RocketPort Plus UNIVERSAL PCI 422
MULTIPORT SERIAL CARDS

User Guide

COMTROL®
Network Enabling Devices

Document Number: 2000370 Rev. B

Table of Contents

Overview

Product Overview

The RocketPort uPCI Plus 422 series multiport serial card fits into the PCI slot of a personal computer, and uses a 43 MHz processor that is specifically designed to process asynchronous serial communications.

The RocketPort uPCI Plus 422 supports RS-422 exclusively, in either DTE or DCE mode. It supports 3.3 and 5.0 volt PCI bus architecture and is compatible with 32- and 64-bit PCI slots. The RocketPort uPCI Plus 422 card supports communications speeds up to 921,600 baud.

The RocketPort uPCI Plus 422 series uses Comtrol Application Specific Integrated Circuit (ASIC) technology to replace most hardware functionality to minimize components, including:

- The processor
- A serial controller
- Bus interface logic and other miscellaneous logic

You can install up to four RocketPort uPCI Plus 422 cards in one computer, providing a maximum of 32 additional serial ports. The PC must comply with the PCI 2.2 specification or greater.

Supported Models

The RocketPort uPCI Plus 422 family consists of the following models:
- Quadcable (fanout cable) with four DB9 male connectors
- Octacable (fanout cable) with eight DB9 male connectors

Before Installing the RocketPort uPCI Plus 422

If you are planning on installing the RocketPort uPCI Plus 422 in a Windows system make sure that you have placed the device driver assembly to a location that is available to the host system before installing the card in the host.

You can use the *Software and Documentation* CD to locate the latest device drivers and documentation. Optionally, you can use the links in the following subsection.

You may want to record the model and serial number of the RocketPort uPCI Plus 422 before installing the card in the event you need to call technical support.

Locating the Latest Drivers and Documentation

This table contains links the software and installation documentation.

Software or Document	Location
Device drivers	ftp://ftp.comtrol.com/html/RPuPCIplus422_drivers.htm
Diagnostic and Utilities	ftp://ftp.comtrol.com/html/RPuPCIplus422_diag.htm
User Guides	ftp://ftp.comtrol.com/html/RPuPCIplus422_docs.htm

Card and Interface Installation

Use the following procedure to install a RocketPort uPCI Plus 422 card.

1. If this is a Windows installation, copy the latest driver to your system before installing the RocketPort uPCI Plus 422. See Locating the Latest Drivers and Documentation on Page 6 to locate the latest driver and installation documentation.

2. Turn off the host computer.

   Note: *You may want to write down the model number and serial number of the card before installation.*

3. If necessary, set the DIP switches for the appropriate communications mode. The default DIP switch setting is DTE.

DIP Switch

- **DCE mode**, if necessary, set the DIP switch to **ON** on the corresponding ports.
- **DTE mode**, if necessary, set the DIP switch to **OFF** on the corresponding ports.

Factory Default Setting = DTE

OFF
ON

1 2 3 4 5 6 7 8

DCE = On (Down)
DTE = Off (Up)
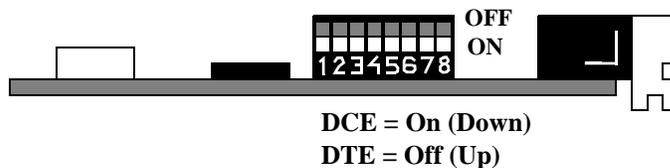
4. Remove the system cover from your computer.

5. Select a PCI expansion slot.

6. Remove the slot cover or release the clamp.

7. Insert the card into the slot and seat it securely.

8. Reinstall the expansion slot retaining screw or clamp.

   Note: *You may want to replace the system cover after the driver is installed and running in the event that you need to change the DTE/DCE switch setting.*

   Do not connect an interface to the card when the host system is powered on, this can cause card failure.

⚠
Caution

9. Attach the DB78 end of the quadcable or octacable to the card.

Octacable DB9

⚠️ **Caution**

Make sure that the connectors are properly aligned and forcefully push the connector of the Octacable with a rocking motion into the card connector. Make sure that the connector is seated tightly before tightening the retaining screws on the connector.

10. Tighten the retaining screws on the connector.

11. Power on the host system.

12. Click **Cancel** if a *Found New Hardware* message appears on a Windows operating system.

   Execute the device driver file to start the driver installation.

   For other operating system device drivers, see Locating the Latest Drivers and Documentation on Page 6.

13. After installing the driver, you should verify that the ports are functioning properly and then connect your serial devices.

