



*Vanguard Multiport™
4520CP Controller*

Synchronous/asynchronous Communications
for CompactPCI-equipped Solaris™ systems
Vanguard Models 4520CPF
 4520CPR

Part Number: 15-30001-00, Rev. C
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Vanguard Multiport 4520CP Controllers

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EN 55022:1998 Class A ITE emissions requirements (EMC)

FCC 47CFR, Part 15/1998, Class A Radio Frequency Devices Regs.

EN 55024:1997, Class A EMC generic immunity standard

Warning

This is a Class A product. In a domestic environment this product may cause
radio interference in which case the user may be required to take adequate
measures

FCC Notices

This device complies with part 15 of the FCC Rules. Operation is subject to the
following two conditions: (1) This device may not cause harmful interference,
and (2) this device must accept any interference received, including interference
that may cause undesired operation.

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

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About this Manual

The *Vanguard Multiport Controllers* User's Manual describes how to install and use Aurora Technologies' Vanguard sync/async series of multiport controllers for systems equipped with the CompactPCI bus (cPCI).

Manual Organization

This manual is organized as follows:

Chapter 1, "About this Manual."	Describes the purpose, audience, organization, and related documents for this guide.
Chapter 2, "Introducing the Vanguard Multiport 4530CP Controller."	Provides a technical overview of each multiport controller available for CompactPCI-based systems.
Chapter 3, "Installing Vanguard Multiport Hardware."	Describes unpacking procedures and hardware installation.
Chapter 4, "Software Installation and Configuration."	Describes installation of the device driver, and the device files that are created under Solaris.

Chapter 5, “Using the Vanguard Multiport Software.”	Describes administration of ports on the multiport controllers.
Chapter 6, “Troubleshooting.”	Describes potential installation problems, error messages, and diagnostic tools.
Chapter 7, “Warranty & Maintenance Information.”	Describes warranty and maintenance information for this Aurora Technologies’ product.
Chapter A, “Cables and Connectors.”	Provides wiring diagrams and general cabling information.
Appendix B, “Product Information Worksheet.”	Provides a record of information for this product.




Who Should Use This Book

This book is a reference manual for anyone who wants to install, configure, and use Vanguard Multiport controllers in CompactPCI-equipped computer systems.

Document Conventions

Table 1 describes the symbolic conventions used in this guide.

TABLE 1. Conventions

Symbol	Description
screen display	Graphic text that appears on screens, menus and dialog boxes appears in sans serif font.
User input	User input values appear in boldface . These are characters or commands you type literally.
<i>emphasis</i>	Italics are used in the text for emphasis, titles, and variables.
	This caution symbol marks notes about possible damage to computer equipment or data if a procedure or process isn't followed according to instructions.
	This warning symbol marks notes about possible harm to yourself unless you follow special instructions.
	This symbol marks special text passages that contain additional information such as notes you should know about or tips you should consider when installing, operating, or maintaining this product.

Related Manuals

For more information, refer to the following manuals:

- Your computer system documentation
- Your Solaris documentation
- Your peripheral's documentation.

Getting Help

If you need to reach us, you can contact us by

- The Web: www.auroratech.com for product literature, phone numbers and address.
- Phone service: Mon–Fri, 8:30–6:00 Eastern Time
For faster service, have your product serial number available.
- FAX: Attn: Customer Service and Support
- Email: support@auroratech.com
- Mail: Attn: Customer Service and Support

Registration

To receive warranty coverage on your Aurora product, you must fill out and mail back the Aurora Warranty Registration Card in Chapter 7, “Warranty & Maintenance Information.”. Phone support can only be provided after product registration is complete. Hardware and Software Maintenance Agreements can be provided for extended customer support.

Sending in this card also lets us keep you up-to-date on the complete line of Aurora Technologies’ products.

If you have any questions or comments on your Aurora Technologies’ product, contact our Customer Support Department at support@auroratech.com or your sales representative.

Introducing the Vanguard Multiport 4530CP Controller

Congratulations on purchasing your Aurora Technologies Vanguard Multiport™ controller. Combining on-board RISC processing, dedicated data buffers, and flow control processing, Vanguard Multiport controllers off-load communications overhead from your host CPU and your network for optimum system performance.

Introducing the Vanguard Multiport Controllers

The Vanguard Multiport series of SBus-bus, sync/async controllers provides the performance and reliability needed for high-speed serial communications. Data transfer rates up to 115.2 kbps asynchronous and 256 kbps synchronous (depending on processor speed), full duplex, are supported. Vanguard Multiport controllers are available for any SPARC-compatible system or personal computer with a SBus (cPCI) expansion bus, running Solaris SPARC or Solaris x86. (See the Driver Release Note for supported Solaris releases.)

Multi-protocol support

Optional Aurora synchronous data communications protocols including X.25 and HDLC are available for SPARC and x86 systems. Solstice (SunLink) protocols are fully supported.

Interface options

The Vanguard Multiport controllers support the RS-232 interface and are available with either DB-25 or RJ-45 connectors. RS-422 or RS-485 with DB-25 connectors are optionally available.

System Requirements

Aurora's Vanguard Multiport controllers are designed to work with a wide range of systems running Solaris SPARC or Solaris x86. Your system must meet the following requirements:

Workstation:	SBus Chassis
Operating System:	Solaris SPARC/Solaris x86 (See Driver Release Note for supported releases.)
CPU:	SPARC or Intel x86
Bus:	SBus
Memory:	16 Mbytes minimum
Disk Drive:	1 Mbyte free in /opt
CD-ROM drive:	(optional)

Technical Specification Overview

Table 2 provides a technical specification overview of the Vanguard Multiport controllers.

TABLE 2. Vanguard Multiport Controller Specifications

	4520CP
Ports	4
Electrical Interface	RS-232 standard RS-422, RS-485 optional
Connector	DB-25 DTE (male) RJ-45 optional
Speed full duplex, simultaneously on all ports	async: 50–115.2 kbps sync: 50–256 kbps
Start/Stop bits	1 and 2
Data bits	5, 6, 7, or 8 bits
Interrupt Level	Assigned by OS
Flow Control	Hardware: CTS/RTS Software: XON/XOFF
Modem support	Full support all lines
Modem control	CD/DTR/DSR
I/O Buffer (per port)	128 Bytes send and receive per port
Certification	FCC Class A and CE

Table 3 provides a brief overview of the synchronous capabilities of the Vanguard Multiport controllers.

TABLE 3. Vanguard Multiport Synchronous Communications Specifications

Feature	Description
Data Encoding	NRZ, NRZI, Manchester
Data Format	HDLC
Duplex Support	Full & Half
Clocking	input: T_xC_{in} , R_xC_{in} output: T_xC_{out}
Modem Support	All lines RTS, CTS, DSR, CD, DTR

Installing Vanguard Multiport Hardware

This chapter describes how to install Vanguard Multiport hardware and consists of the following:

- Taking precautions before installation
- Unpacking the Vanguard Multiport hardware
- Installing the Vanguard Multiport card
- Connecting peripherals

Installation Overview

This section provides an overview of how to install your Vanguard Multiport controller and the Aurora device drivers.

