled A and B. Plug the Dual-Link cable into either port. Optionally, connect a second Raptor 2500T-DL card to the remaining port. Select which signal to display by accessing the OSD (on-screen display) or by sending the appropriate signals to the panel's RS232 interface. For more information on the RS232 interface, please refer to the Raptor LCD manual.

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Chapter 3

SOFTWARE INSTALLATION

3.1 Requirements

The following are prerequisites for installing the Raptor Drivers for HP-UX software:

- The workstation/server is running HP-UX 10.20, HP-UX 11.0 or HP-UX 11i
- Any previous versions of Raptor software have already been uninstalled.
- At least 5MB of disk space available in `/usr` for drivers.
- A Raptor card is presently installed in the workstation/server (See Chapter 2 for installing a Raptor graphics card).

The kernel will be rebuilt during installation.

3.2 CD-ROM Installation

The Raptor drivers for HP-UX consists of the following packages:

- `TSIRDHPUX_10`   Drivers and HP windows modules for the Raptor 2000 for HP-UX 10.20
- `TSIFTHPUX_10`   Drivers and HP windows modules for the Raptor 1100T, Raptor 2100T and Raptor 2500T-DL for HP-UX 10.20
- `TSIRDHPUX_11`   Drivers and HP windows modules for the Raptor 2000 for HP-UX 11.0
- `TSIFTHPUX_11`   Drivers and HP windows modules for the Raptor 1100T, Raptor 2100T and Raptor 2500T-DL for HP-UX 11.0
- `TSIFTHPUX_11i`   Drivers and HP windows modules for the Raptor 1100T, Raptor 2100T and Raptor 2500T-DL for HP-UX 11i

3.2.1   Installation on HP-UX 10.20

The following are step-by-step instructions for installing the Raptor Drivers for HP-UX 10.20 software from a CD-ROM.

1. Install a supported Raptor card in the HP workstation/server, and boot the system.

2. Log in as `root` on the target system, using `/sbin/sh` as your shell.

3. Uninstall any previous version of Raptor software in accordance with the instructions supplied with that software.

4. Insert the CD-ROM labeled "Raptor Drivers for HP-UX" into the drive.

5. Run `swinstall`. Accept all the path defaults.

6. The `swinstall` program will automatically try to locate, mount, and read any CD-ROM device present. If the program is successful, it will display `TSIRDHPUX_10` and `TSIFTHPUX_10`. If this is not displayed, please proceed to the section titled, "Mounting the CD-ROM Manually." See Section 3.2.4.

7. Move the cursor down to the desired package and highlight it by pressing `<space>`.

NOTE: You only need to install the packages for the graphics card that you wish to use.

8. Press `<tab>` to activate the menu bar. Move the cursor across to 'Actions' and press `<Enter>`. Move the cursor down to 'Install (analysis)' and press `<Enter>`.

9. Follow the on-screen instructions to complete installation. If any warnings or errors are reported, check the Logfile (default: `/var/adm/sw/swagent.log`), correct the errors, then continue.

3.2.2 Installation on HP-UX 11.0

The following are step-by-step instructions for installing the Raptor Drivers for HP-UX 11.0 software from a CD-ROM.

1. Install a supported Raptor card in the HP workstation/server, and boot the system.

2. Log in as `root` on the target system, using `/sbin/sh` as your shell.

3. Uninstall any previous version of Raptor software in accordance with the instructions supplied with that software.

4. Insert the CD-ROM labeled "Raptor Drivers for HP-UX" into the drive.

5. Run `swinstall`. Accept all the path defaults.

6. The `swinstall` program will automatically try to locate, mount, and read any CD-ROM device present. If the program is successful, it will display `TSIRDHPUX_11` and `TSIFTHPUX_11`. If this is not displayed, please proceed to the section titled, "Mounting the CD-ROM Manually." See Section 3.2.4.

7. Move the cursor down to the desired package and highlight it by pressing `<space>`.

NOTE: You only need to install the packages for the graphics card that you wish to use.

8. Press `<tab>` to activate the menu bar. Move the cursor across to 'Actions' and press `<Enter>`. Move the cursor down to 'Install (analysis)' and press `<Enter>`.