   You can use the *Troubleshooting* section on Page 13 for port testing procedures for your operating system.

   Refer to *Connecting RS-422 Serial Devices* on Page 9 for information about connecting serial devices.

Connecting RS-422 Serial Devices

This section provides information about the RocketPort uPCI Plus 422 connectors, in the event that you need to build cables or loopback plugs.

A *loopback* plug is a serial port plug with pins wired together that you can use with application (for example, the diagnostic, Test Terminal, or minicom) to test serial ports. See *Before Calling Technical Support* on Page 13 for information about using the test application shipped with the RocketPort uPCI Plus 422.

DTE Versus DCE

The DIP switch for the RocketPort uPCI Plus 422 ports are set to DTE at the factory.

Most serial devices, except modems, are Data Terminal Equipment (DTE) devices. Modems are Data Communication Equipment (DCE) devices.

How you build a cable depends on which device your are connecting to (DTE or DCE). For example, you need a null-modem cable to connect the COM ports (COM1 or COM2) on the computer or the RocketPort uPCI Plus 422 ports to printers, terminals, bar code readers or DNC equipment. If you are connecting a DTE device to a DCE device you need a straight-through modem cable.

- Straight-through cable (DTE to DCE) - connects TxD to TxD and RxD to RxD.
- Null-modem cable (DTE to DTE) - connects TxD to RxD and RxD to TxD.

Note: *DTE and DCE modes are controlled with the DIP switch on the RocketPort uPCI Plus 422 (see Card and Interface Installation on Page 7 for information).*

## DB9 Serial Cables and Loopback Plugs

The following figures and table illustrate the signals present on DB9 connectors if you need to build your own null-modem or straight-through DB9 serial cables.

Quadcables and octacables use DB9 male connectors.

- *DB9 Signals (RS-422)* on Page 10
- *Straight-Through Cables (DCE)* on Page 10
- *Null-Modem Cables (DTE)* on Page 10
- *DB9 Loopback Plugs* on Page 11

DB9 Signals (RS-422)

This subsection provides DB9 signal information. Refer to the manufacturer's installation documentation if you need help with the connector pinouts or cabling for the serial device.
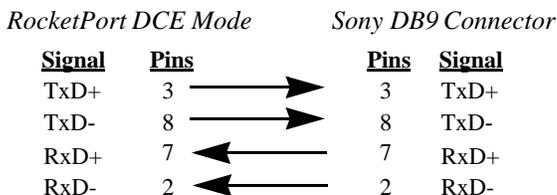
Male
Pin 1   Pin 5

Pin 6   Pin 9
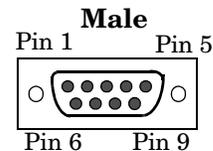
RS-422 DB9 Male Connector		
Pins	**DCE Mode**	**DTE Mode**
1	Not used	Not used
2	RxD-	TxD-
3	TxD+	RxD+
4-6	Not used	Not used
7	RxD+	TxD+
8	TxD-	RxD-
9	Chassis Ground	Chassis Ground

Note: *DTE and DCE mode are controlled with the DIP switch on the RocketPort uPCI Plus 422. See Card and Interface Installation on Page 7 for information. The factory default is set to DTE.*
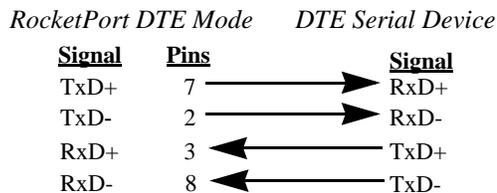
Straight-Through Cables (DCE)

Use the following figure if you need to build an RS-422 straight-through cable for DCE devices.

RocketPort DCE Mode   *Sony DB9 Connector*

Signal	**Pins**		**Pins**	**Signal**
TxD+	3	→	3	TxD+
TxD-	8	→	8	TxD-
RxD+	7	←	7	RxD+
RxD-	2	←	2	RxD-

Null-Modem Cables (DTE)

Use the following figure if you need to build an RS-422 null-modem cable for DTE devices.

RocketPort DTE Mode   *DTE Serial Device*

Signal	**Pins**		**Signal**
TxD+	7	→	RxD+
TxD-	2	→	RxD-
RxD+	3	←	TxD+
RxD-	8	←	TxD-

Note: *RS-422 signals are not standardized and each serial manufacturer uses different pinouts. Refer to the serial device documentation to determine the pinouts for the signals above.*
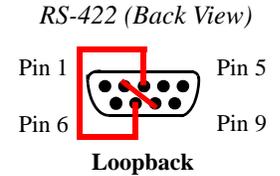
DB9 Loopback Plugs

RocketPort uPCI Plus 422 are shipped with a a single loopback plug. You can use loopback plugs with application software (for example, Test Terminal) to test serial ports.