TABLE 4. Installation Overview Procedures

Step	Description	Go to
1	Unpack the multiport controller.	“Unpacking Vanguard Hardware” on page 3-3
2	Install the card in an empty slot	“Installing the Multiport Card” on page 3-5
3	Install the device drivers	“Installing the Device Driver Software” on page 4-1
4	Set up port services for the asynchronous ports	“Setting Up Asynchronous Port Services” on page 4-4
5	Install sync protocol stack (<i>optional</i>)	Protocol Package Documentation



Step 5 is only required if you are installing a synchronous protocol package such as X.25.

Before beginning the installation, record the following information in the *Product Information Worksheet* at the back of this manual.

- Vanguard Multiport card serial number
- Rear I/O card model and serial number (if applicable)
- The name and model number of the system into which you have installed our product
- The version of the operating system that your system is running (e.g., Solaris 7)

Then fill out and mail the Product Registration Card at the back of this manual, in order to be eligible for technical support.

Installation Precautions

Taking the precautions described in this section should help you avoid injury or damage to your equipment.



Electrostatic discharge can damage integrated circuits on your multiport cards.

To prevent such damage from occurring, observe the following precautions during board unpacking and installation.

- Handle circuit cards only by their non-conducting edges once you have removed them from their protective antistatic bags.
- Stand on a static-dissipative mat.
- Wear a grounding strap to ensure that any accumulated electrostatic charge is discharged from your body to the ground.
- Install circuit cards as soon as you remove them from their protective anti-static packaging.
- Do not leave cards exposed after you unpack them.
- If you must put a card down, place it on anti-static packaging or on a rubber mat.

Unpacking Vanguard Hardware

Open the packing boxes and remove their contents. When removing the multiport card (and rear I/O card, if applicable), leave the card in its anti-static bag. Check to ensure that you have all of the required parts, as listed in Table 5 on page 4.

TABLE 5. Vanguard Multiport Controller Parts List

Qty.	Description
1	Multiport Card
(1)	Rear I/O card (if applicable)
1	distribution cable or box
1	Serial test plug
1	User's Manual with Driver distribution CD-ROM
1	Driver Release Note



Save the shipping cartons and the internal packaging. If you need to ship the product back to your dealer, you must use the original carton and packaging.

Other Things You'll Need

To ensure a smooth installation, you should have the proper cabling and tools on hand.

Cabling

There are a number of cabling approaches you can use to connect devices to the new Aurora ports. If you are not sure what you need, refer to Appendix A.

Tools

You'll need the following tools to install your Vanguard Multiport hardware:

- Any tools listed in your CompactPCI-based system's documentation.

- A small flat-head screwdriver to make cable connections and secure mounting screws.

Installing the Multiport Card

Detailed installation procedures for cPCI cards can be found in your system installation or hardware documentation. The system documentation explains how the slots are numbered and any special considerations you should note.



Electrostatic discharge and static electricity can damage integrated circuits on the cPCI card and in the box.

Be sure to follow the precautions listed in your CompactPCI-based system documentation.

To install the multiport card:

1. Make sure the computer system is powered off.
2. Install the multiport card in the selected slot, following the instructions in your system documentation. Use care to align the card correctly in the guide slots. Gently, insert the multiport card using the injector/extractor handles. Be sure to seat the card fully in the slot. Be sure that you secure the card in its slot with the mounting screws. (The card could dislodge if it isn't secured.)
3. (If applicable) Install the rear I/O card behind the multiport card.
4. Connect the distribution cable or box to the multiport card or rear I/O card, as applicable. See Figure 1 on page 6
5. Turn on and boot the CompactPCI-based system.

Now you are ready to connect your peripherals.

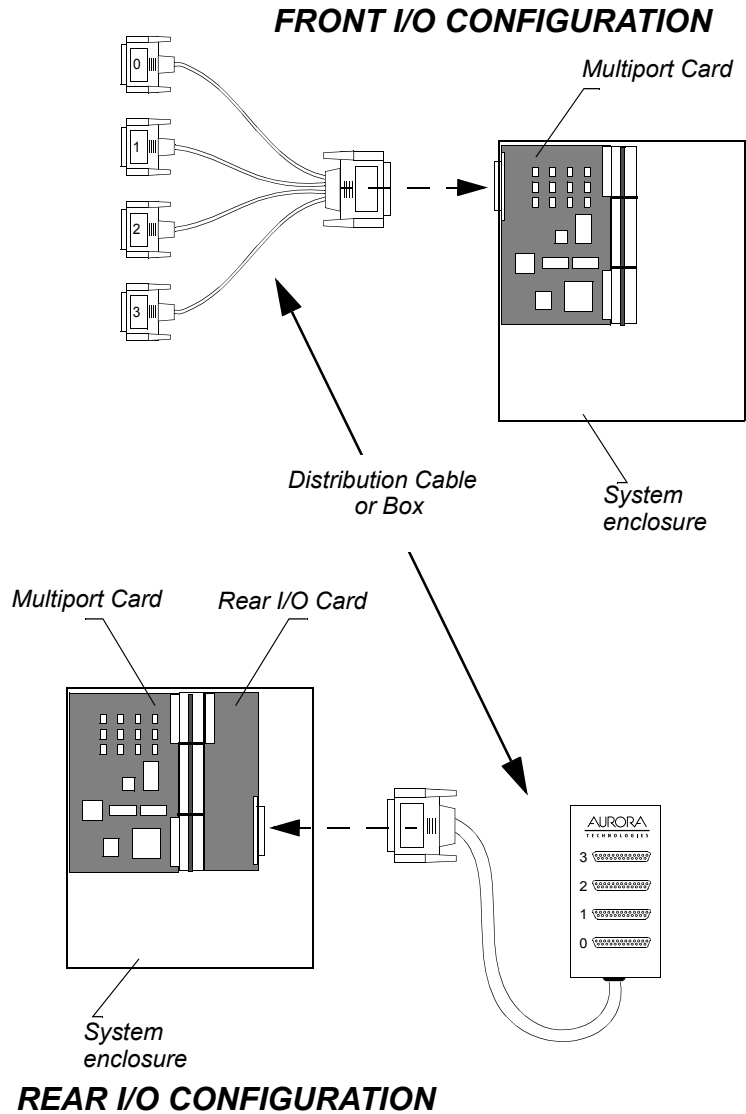


FIGURE 1. Connecting Vanguard Card to the Distribution Cable (or breakout box)

Connecting Peripherals

Peripherals are connected to the Vanguard Multiport distribution cable/box with user-supplied cables (See Figure 2 on page 7). Detailed cabling information is provided in Appendix A. All peripheral cables *must* be shielded to ensure proper functioning of your equipment. Once you have the necessary cables, use the following procedure.