9. Follow the on-screen instructions to complete installation. If any warnings or errors are reported, check the Logfile (default: `/var/adm/sw/swagent.log`), correct the errors, then continue.

3.2.3   Installation on HP-UX 11i

The following are step-by-step instructions for installing the Raptor Drivers for HP-UX 11i software from a CD-ROM.

1. Install a supported Raptor card in the HP workstation/server, and boot the system.

2. Log in as `root` on the target system, using `/sbin/sh` as your shell.

3. Uninstall any previous version of Raptor software in accordance with the instructions supplied with that software.

4. Insert the CD-ROM labeled "Raptor Drivers for HP-UX" into the drive.

5. Run `swinstall`. Accept all the path defaults.

6. The `swinstall` program will automatically try to locate, mount, and read any CD-ROM device present. If the program is successful, it will display `TSIFTHPUX_11i`. If this is not displayed, please proceed to the section titled, "Mounting the CD-ROM Manually." See Section 3.2.4.

7. Move the cursor down to the package and highlight it by pressing `<space>`.

> **NOTE:** You only need to install the packages for the graphics card that you wish to use.

8. Press `<tab>` to activate the menu bar. Move the cursor across to 'Actions' and press `<Enter>`. Move the cursor down to 'Install (analysis)' and press `<Enter>`.

9. Follow the on-screen instructions to complete installation. If any warnings or errors are reported, check the Logfile (default: `/var/adm/sw/swagent.log`), correct the errors, then continue.

3.2.4   Mounting the CD-ROM Manually

When run, the `"swinstall"` program will automatically try to locate, mount, and read any CD-ROM device present. If it fails, you may need to mount the CD-ROM by hand.

1. Login as root.

2. Create a mount point, if one does not exist.

   ```
   # mkdir /CD-ROM
   ```

3. Identify the CD-ROM drive device file.

   ```
   # ioscan -fnC disk
   ```

This will display all recognized hard drives and CD-ROM devices. From that list, select the appropriate entry, and make note of the associated device file (e.g. `/dev/dsk/c1t2d0`).

4. Mount the device on the mount point created in step 2.

   ```
   # mount -r /dev/dsk/c1t2d0 /CD-ROM
   ```

(Replace `/dev/dsk/c1t2d0` with your device file from step 3.)

5. Verify that you can read the CD-ROM.

    ```
    # ls /CD-ROM
    ```

6. Initiate "`swinstall`" and specify your mount point as the source depot.

    ```
    # swinstall -s /CD-ROM
    ```

7. Move the cursor down to the desired package and highlight it by pressing `<space>`.

8. Press `<tab>` to activate the menu bar. Move the cursor across to 'Actions' and press `<Enter>`. Move the cursor down to 'Install (analysis)' and press `<Enter>`.

9. Follow the on-screen instructions to complete installation. If any warnings or errors are reported, check the Log file (default: `/var/adm/sw/swagent.log`), correct the errors, then continue.

3.3 New Devices

One new device name is created in the `/dev` directory for each Raptor card. It is denoted by `raptor#` for the Raptor 2000 card, where # represents an instance number assigned by the operating system. The device names for the other products are enumerated below:

Raptor 2100T	`rap2kt#`
Raptor 2500T-DL	`raptfp#`
Raptor 1100T	`raplkt#`

If the Raptor card was not present in the system during software

installation, or if for some other reason the device nodes are not created, or if any Raptor cards are added to or removed from the system after the software has been installed, then the Raptor drivers must be reconfigured in order to create the proper device nodes under `/dev` (i.e. `/dev/raptor0`, `/dev/rap2kt1`, etc.). To reconfigure the Raptor drivers, issue the following two commands:

On HP-UX 10.20:

For Raptor 2000 cards:

```
# swconfig  -u TSIRDHPUX_10
# swconfig  TSIRDHPUX_10
```

For Raptor 2100T, Raptor 1100T and Raptor 2500T-DL cards:

```
# swconfig  -u TSIFTHPUX_10
# swconfig  TSIFTHPUX_10
```

On HP-UX 11.0:

For Raptor 2000 cards:

```
# swconfig  -u TSIRDHPUX_11
# swconfig  TSIRDHPUX_11
```