Wire the following pins together to build additional plugs or replace a missing loopback plug.
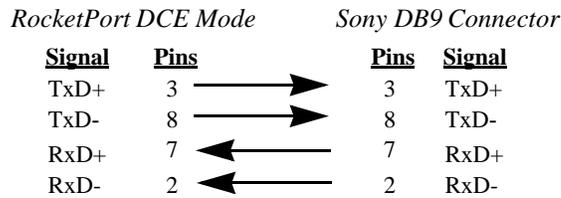
- Pins 2 to 8
- Pins 3 to 7

Note: *DTE and DCE mode are controlled with the DIP switch on the RocketPort uPCI Plus 422. See Card and Interface Installation on Page 7 for information. The factory default is set to DTE.*
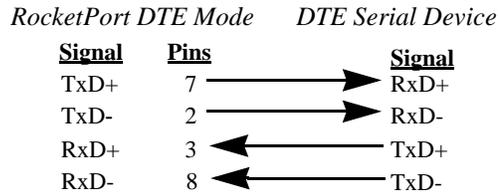
RS-422 (Back View)

Pin 1   Pin 5

Pin 6   Pin 9

Loopback

Straight-Through Cables (DCE)

Use the following figure if you need to build an RS-422 straight-through cable for DCE devices.

RocketPort DCE Mode   *Sony DB9 Connector*

Signal	Pins		Pins	Signal
TxD+	3	→	3	TxD+
TxD-	8	→	8	TxD-
RxD+	7	←	7	RxD+
RxD-	2	←	2	RxD-

Null-Modem Cables (DTE)

Use the following figure if you need to build an RS-422 null-modem cable for DTE devices.

RocketPort DTE Mode   *DTE Serial Device*

Signal	Pins		Signal
TxD+	7	→	RxD+
TxD-	2	→	RxD-
RxD+	3	←	TxD+
RxD-	8	←	TxD-

Note: *RS-422 signals are not standardized and each serial manufacturer uses different pinouts. Refer to the serial device documentation to determine the pinouts for the signals above.*

Troubleshooting

If you are experiencing problems with the RocketPort uPCI Plus 422, review the troubleshooting procedures for your system before calling Technical Support.

Before Calling Technical Support

Review the following information before calling Technical Support because they will request that you perform many of the procedures or verifications before they will be able to help you diagnose a problem.

- Verify the cabling using *Connecting RS-422 Serial Devices* on Page 9.

  Note: Most customer problems reported to Comtrol Technical Support are eventually traced to cabling or network problems.

- If you have not done so, run the diagnostics (*RocketPort uPCI Plus 422 Diagnostics* on Page 13).

- Verify that you have installed the latest RocketPort uPCI Plus 422 device driver, see Locating the Latest Drivers and Documentation on Page 6.

  If necessary, remove or update the existing driver using the procedures in the *RocketPort uPCI Plus 422 Device Driver Installation Guide for Windows* or **README** file packaged with the FreeBSD, Linux, QNX, or SCO OpenServer driver.

If none of the above work, you can refer to one of these subsections:

- *Troubleshooting Windows Systems* on Page 15
- *Troubleshooting Linux Systems* on Page 23

RocketPort uPCI Plus 422 Diagnostics

This subsection describes how to create and run the bootable diagnostic to verify that the RocketPort uPCI Plus 422 hardware is functioning properly. The RocketPort uPCI Plus 422 is shipped with a bootable diagnostic on the ***Software and Documentation*** CD that executes hardware diagnostics.

You can use the diagnostic to:

- Confirm that the hardware is functioning
- Determine resolutions to conflicts during installation
- Perform a stress test on all RocketPort uPCI Plus 422 ports in the system

The diagnostic requires a loopback plug to test a port or ports. A single loopback plug is shipped with the RocketPort uPCI Plus 422. You can build additional loopback plugs or move the loopback plug to the port you want to test. See *Connecting RS-422 Serial Devices* on Page 9 if you want to build loopback plugs.

Bootable CD

Use the following procedure to create a bootable Diagnostic CD.