To connect a peripheral device to the distribution cable/box

1. Acquire the correct, shielded, peripheral cable.¹
2. Attach one end of the cable to the peripheral.
3. Attach the other end of the cable to one of the free connectors on the distribution cable or box.
4. Record the slot number of the cPCI interface card and the port number of the Aurora port in the Product Information Worksheet at the back of this manual.

Now you can set up the port services for the peripheral device.

The connectors on the distribution cable and box are numbered to match the device names that are created when the driver software is installed. But you will also need to know which port the peripheral is connected to when setting up its port services.

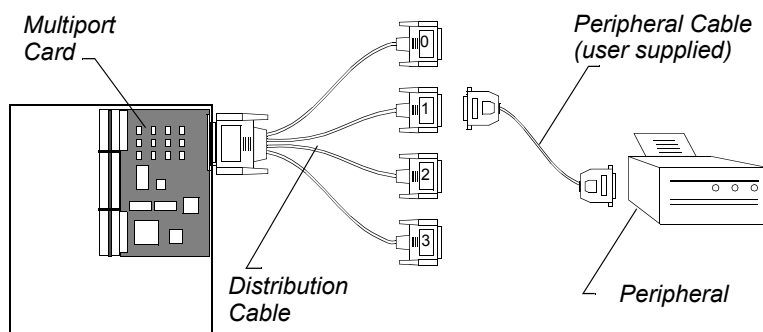


FIGURE 2. Connecting Peripherals to the Distribution Cable

1. This cable is not provided.

Software Installation and Configuration

The Vanguard Multiport device drivers allow your CompactPCI-based system to communicate with various asynchronous and synchronous serial devices (such as printers, terminals, or modems) through the Aurora ports.

A CD-ROM containing the device driver software plus installation script is shipped with your Vanguard Multiport card.

This chapter presents the following:

- Installing the Device Driver Software
- Asynchronous Device File Names
- Setting Up Asynchronous Port Services
- Synchronous Configurations

You must install the Vanguard Multiport card before installing the software.

Installing the Device Driver Software

After you have installed your new Aurora hardware, follow the device driver software installation procedures in the Driver Release Note to install the driver.

You only need to install the driver once, even if you are installing more than one Vanguard Multiport serial card. One device driver can support up to sixteen serial cards.

After you have installed the driver software, proceed with the setup and configuration procedures that follow in this chapter.

Free Driver and Release Note Downloads

You can download the latest versions of all Aurora drivers and release notes from the Aurora Technologies web site. Use the following procedure

To download from the Aurora web site

1. Using your favorite browser, go to www.auroratech.com.
2. Click on **Support**.
3. Click on **Drivers**.
4. Follow the instructions provided on the displayed web page.

Asynchronous Device File Names

Each serial port connected to terminals, modems, etc., needs to be identified by one or more device files, depending on the intended use of the port. Device file naming conventions vary, depending on the device's use.

The system automatically creates Solaris device files for each new port on the Vanguard Multiport card. Table 4 shows the device files created for a four-port card installed on the same system.

The format for device file names is defined as shown in Figure 3.

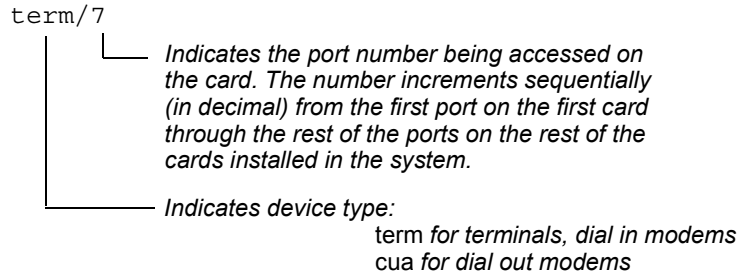


FIGURE 3. Filenaming Format for Asynchronous Device Files

In this example, the terminal device for the port labelled 3 on the second 4520CP card is accessed by the `term/7` device file.

TABLE 6. Solaris asynchronous device file names for two Vanguard Multiport 4520CP cards installed on the same system

Port Label	Async Terminal (Dial-in Modem)	Async Modem (Dial-out)
<i>Vanguard Multiport 4520CP card 1</i>		
0	/dev/term/0	/dev/cua/0
1	/dev/term/1	/dev/cua/1
2	/dev/term/2	/dev/cua/2
3	/dev/term/3	/dev/cua/3
<i>Vanguard Multiport 4520CP card 2</i>		
0	/dev/term/4	/dev/cua/4
1	/dev/term/5	/dev/cua/5
2	/dev/term/6	/dev/cua/6
3	/dev/term/7	/dev/cua/7

Setting Up Asynchronous Port Services

Once your peripherals are connected and the Aurora software packages are installed, the next step is to set up the appropriate port services for each peripheral.

Solaris has a number of tools available for administering port services. You should familiarize yourself with the man pages on `sacadm`, `pmadm`, `ttyadm`, and `lpadmin` before attempting to connect peripherals to the Aurora serial ports.

SunSoft also provides the window-based `Admintool`, which can simplify many tasks. However, in some cases they may not provide sufficient control over communications parameters to allow you to optimize the performance of your peripheral. For example, if you decide to use `Admintool:Printers` to set up printer services, you will find that you can't vary the baud rate.

In this section we do not address the use of `Admintool`; we simply provide command line examples. If you want more information, refer to your SunSoft documentation.

Setting Up Printer Services

Setting up printer service in Solaris requires the `lpadmin`, `accept`, and `enable` commands. The following example sets up a printer named `testlp` on port 0 running at 38,400 baud.

```
system% lpadmin -p testlp -v /dev/term/0 -T \  
hplaserjet -D "testlabel" -o nobanner -o \  
"stty='38400 cs8 -parenb -cstopb -crtscts ixon \  
tabs'" \  
system% accept testlp \  
system% enable testlp
```



Refer to your printer manual for details on how to set its transmission characteristics (baud rate, bits/char., parity) and flow control (software/hardware). Refer to your Solaris documentation for more information about using `Admintool` and setting up printer services.

Setting Up Terminal Services

Setting up terminal service in Solaris requires the `sacadm` and the `pmadm` commands. The following example sets up a typical terminal.

To set up services for a typical terminal

1. Create a new port monitor using `ttyaur0` as the PMTAG name:

```
system% sacadm -a -p ttyaur0 -t ttymon -c \  
/usr/lib/saf/ttymon -v 1
```

If you get the message `ttyaur0 already exists`, it simply means that someone has already created `ttyaur0`.

We recommend a unique PMTAG name for every 16 Aurora ports (in other words, a unique name for each expansion unit you have). `ttyaur0`, `ttyaur1`, . . . is our suggestion for PMTAG names; you could use something else if you prefer. However, it is important *not* to use a name of the form `ttymonxx` as the PMTAG name.