For Raptor 2100T, Raptor 1100T and Raptor 2500T-DL cards:

```
# swconfig  -u TSIFTHPUX_11
# swconfig  TSIFTHPUX_11
```

On HP-UX 11i:

For Raptor 2100T, Raptor 1100T and Raptor 2500T-DL cards:

```
# swconfig  -u TSIFTHPUX_11i
# swconfig  TSIFTHPUX_11i
```

3.4 Changing Resolution on Raptor Cards

3.4.1 Changing Resolution on Raptor 2000 and Raptor 2100T

The resolution for Raptor 2000 and Raptor 2100T cards are fixed at 2048 x 2048.

3.4.2 Changing Resolution on Raptor 1100T

The Raptor 1100T card is capable of supporting multiple resolutions. The resolution for this card is software configurable. See section 4.3.2 for details.

3.4.3 Changing Resolution on Raptor 2500T-DL

The resolution for Raptor 2500T-DL card for *Raptor 2500 FPS* Digital Flat Panel subsystem is configured at 2560x2048. The resolution for Raptor 2500T-DL card for *Raptor 2100 FPS* Digital Flat Panel subsystem is configured at 2048x2048.

Chapter 4

INVOKING X WINDOWS

4.1 Overview

There are several ways to invoke X Windows on your system:

- `startx`
- `xinit`
- Common Desktop Environment (CDE)

This section assumes the use of the `csh` environment. If you prefer a different shell, make the appropriate changes from the examples.

All of the examples in this section use the device names `/dev/raptor0` and `/dev/rap1kt0`. Your device name may differ, depending on the card type and instance number. Please refer to Section 3.3 for specific device names.

4.2 Configuring X Windows

4.2.1 Single Screen Mode

Under HP-UX, the devices that X Windows will use are configured in the file `/etc/X11/X0screens`. This file is used by the X Server regardless of how it is invoked (e.g. `startx`, `xinit`, CDE, etc). Edit the file `/etc/X11/X0screens` to configure display `0`. For display `1` you would edit `/etc/X11/X1screens`.

This section assumes that display `0` is to be configured. To run X Windows on the Raptor card only, comment out `/dev/crt` in `/etc/X11/X0screens` by placing a '#' at the beginning of that line, and add the Raptor device by entering `Screen /dev/raptor0` on a new line:

```
#Screen /dev/crt
Screen /dev/raptor0
```

4.2.2 Multi-Screen Mode

To run X Windows on the console and the Raptor card, list the devices in the order you wish to register them with `x`. The first device listed will be screen `:0.0`; the next, screen `:0.1.`

```
Screen /dev/crt
Screen /dev/raptor0
```

X Windows can also be run on two Raptor cards. For example to set up Raptor 2000 as screen 0 and Raptor 1100T as screen 1 (`display0`) edit the `X0screens` file as follows:

```
Screen /dev/raptor0
Screen /dev/rap1kt0
```

NOTE: Multi-screen mode can be used on multiple Raptor cards only if the cards are not of the same type.

4.3 Setting Bit-Depth and Resolution

4.3.1 Setting Bit-Depth

The Raptor 2000 supports 8-bit PseudoColor mode only. Raptor 1100T, Raptor 2100T and Raptor 2500T support the following bit-depths:

`8`	8-bit PseudoColor
`24`	24-bit TrueColor
`8+24`	Simultaneous 8-bit PseudoColor and 24-bit TrueColor

```
8+8                 Two 8-bit PseudoColor visuals
```

By default X Windows comes up in 8-bit mode on all Raptor cards.

There are two ways to set bit-depth:

- By editing the config file `/var/X11/TSIScreenConfig`

- By setting the environment variable `STARSMODE`

The default visual in 8+24-bit mode is PseudoColor. In order to set the default visual in the 8+24-bit mode to TrueColor, the `/etc/X11/X0screens` file needs to be modified. The example below shows how to set the default visual to TrueColor for the card `rap1kt0`.

```
Screen /dev/rap1kt0
      DefaultVisual
                Class TrueColor
```

> **NOTE:** This method of setting the default visual has an effect only in the 8+24-bit mode.