1. Copy the **.iso** file to a temporary location.

    The diagnostic .iso file can be copied from the *Software and Documentation* CD or you can download the latest version (Locating the Latest Drivers and Documentation on Page 6).

2. Burn the image to a CD-ROM.

    Note: An .iso file cannot be copied onto a CD but must be burned using an application that burns the image to the CD. If you do not have an application available, you can use a freeware application that is on the Comtrol Software and Documentation CD or download it at: ftp://ftp.comtrol.com/iso/IsoBurner/.

3. To run the diagnostic, you will need at least one loopback plug. A loopback plug was shipped with the RocketPort uPCI Plus 422. To build a loopback plug, see *DB9 Loopback Plugs* on Page 11.

4. To start the diagnostic, reboot your system with the *Diagnostics* CD in the drive and follow the instructions in the diagnostic.

Running the Bootable Diagnostic CD

Use the following procedure to run the diagnostics.

*Note: If the diagnostic goes into sleep mode while unattended, press the **Num Lock** key to activate the screen. Use **Ctrl/Alt Delete** to kill the diagnostic process at any time.*

1. Insert the bootable CD that contains the diagnostic and restart your machine.

    Note: If the Diagnostic CD does not boot the PC, you may need to change your BIOS settings so that the PC can boot from a CD drive.

    The diagnostic starts automatically and takes a few moments before the first screen appears.

    Note: If the diagnostics did not detect the RocketPort uPCI Plus 422, the adapter has a hardware failure, contact Technical support (Page 24).

2. Press **Any Key** at the disclaimer screen to begin the diagnostic.

3. Press **Any Key** at the *Please Note* screen about RocketPort ISA.

4. Press **Enter** to *Are there ISA boards installed?* in the *VERIFY TEST* screen.

5. Press **Enter** to the *Is this board configured for RS-422?* query.

    Note: The caution at the bottom of the screen that the RS-232 test will fail when run on an RS-422 port.

6. Press **Enter** to the *Is this board configured for RJ45 cables?* qquery.

7. Select from the following options and use the appropriate steps:
    *   *Testing a Port or Ports*
    *   *Stress Testing the RocketPort uPCI Plus 422*

Testing a Port or Ports

8. Enter **1** to **4** and press **Enter** to test a port or ports on a specific RocketPort uPCI Plus 422 or on multiple adapters.

9. Press **Enter** to test ALL ports on the RocketPort uPCI Plus 422 or enter the port number of a port that you want to test.

10. Follow the instructions on the screen. If you are testing all of the ports and have only one loopback plug, you must move it from port to port during the test.

    Note: Port 0 in the diagnostic is Port 1 on the octacable or interfaces.

    The diagnostic will provide hardware status on the *TESTING SERIAL I/O, MODEM CONTROL AND IRQ* screen. The Modem Control tests correctly display **N/A** (because there are no modem control signals in RS-422 mode).

11. Choose from the following options:

    - Press **Q** to quit the diagnostic without reviewing the *Test Summary* screen.

    - Press **R** to return to the board test screen.

    - Press any key or **Enter** to review the *Test Summary* screen, which provides the ability to restart (**Y**) or quit (**N**) the diagnostic.

Stress Testing the RocketPort uPCI Plus 422

Select **S** and press **Enter** to access the *STRESS TEST* screen. Make sure that you have a loopback plug installed on each port on each adapter.

The stress test uses a default configuration to simultaneously stream data to all ports of the RocketPort uPCI Plus 422 cards in a system until you stop the test.

The following options are available:

- To stop the test and review the results of the stress test, enter **S**.

- To return to the board test screen, press **R**.

Exiting the Diagnostic

To end the diagnostic, you may need to select **b** to return to a screen that contains a **q** to quit. Type **reboot**, select **Enter**, and remove the CD from the drive when prompted.

If the Diagnostic Fails

If the diagnostic fails, try the following before contacting Technical Support.

1. Turn off the power and reseat the RocketPort uPCI Plus 422 card into the slot.

2. Try running the diagnostics again. If they fail again, you may have a bad port, contact *Technical Support* on Page 24.

Troubleshooting Windows Systems

If you are using a RocketPort uPCI Plus 422 driver on a Windows system and the diagnostic verified that the card is functional, you can check the following:

1. Verify that the RocketPort uPCI Plus 422 has installed by checking the *Device Manager* to verify that the RocketPort uPCI Plus 422 card displays.

2. Verify that you are addressing the port correctly.

   In many applications, device names above COM9 require the prefix \\.\ in order to be recognized. For example, to reference COM20, use \\.\COM20 as the file or port name.RocketPort uPCI Plus 422.