2. Check the status of the port monitor:

```
system% pmadm -l
```

3. Remove the existing service (`ttymon0`) from the port to be administered (in this case port 0):

```
system% pmadm -r -p ttymon0 -s 0
```

If the Aurora board is the only serial device using `ttymon0` as a PMTAG name, you can remove the services from all ports by typing:

```
system% sacadm -r -p ttymon0
```

4. Start a port monitor service for a specific port (in this case, a Wyse 50 terminal running at 38.4 Kbps):

```
system% pmadm -a -p ttyaur0 -s 0 -i root -fu -v1 \  
-m "`ttyadm -c -d /dev/term/0 -l 38400 \  
-s /usr/bin/login -m ldterm -T wyse50 -S n`"
```

5. Repeat steps 2–4 to set up other terminal ports.



Refer to your terminal manual for details on how to set its transmission characteristics (baud rate, bits/char., parity) and flow control (software/

hardware). Refer to your Solaris documentation for more information about using Admintool and setting up terminal services.

Bypassing the Carrier Detect (CD) Line

If you are using 3-wire cabling (or for some other reason the CD line will not be pulled high), you must bypass the CD line for terminal and printer ports. This is done by instructing the driver to assume the CD line is high regardless of its actual state.

The easiest way to do this is using Admintool. Browse the serial ports, select the appropriate port, and edit the port service by checking off the Software Carrier option on the Admintool:Modify Serial Port dialog box (click on Detail: More to display this option).

Alternatively, you can make the driver assume the CD line is high by typing

```
system% /opt/AURAase/ttysoftcar -y <device>
```

To restore the CD line to its normal, driven state, type

```
system% /opt/AURAase/ttysoftcar -n <device>
```

You can query the state of the software carrier by typing

```
system% /opt/AURAase/ttysoftcar <device>
```

If you need to bypass the CD line from a C program, open the port using the `O_NDELAY` flag, and issue the following `ioctl` call:

```
int val=1;
ioctl(fd, TIOCSSOFTCAR, &val);
```



Do not bypass the CD line on serial ports connected to modems.

Setting Up Modem Services

Setting up modem service in Solaris requires the `sacadm` and the `pmadm` commands. The following example sets up a typical bidirectional modem.

To set up services for a typical bidirectional modem

1. Create a new port monitor using `ttyaur0` as the PMTAG name:

```
system% sacadm -a -p ttyaur0 -t ttymon -c \  
/usr/lib/saf/ttymon -v 1
```

If you get the message `ttyaur0` already exists, it simply means that someone has already created `ttyaur0`.

Use a unique PMTAG name for every 16 Aurora ports (in other words, a unique name for each expansion unit you have). For example, you could use `ttaur0`, `ttaur1`, . . . and so on for PMTAG names. Don't use a PMTAG naming format of `ttymonxx`.

2. Check the status of the port monitor:

```
system% pmadm -l
```

3. Remove the existing service (`ttymon0`) from the port to be administered (in this case port 0):

```
system% pmadm -r -p ttymon0 -s 0
```

4. Start a port monitor service for a specific port (in this case, a bidirectional modem running at 38.4 Kbps):

```
system% pmadm -a -p ttyaur0 -s 0 -i root -fu -v 1 \  
-m ``ttyadm -b -d /dev/term/0 -l 38400 \  
-s /usr/bin/login -m ldterm -S n``
```

5. Now, add the modem to the `/etc/uucp/Devices` file using the following format:

```
ACU cua/0 - 38400 <type>
```

where `<type>` is either a built-in function (801, Sytek, TCP, Unet-server, DK) or one whose name appears in the `/etc/uucp/Dialers` file (hayes, tbfast, etc.).

6. Repeat steps 2–5 for other modem ports.



Refer to your modem manual for details on how to set its transmission characteristics (baud rate, bits/character, parity) and flow control (software/hardware). Refer to your Solaris documentation for more information about using Admintool and setting up modem services.

Setting Asynchronous Data Rates

Aurora recommends that you use the SunSoft Admintool or Solaris `stty` command to set baud rates for asynchronous ports. See the Admintool documentation or the Solaris `stty(1)` man page for information on how to do this.

Synchronous Configurations

As stated earlier, your Vanguard Multiport card supports multi-protocol configurations. In other words, you can configure the ports on the Vanguard Multiport card to support any combination of asynchronous and synchronous data-link protocols. This section describes setting up synchronous configurations.

Synchronous Drivers

The Aurora synchronous driver `ases` supports frame level interfacing for bit-oriented frames (HDLC and SDLC) and the Sun synchronous interface.

Other synchronous drivers may be used simultaneously or exclusively so that you can use other synchronous data link protocols (such as Frame Relay and PPP) with your Vanguard Multiport card. Installing the Aurora Synchronous Device Driver is necessary if you plan to run one of Aurora's data link protocol software packages such as Aurora HDLC, Aurora X.25, etc.

Synchronous Device File Names

Each synchronous port needs to be identified by an appropriate device file name, depending on the type of data link protocol (bit synchronous, byte synchronous, Sun synchronous) to be used on the port.

The system automatically creates Solaris device files for each new port on the Vanguard Multiport card. Table 7 shows the device files created for two four-port cards installed in the first available slot and in the next available slot.

The format for synchronous device file names is defined as shown in Figure 4.

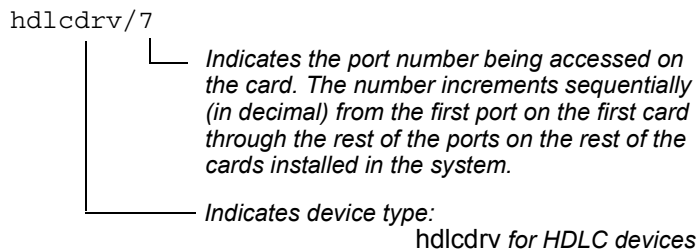


FIGURE 4. Filenaming Format for Synchronous Files

In this example, an HDLC device connected to the port labelled 7 on the second Vanguard Multiport 4520CP card is accessed by the `hdlcdrv/7` device file.

TABLE 7. Synchronous device file names for two Vanguard Multiport 4520CP cards installed on the same system

Port Label	HDLC/SDLC	Sun Synchronous (SSIF)
<i>Vanguard Multiport 4520CP card 1</i>		
0	/dev/hdlcdrv/0	/dev/ases0
1	/dev/hdlcdrv/1	/dev/ases1
2	/dev/hdlcdrv/2	/dev/ases2
3	/dev/hdlcdrv/3	/dev/ases3
<i>Vanguard Multiport 4520CP card 2</i>		
0	/dev/hdlcdrv/4	/dev/ases4
1	/dev/hdlcdrv/5	/dev/ases5
2	/dev/hdlcdrv/6	/dev/ases6
3	/dev/hdlcdrv/7	/dev/ases7

SunLink® Support

Some applications require SunLink device names of the form `/dev/zshx`. If you plan to run such an application over your expansion ports, first run `/opt/AURAase/zshreplace`. Then type, `devlinks;drvconfig`.