4.3.1.1 Config File

The depth and resolution of the Raptor card can be set using the `/var/X11/TSIScreenConfig` file.   Each row in the file corresponds to a specific Raptor card that is identified by its device name. The fields in each row are separated by spaces. In the sample config file shown below the bit-depth of the Raptor 1100T (`rap1kt0`) card is set to 8+24. The cached pixmap field is used for debugging purposes only and should always be set to 1. The other fields are discussed in 4.3.2.

```
# device  Depth   Resolution Sync Cached Resfile
                                    pixmap
rap1kt0   8+24    DEFAULT     1     1     trzresinfo
```

4-3

4.3.1.2 STARSMODE Variable

The bit-depth of the Raptor card can be set using the `STARSMODE` environment variable. This variable should be set before starting up the X server.

For example, set the bit-depth of the Raptor card to 8+24
```
#setenv STARSMODE +8+24
```

To set the bit-depth of the Raptor card to 8+8
```
#setenv STARSMODE +8+8
```

Other bit-depths can be selected in a similar manner.

In a multi-screen configuration of Raptor cards, this method will set the bit-depth of all the screens to the same value.

NOTE: In the case when both the methods to set bit-depth are used, the `STARSMODE` variable takes precedence over the settings in the `TSIScreenConfig` file.

4.3.2   Setting the Resolution

The resolution of the Raptor 2000 and Raptor 2100T cards is fixed at 2048x2048. The resolution of the Raptor 2500T is configured at the time of manufacture to be either 2560x2048 or 2048x2048. The Raptor 1100T supports multiple resolutions.

The resolution of the Raptor 1100T card can be changed by editing the config file `/var/X11/TSIScreenConfig`. By default, the resolution of this card is set to 1920x1080. Each row in the config file corresponds to a Raptor card that is identified by its device name. The fields in each row are separated by spaces. The resfile field specifies the file that contains a list of available resolutions and the corresponding timing numbers. Normally, this file is called `trzresinfo` and is located in `/var/X11`. The cached pixmap field is used for debugging purposes only and should always be set to 1.

The resolution field should contain the name of a resolution from the resfile. The sync field can be used to specify a sync flag. If it is set to 1, the sync flag will default to the value specified in the resfile. An explanation of the various sync flags can be found in the `trzresinfo` file.

In this example config file, the resolution of the Raptor 1100T card is set to 800X600X60.

```
# device Depth  Resolution   Sync Cached Resfile
                                  pixmap
rap1kt0  8      800X600X60   1    1      trzresinfo
```

4.4 startx

This is the easiest way to start up the X Window System server. The `startx` script is provided in `/usr/contrib/bin/X11` directory.

To start up the X server in the default mode type:

```
prompt% startx
```

You may add command line arguments to the end of the line.

4.5 xinit

The `xinit` program can be directly used to start the X Window System server. The `xinit` format is as follows:

```
xinit [[client] options] [ -- [server]
[display]   options ]
```

If no specific client program is given on the command line, `xinit` will look for a file in the user's home directory called `.xinitrc` to run as a shell script to start up client programs. If no such file

exists, `xinit` will use the following as a default:

```
xterm -geometry +1+1 -n login \
-display :0
```

If no specific server program is given on the command line, `xinit` will look for a file in the user's home directory called `.xserverrc` to run as a shell script to start up the server. If no such file exists, `xinit` will use the following as a default:

```
X :0
```

Note that this assumes that there is a program named `X` in the current search path.

To startup the server using `xinit`, type:

```
prompt% xinit -- /usr/bin/X11/X
```

You may also add any other command line arguments to the end of the line. For additional information on the use of `xinit`, refer to the `xinit` man page.

See Section 4.2 for configuring the file `/etc/X11/X0screens.`

4.6 Common Desktop Environment (CDE)

Common Desktop Environment (CDE) is available with HP-UX and is independent of the Raptor software. In order to use CDE, you need to configure only the `X0screen` file. See Section 4.2 for configuring the file `/etc/X11/X0screens.`

CDE can be started by typing:

```
prompt% /usr/dt/bin/dtlogin
```

Chapter 5

UNINSTALLING RAPTOR DRIVERS FOR HP-UX

5.1 Uninstalling Raptor Drivers

To remove the Raptor Drivers for HP-UX from the system, follow the steps below carefully:

> **NOTE:** If you have a previous version of Raptor Drivers, please use the uninstall procedure provided with that software.