Note that after running this script, you will not be able to use the Solaris workstation serial ports A and B as `zsh` devices due to inevitable device name conflicts. However, those ports *can* be used for async connections using device names such as `/dev/term/x` or `/dev/cua/x`.

Using the Vanguard Multiport Software

Aurora Technologies device driver software delivers advanced features for unparalleled flexibility and convenience. These features are described in the following sections:

- Viewing Port Parameters with `aseinfo`
- Administering Ports with `mset`

Viewing Port Parameters with `aseinfo`

The `aseinfo` command allows you to view the current status of your expansion ports.

To use `aseinfo`, you must first

- Log in as root
- Change to the `/opt/AURAase` directory

The syntax for `aseinfo` is

```
system# ./aseinfo [-ports] | [-drivers]
```

To view the port parameters

1. Type

```
system# ./aseinfo -ports | more
```

2. Scroll through the listing using the space bar.

To view the active drivers

1. Type

```
system# ./aseinfo -drivers | more
```

2. Scroll through the listing using the space bar.

See Figure 5 on page 5-3 for sample output from `aseinfo`. In that example two Vanguard 4520CP cards are installed in slots 3 and 4 of the SBus-equipped system.

Board 0 (Vanguard Multiport 4520CP, slot 3)					
0,0	0	term/0	sync/0	CLOSED	
0,1	1	term/1	sync/1	CLOSED	
0,2	2	term/2	sync/2	OPEN	asea
0,3	3	term/3	sync/3	CLOSED	
Board 1, (Vanguard Multiport 4520CP, slot 4)					
1,0	4	term/4	sync/4	CLOSED	
1,1	5	term/5	sync/5	CLOSED	
1,2	6	term/6	sync/6	CLOSED	
1,3	7	term/7	sync/7	CLOSED	

FIGURE 5. Output from the aseinfo Command

Administering Ports with mset

Use the `mset` utility to reset hung ports, to set a port to use external clock, and to check the error statistics for the asynchronous lines in use.

mset Command Options Summary

The command format for `mset` is

```
mset <device_name> <option>
```

where

`<device_name>` is the device name

`<option>` is one of the command options listed in Table 8.

TABLE 8. mset Options

mset Option	Description
-<baud_rate>	Sets BAUD rate for given port.
-baud <baud_rate>	Sets BAUD rate for given port.
-dtrflow	Configures the driver to use DTR (pin 20) as the input hardware flow control pin. The DTR pin will function like RTS (pin 4). The RTS pin switches its function to act like DTR. (Not available in ASE driver)
ext	Sets [port BAUD rate to external clock.
-flush	Resets a hung port.
-rtsflow	Configures driver to use RTS (pin 4) as the input hardware flow control pin (see -dtrflow above). (Not available in ASE driver)
-show	Reports the current settings of the custom baud rate, input hardware flow control pin, and close timeout for the specified port.
-stats	Reports error statistics for the specified asynchronous port. Note: -statsr reports the same information as -stats and additionally resets each field to zero.
-statschk	Reports a list of board/port numbers that have detected receiver overruns, frame errors, parity errors, or dropped characters.
-statsreset	Resets all errors and statistics for all ports.
-std	Sets port Baud rate to 38400 bps.
-timeout	Sets the time that the driver will wait during a close before forcing the close to complete if the close is waiting on transmit data. The default time is 15 seconds.

Troubleshooting

This chapter describes problems you could possibly experience with your Vanguard Multiport card and the actions you should take to diagnose and solve those problems. Topics covered in this chapter include:

- Resolving installation problems
- Clearing hung Async ports
- Using the xxtrace driver tracing utility
- Troubleshooting using mset (Async only)
- Troubleshooting with mset (async only)
- Calling for support

Installation Problems

If you experience problems immediately after the installation of your Vanguard Multiport card, please check the following:

- Is the peripheral cable the correct type? If it is a null-modem cable, is it the right kind of null-modem cable? The vast majority of problems are due to incorrect cable selection. Refer to Appendix A, Cables and Connectors.
- Are any connections to other boards loose?
- Is the cPCI card properly seated in the system?
- Is the power cord loose in the wall socket or at the connection to the system unit?
- Are the external equipment connections made properly?
- Is the equipment powered on?
- If you're experiencing interference are you using properly shielded cables? Make sure that the cabling is not running near a power source; if it is try moving the cabling to a new location.
- Is the cable length correct?
The RS-232 cable specification is 50 feet (15.25 m) at 9600 bps. The Vanguard Multiport card uses powerful drivers that can support 38.4 kbps with cable lengths up to 200 feet (61 m).

If everything on the list is OK, remove

- all Vanguard Multiport software (see installation chapter for your operating system)
- the Vanguard Multiport card (see your CompactPCI-based system hardware documentation for instructions).

Now bring up your system to determine whether it operates correctly without the Vanguard Multiport card installed.

If your system operates correctly, the problem may be with the Vanguard Multiport card. If your system does not operate normally, the problem is most likely with the system.

Clearing Hung Async Ports

Asynchronous ports may occasionally hang due to a number of factors. If this occurs try some of the suggestions here. If all else fails, reboot your workstation.

To clear a hung async port

1. Switch user to root:

```
system% su  
Password: <root_password>  
system#
```

2. Run **ps** to get the process number for the program that has the port open: system# **ps**

3. Use **kill** to remove the offending process:

```
system# kill -9 <process_number>
```

This should free up the port. If it doesn't, the process may be defunct. Use the appropriate procedure below to remove a defunct process from a port.

To clear a defunct process on port cua/8

1. Switch to the AURAase directory

```
system# cd /opt/AURAase
```

2. Use the **mset** command to clear the port.

```
system# ./mset cua/8 -flush
```



Never use the `mset -flush` command on a functioning port. Lost data will result.

The xxtrace Driver Tracing Utility

If you are having problems with your Vanguard Multiport card, a service representative may ask you to take a trace of your problem. This section describes the steps you take to get a driver trace.

xxtrace Command Summary

Table 9 contains a summary of the `xxtrace` commands.

TABLE 9. xxtrace Command Summary

xxtrace Command	Description
ld	Loads the Vanguard Multiport driver (async)
ul	Unloads the Vanguard Multiport driver (async)
xa	Enables tracing on all ports
xb <i>n:p</i>	Enables tracing on a specific board/port
xc	Clears the trace buffer and restarts tracing, keeping the same ports and events active
xp	Dumps the contents of the trace buffer out of memory and prints it to stdout
xr	Clears the trace buffer and shuts off tracing
xs	Shows the current port(s) and events being traced

Running xxtrace

To run xxtrace

1. Log in as root



You must be logged in as root in a `cs`h environment to run this test.