1. Login as root.

2. Type: `/usr/sbin/swremove`.

Using the arrow keys, move the cursor down to the desired package and select that package by pressing the spacebar. For HP-UX 10.20 this package could be `TSIRDHPUX_10` or `TSIFTHPUX_10` depending on the type of Raptor card installed. For HP-UX 11.0 this package could be `TSIRDHPUX_11` or `TSIFTHPUX_11`, again depending on the type of Raptor card installed. For HP-UX 11i this package is `TSIFTHPUX_11i`. If several packages have been installed on the target system, the target package may not be immediately visible. It may be necessary to scroll down through a long list to find it. The packages are listed alphabetically.

3. Press `<tab>` to activate the menu bar.

4. Move the cursor over to `Actions` and press `<Enter>`.

5. Move the cursor down to `Remove (analysis)` and press `<Enter>`.

6. When the `Status` becomes `Ready`, press `<tab>` until `OK` is highlighted, and press `<Enter>`.

7. A warning message will pop up. Read the warning, then select `Yes`.

8. Another warning will pop up indicating that the kernel will be rebuilt. This is necessary in order to remove the driver from the system, so select `Yes`.

9. After several minutes, the status will again say `Ready`. Press `<tab>` until `OK` is highlighted, then press `<Enter>`.

10. A warning message will pop up indicating that the system will reboot when you press `<Enter>`. Press `<Enter>`. When the system has rebooted, the Raptor Drivers for HP-UX package will have been removed from the system.

Chapter 6

TECHNICAL ASSISTANCE

6.1 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 **9:30am - 5:30pm EST** Monday through Friday.

Please have the software part number, version, and serial number for your Raptor card(s) available when contacting Tech Source in order to expedite support. Please make a note of this information in the area below:

<u>DETAILS OF YOUR CARD(S):</u>

P/N: _____

Model Name: _____

Serial Number(s):   _____

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

6.2 Email Address

Our email address is `hotline@techsource.com`.

International customers may use email or our fax line at (407) 339-2554.
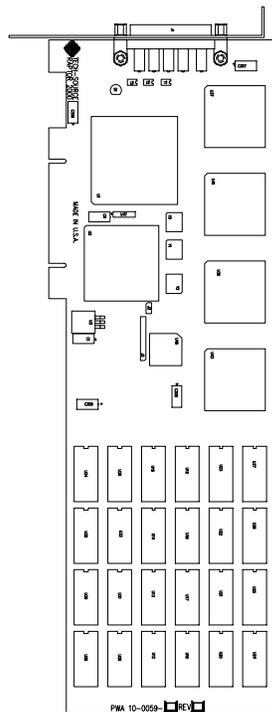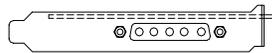
6.3 Website

For detailed product information and Frequently Asked Questions (FAQs), please visit our website located at:

`http://www.techsource.com`

Appendix A

CARD SPECIFICATIONS

A.1 Raptor 2000 Specifications

Frame Buffer:	8-bit single or double buffered; 24 Megabytes VRAM
MOX Hardware:	Tech Source MOX ASIC; 24 layer Priority Management
Hardware Cursor:	3 color, 64 x 64 bitmap
Color Lookup Table(s):	1024 entries
PCI Interface:	33 MHz, 32-bit
Video Interface:	Red, Green, Blue, at RS-343 (50 ohms)
Video Sync:	Separate sync at TTL levels (75 ohms)
Video Connector:	DB-5W5
Temperature Rating:	10^0 to 50^0C operating -10^0 to 70^0C non-operating
Humidity Rating:	5 to 90% (non-condensing)
Power Rating:	+5V @ 4 Amps; +12V @ 100mA
Dimensions:	312mm x 107mm (12.28" x 4.2")