2. Change to the appropriate directory:

```
system# cd /opt/AURAase
```

3. Enter the following:

```
system# source sourceceme
```

4. Enable tracing by entering one of the following:

To enable tracing on *all* ports, type

```
system# xa
```

To enable tracing on a *specific* port, type

```
system# xb n:p
```

(*n* and *p* are in hexadecimal)

where n is the board number in the system starting with 0, and p is the port number, starting with 0.

For example, `xb 0 : 3` turns on tracing for the first Aurora card in the system for port 3.

5. To show that tracing is turned on, type:

```
system# xs
```

The system displays a list of all the trace points.

6. Reproduce the situation that was occurring when you encountered the problem.
7. *As soon as* the failure condition occurs (to avoid overwriting any buffers), dump the contents of the trace buffer out of memory and print it by typing:

```
system# xp
```

This command prints data to standard output. You can redirect the contents to a file, using this format:

```
system# xp > /tmp/filename
```

where *<filename>* is the name of the redirected output file in the `/tmp` directory.

8. Find out how many lines the trace output is by doing a `wc -l` on the file.

To clear the trace buffer and restart tracing, keeping the same port(s) and events active, enter

```
system# xc
```

If the output is not very long, you can FAX it to us. Otherwise, tar it to a diskette and send it to us addressed to Customer Service and Support or compress, uuencode, and e-mail it to

```
support@auroratech.com.
```

To make the system operational again

1. Clear the trace buffer and shut off tracing:

```
system# xr
```

2. Now reboot the system:

```
system# reboot
```

Troubleshooting with mset (async only)

You can run `mset` when you are receiving data corruption errors on incoming data, such as

- Receiver Overruns: This occurs when the chip's FIFO is full, more data has arrived, and the system could not respond to the interrupt fast enough.
- Frame Errors: The data received was missing a stop bit.
- Parity Errors: The parity check was wrong.
- Dropped Characters: The OS did not have enough memory to handle the incoming data.

To run mset

3. Log on as root
4. Change to the appropriate directory:

```
system# cd /opt/AURAase
```

5. Type the following:

```
system# ./mset <device_name> -statschk
```

This prints a list of board/port numbers that have detected receiver overruns, frame errors, parity errors, or dropped characters. The output looks similar to the following:

```
The following channels have detected errors:  
Board 1, port: 3, 4  
Board 2, port: 2
```

This indicates that the port labeled “3” and the port labeled “4” of the first board has detected errors and the port labeled “2” on the second board has detected errors.

6. To report the error statistics for the specified asynchronous port, enter:

```
system# ./mset <device_name> -stats
```

This example shows 5 characters received with parity errors. It also shows that the port received 3021 characters and transmitted 21 characters.

```
receiver overruns:           <0>  
receiver frame errors:      <0>  
receiver parity errors:     <5>  
receiver chars dropped:     <0>  
  
received chars:             <3021>  
transmitted chars:         <21>
```

7. To reset all errors and statistics for all ports, enter:

```
system# ./mset <device_name> -statsreset
```



To report error statistics and reset all errors and statistics per port, you could have entered the following in Step 3:

```
system# ./mset <device_name> -statsr
```

mset Error Message

```
cannot open device
```

The device specified in the message line cannot be opened by `mset`. This could be due to permissions on the device, or the driver is not loaded, or that device actually doesn't even exist. This could also mean that the device name is not specified properly.

Calling for Support

If you need to call Aurora Technologies' technical support for help, make sure that you have completed the following checklist:

Support Call Checklist

1. Serial Number: _____
(found in the back of this manual, on the hardware, and on the shipping container)
2. CompactPCI-based system model number: _____
3. Solaris version: _____
4. List all peripherals connected to the Vanguard Multiport card.
5. Vanguard Multiport software driver version: _____
(The version number is printed on the driver software media and is displayed when installation is completed.)
6. List the cable pinout description.
7. Verify the type of cables used. (modem, null-modem, etc.)

Telephone support is available Monday through Friday, 8:30AM to 6:00PM Eastern Time.

Warranty & Maintenance Information

Warranty on Hardware & Software

Aurora products carry the following standard warranties:

Standard Hardware Warranty Policy

All Aurora hardware products are warranted against defects for two (2) years from the date of delivery. The Standard Warranty includes 90 days of free Technical Support, two (2) years product repair, and driver upgrades.

Standard Software Warranty Policy

Aurora warrants that the physical media on which software is furnished will be free from defects in materials and workmanship, under normal use, for a period of (90) days from the date of shipment.

The Standard Warranty includes 90 days of Free Technical Support.

Make sure you complete the Warranty Registration form on page 7-2 and return it to Aurora Technologies. Refer to Warranty information at www.auroratech.com for details on extended warranty plans.

Product Registration Form

Important! Please print, complete, and return this Product Registration Form to Aurora's Customer Service and Support (CSS) Department at 508-588-0498. The information you provide here allows CSS to validate your warranty and inform you of software and hardware upgrades.

Purchase Order No.: _____ **Sales Order No.:** _____

Serial No.: _____

Name/Title: _____

Company: _____

Street Address: _____

City: _____ State: _____ Postal Code: _____

Country: _____

Phone: _____ Fax: _____

Email Address: _____

Supplier Name: _____ Date Purchased: _____

Supplier Address: _____

City: _____ State: _____ Postal Code: _____

Country: _____

Supplier Phone: _____

Protocol/Software License Application

Product: X.25 HDLC Control Tower Version: _____

Workstation Type: _____ O/S Version: _____ Host ID: _____

Maximum Number of Ports: _____

Your Application

- | | |
|---|---|
| <input type="checkbox"/> Printer/Plotter Connectivity | <input type="checkbox"/> Internet Connectivity |
| <input type="checkbox"/> Terminal/Instrumentation I/O | <input type="checkbox"/> Telecom Service Provider |
| <input type="checkbox"/> Modem Pool | <input type="checkbox"/> Data Feed |
| <input type="checkbox"/> WAN Connectivity | <input type="checkbox"/> Other |

Cables and Connectors

This appendix provides necessary background information for making connections to serial ports. It discusses modem and null modem connectors, the standard RS-232 pinouts, and describes some typical cables.

Two terms used frequently in this appendix are

- Data Communications Equipment (DCE)
- Data Terminal Equipment (DTE)

DCE peripheral devices usually refer to modems. DTE devices include terminals, printers, and computers.

Cabling Overview

To connect a peripheral device to a Vanguard Multiport card, you need an interface cable to run electrical signals from one of the DB-25 connectors to the device. Aurora does not supply this cable. You can purchase ready-made cables at your local computer store.

There are two types of serial devices: DCE and DTE. The important difference between the two types is that they send and receive signals through different pins. Aurora's Vanguard Multiport cards are configured as DTE devices. In general,

when connecting a DCE device, such as a modem, to a Vanguard Multiport card, use *modem* (or straight-through) cables. For DTE devices, such as terminals and printers, use *null-modem* cables.