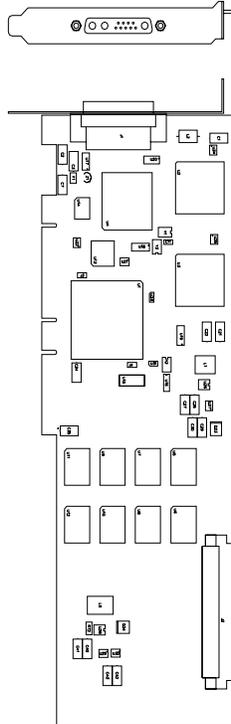# A.2 Raptor 2100T Specifications
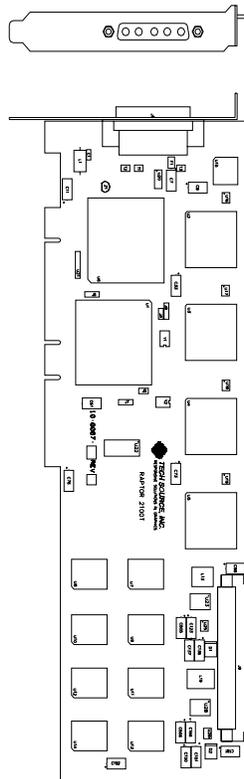
Frame Buffer:	**32**MB SGRAM
MOX Hardware:	Tech Source MOX ASIC; 32 layer Priority Management, 2 blending layers
Hardware Cursor:	Up to 3 cursors
Color Lookup Tables:	Primary color map with 2048 entries and two auxiliary color maps with 256 entries each
PCI Interface:	33/66 MHz, 32/64-bit Universal Signaling
Video Interface:	Red, Green, Blue, at RS-343 (50 ohm)
Video Sync:	Separate sync at TTL levels, (75 ohm)
Video Connector:	DB-5W5
Temperature Rating:	10^0 to 50^0C operating -10^0 to 70^0C non-operating
Humidity Rating:	5 to 90% (non-condensing)
Power Rating:	+5 @ 5 Amps
Dimensions:	312mm x 107mm (12.28" x 4.2")

A.3 Raptor 2500T-DL Specifications
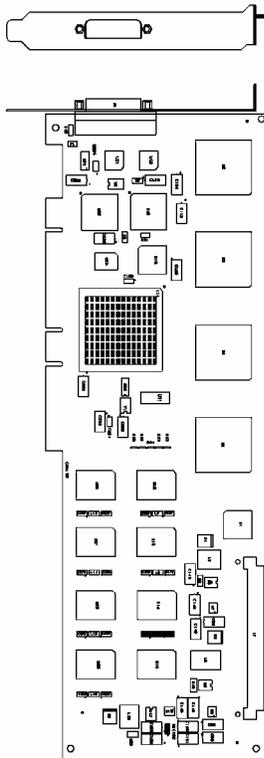
Frame Buffer:	64MB SGRAM
MOX Hardware:	Tech Source MOX ASIC; 32 layer Priority Management, 2 blending layers
Hardware Cursor:	Up to 3 cursors
Color Lookup Tables:	Primary color map with 2048 entries and two auxiliary color maps with 256 entries each
PCI Interface:	33/66 MHz, 32/64-bit Universal Signaling
Video Connector:	DVI Dual-Link
Temperature Rating:	10^0 to 50^0C operating -10^0 to 70^0C non-operating
Humidity Rating:	5 to 90% (non-condensing)
Power Rating:	+5V @ 5 Amps
Dimensions:	312mm x 107mm (12.28" x 4.2")

A.4 Raptor 1100T Specifications

Frame Buffer:	32MB SGRAM
MOX Hardware:	Tech Source MOX ASIC; 32 layer Priority Management, 2 blending layers
Hardware Cursor:	Up to 3 cursors.
Color Lookup Tables:	Primary color map with 2048 entries and two auxiliary color maps with 256 entries each
PCI Interface:	33/66 MHz, 32/64-bit Universal Signaling
Video Interface:	Red, Green, Blue, at RS-343A (75 ohm)
Video Sync:	Separate or composite syncs at TTL levels, (75 ohm)
Video Connector:	DB-13W3
Temperature Rating:	10^0 to 50^0C operating -10^0 to 70^0C non-operating
Humidity Rating:	5 to 90% (non-condensing)
Power Rating:	+5V @ 5 Amps
Dimensions:	312mm x 107mm (12.28" x 4.2")

NOTES