Since cabling accounts for most installation problems, this appendix describes the different types of cables to use. You should check the design of the cables you buy against the cables defined in this chapter to verify that you have the correct cables.

Serial Connector Pinouts

Terminals, modems, and printers typically communicate through an RS-232 (serial) interface. All of the DB-25 connectors are DTE type RS-232 compatible serial connectors.

Figure 6 shows the location of the RS-232 pins supported by the Vanguard Multiport cards.

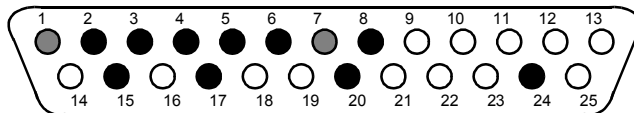


FIGURE 6. Serial Connector Pin Diagram (male DTE)

Table shows the connector pinouts for both asynchronous and synchronous devices. Table provides a description of each signal.

Serial Connector Pinout

Pin Number	RS-232 Signal	V.24 Signal	Direction
1	Chassis GND	102	None
2	TXD	103	Output
3	RXD	104	Input
4	RTS	105	Output
5	CTS	106	Input

Serial Connector Pinout

Pin Number	RS-232 Signal	V.24 Signal	Direction
6	DSR	107	Input
7	Signal GND	–	None
8	DCD	109	Input
15	TxC _{in}	114	Input
17	RxC _{in}	115	Input
20	DTR	108/2	Output
24	TxC _{out}	113	Output

Pin Signal Descriptions

Signal	Description
Chassis GND	Chassis (Earth) Ground. Prevents static discharge.
TXD	Transmit Data. Sends data to peripheral device.
RXD	Receive Data. Receives data from the peripheral.
RTS	Request to Send. Signal asking if peripheral device is ready to receive data.
CTS	Clear to Send. Signal from the peripheral device indicating readiness to accept data.
DSR	Data Set Ready. Signal from the peripheral indicating its status.
Signal GND	Signal Ground. Provides reference level for other signals.
DCD	Data Carrier Detect. Signal indicating that the peripheral device has detected a signal from the remote peripheral device over the telecommunications channel.
RxC _{in}	Receive Data Clock. Input for receiver signal element timing from a synchronous, DCE device.
TxC _{in}	Transmit Data Clock. Input for transmitter signal element timing from a synchronous, DCE device.

Pin Signal Descriptions

Signal	Description
DTR	Data Terminal Ready. Indicates the local device is ready to communicate.
TxC _{out}	Transmit Data Clock. Output for transmitter signal element timing generated on the Vanguard Multiport cards.

Asynchronous Serial Cables

Vanguard Multiport cards support both asynchronous and synchronous communications. This section describes cables for asynchronous use. The section on page 7 describes cables for synchronous use.

Asynchronous Modem Cables

Modem cables are designed to connect devices that send and receive data on different pins, which is the case when connecting a DCE device to a DTE device. In a serial modem cable, the pins in the connectors are wired straight-through: 1-1, 2-2, 3-3, and so on.

Since the Vanguard Multiport cards are configured as DTE devices, use a modem cable when connecting modems and other DCE devices to the card. You must obtain a modem cable with a male connector for the modem end and a female connector for the system end. The correct cable can be obtained from most computer stores.

Figure 7 shows the wiring of an asynchronous serial modem cable that enables the Vanguard Multiport card to communicate with the modem. For a listing of the signal names of the pins, see the preceding section.

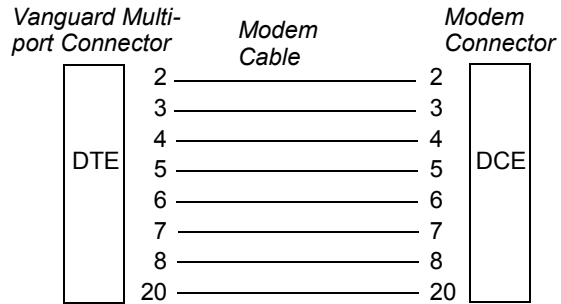


FIGURE 7. Asynchronous Modem Cable (DTE to DCE)

Asynchronous Null-Modem Cables

Null-modem cables are designed to connect devices that send and receive data on the same pins, which is the case when you connect a DTE device to another DTE device. Because both devices are trying to send and receive on the same pin, the wiring of the cable must swap those signals.

Since the Vanguard Multiport cards are configured as DTE devices, you must use a null-modem cable to connect them to other DTE devices such as terminals, printers, and plotters.

There are several different types of null-modem cables available. Three of the most common ones are

- XON/XOFF
- Request-To-Send (RTS)
- Data Terminal Ready (DTR)

The difference among the three cable types is the flow control they support:

- XON/XOFF supports software flow control only, with its three-wire configuration for XON/XOFF handshaking (see Figure 8).
- RTS supports hardware handshaking when the peripheral uses the *Request To Send* (pin 4) signal (see Figure 9).
- DTR supports hardware handshaking when the peripheral uses the *Data Terminal Ready* (pin 20) signal (see Figure 10).

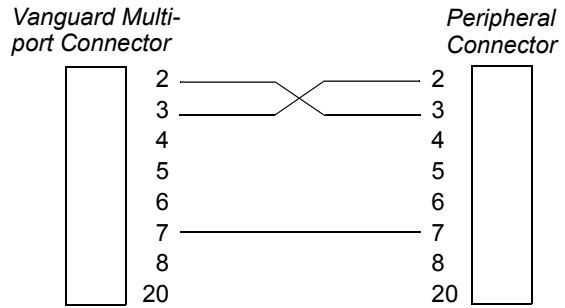


FIGURE 8. Asynchronous Null Modem Cable (XON/XOFF Handshaking)

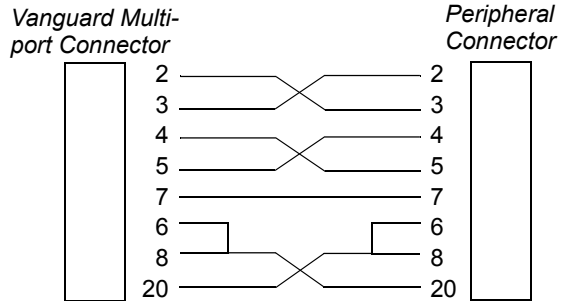


FIGURE 9. Asynchronous Null Modem Cable (RTS Handshaking)

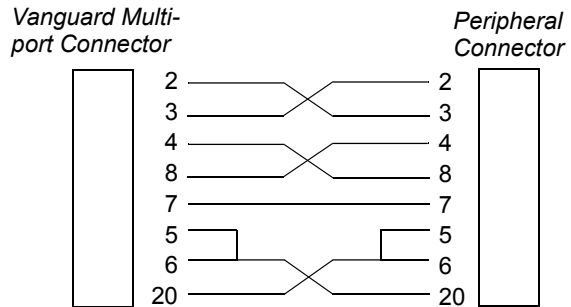


FIGURE 10. Asynchronous Null Modem Cable (DTR Handshaking)

See your device manual to determine what type of null-modem cable is required. Note that all three cables shown here can support XON/XOFF software flow control since pins 2, 3, and 7 are wired the same way.

Synchronous Serial Cables

Vanguard Multiport controllers offer full support for synchronous communications. For successful synchronous cabling, you must carefully consider what pins your clock signals are on. You must ensure that there is a single clock source for both the transmitter and receiver of data.

Connecting Synchronous Modems

Since all clock signals are brought out on their standard pins, you can use the straight-through modem cables shown in Figure 11 to connect synchronous modems to the Vanguard Multiport controllers. No adaptors are necessary.

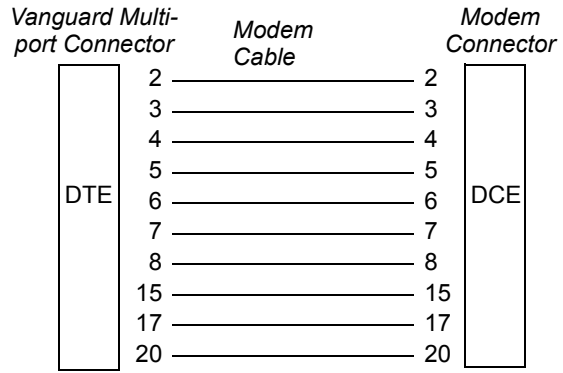


FIGURE 11. Straight-through synchronous modem cable

Connecting Other Synchronous Devices

Figure 12 shows the null-modem cable design for connecting Vanguard Multiport controllers to synchronous DTE devices.

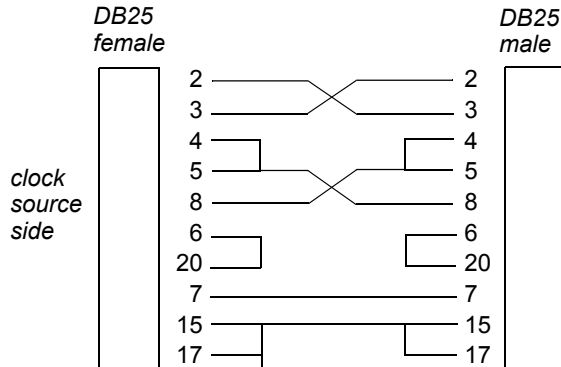


FIGURE 12. Synchronous Null-Modem Cable



This is a general purpose synchronous cable that can be used for other, non-Aurora ports.

Connecting Peripherals

Each port on the expansion unit has a male DB-25 connector. You must supply cabling that connects your peripheral devices to the DB-25 connectors on the Expansion unit. Depending on the required interface, you may need to use an adaptor.

For example, if you are using an RS-449 interface, you will need a 25-pin to 37-pin adaptor to connect the Vanguard Multiport card's DB-25 output to the DB-37 connector specified by RS-449. This adaptor would be wired with respect to the pinout shown in Figure 14.

RS-232 Functional Pinout

The Vanguard Multiport controllers support the RS-232 compatible functions shown in Figure 6. These signals allow reliable asynchronous and synchronous communications.

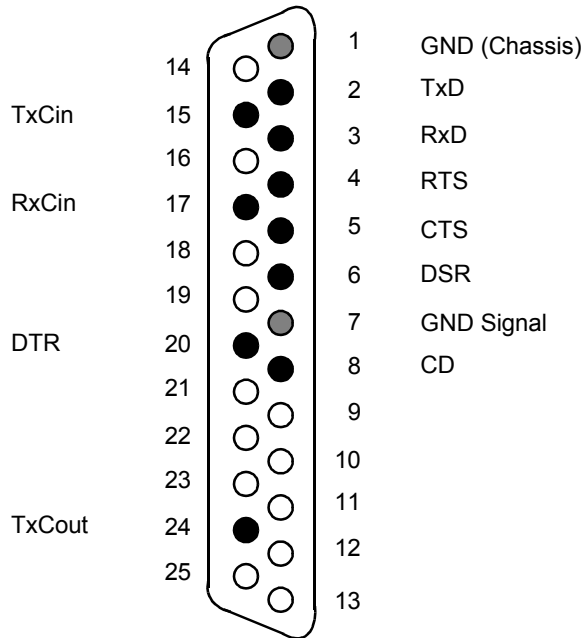


FIGURE 13. RS-232 Interface Signals Transmitted through the DB-25 Connector Pins

RS-422 and RS-485 Support (optional)

Since RS-422 and RS-485 are electrical specifications only, they can be supported over many connectors. The Vanguard Multiport controllers support them over its DB-25 output connectors using the functional pinout shown in Figure 14.

Both RS-422 and RS-485 specify balanced electrical operation. The main difference between the two specifications is that RS-485 allows multipoint connections where RS-422 is point-to-point only. Note that EIA-530 refers to RS-422 for its electrical specification.

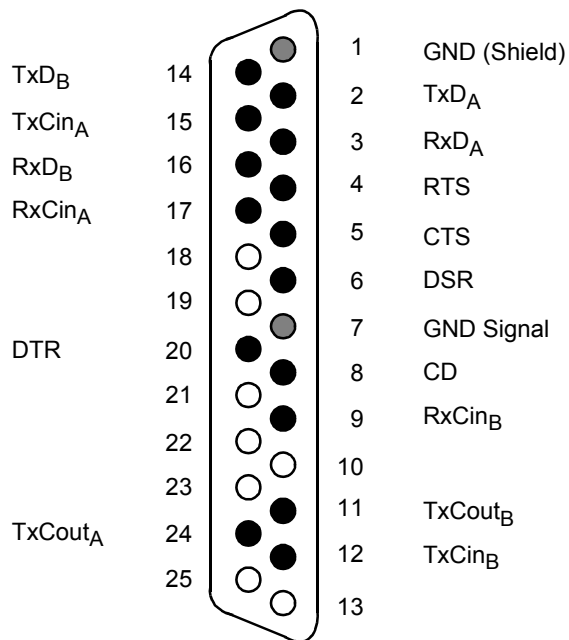


FIGURE 14. Signals Transmitted through the DB-25 Connector Pins for RS-422 and 485

Appendix B

*Product Information
Worksheet*

*Completing the Product Information
Worksheet*

Complete the following information about your Aurora WANmultiServer and workstation.

WANmultiServer serial number: _____

Rear I/O Card model no.: _____

Rear I/O Card serial no.: _____

Workstation/PC model: _____

Operating System version: _____

Peripheral/Port assignments:

Slot	Port	Peripheral
	0	
—	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	

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