3. After driver installation, *if a port does not open*; go to *Ports COM & LPT*, right-click on the yellow exclamation mark on the port, and click **Update Driver**. Use the same procedure used when installing the ports that are detected with plug and play systems.

4. Enable the *Verbose Event Log* feature on the *Options* tab of the RocketPort uPCI Plus 422 driver and then reboot the server.

5. Install and use one of the tools in the **Comtrol Utility** package. Use the following subsection, *Comtrol Utility*, below for installation and adapter testing procedures.

Comtrol Utility

The **Comtrol Utility** is available on the ***Software and Documentation*** CD or you can [download](#) (Page 6) the latest version. The file is a self-extracting zip file that automatically starts the installation procedure. It is not necessary to reboot the PC after installation.

The **Comtrol Utility** package includes the following applications that you can access from the *Comtrol Program* group:

- **Port Monitor** (PortMon2) checks for errors, modem control, and status signals. In addition, it provides you with raw byte input, output counts, and confirm that the device driver is functioning. It can determine if the ports are in use by another application.

- **Test Terminal** (WCOM2) can be used to troubleshoot communications on a port-by-port basis (*Using Test Terminal to Test a Port* on Page 21). Test Terminal requires a loopback plug. You can build a loopback plug if you are missing the loopback plug shipped with the adapter (*Connecting RS-422 Serial Devices* on Page 9).

Use the following procedure to install the Comtrol Utility package.

1. Execute the **Comtrol_Utility_Pack age_x.xx.msi** file, where **x_xx** is the Comtrol Utility version number.

2. Click **Next**.

3. Click **Next**.
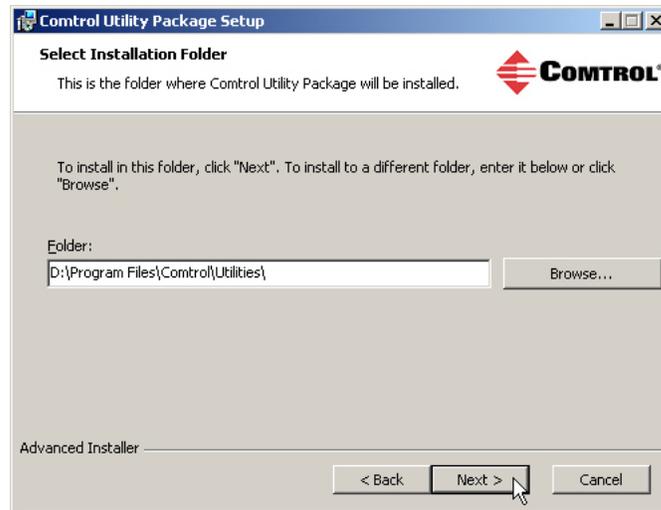
4. Click **Install**.
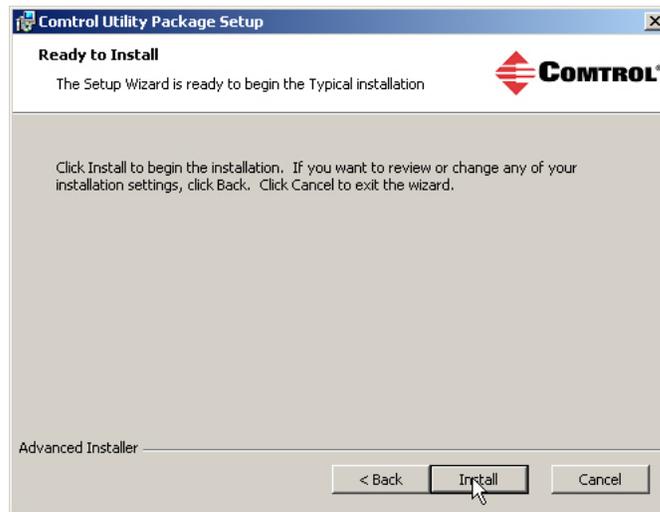
5. Click **Finish**.

6. Go to *Using PortMon to Test the Driver Installation* on Page 18.

Using PortMon to Test the Driver Installation

You can use **PortMon** to check whether the RocketPort uPCI Plus 422 can communicate through the device driver for Windows. If necessary, use *Comtrol Utility* on Page 16 to install **PortMon**.

1. From the **Start** menu, select **Programs** > **Comtrol** > **Utilities** > **Port Monitor** (**PortMon2**).
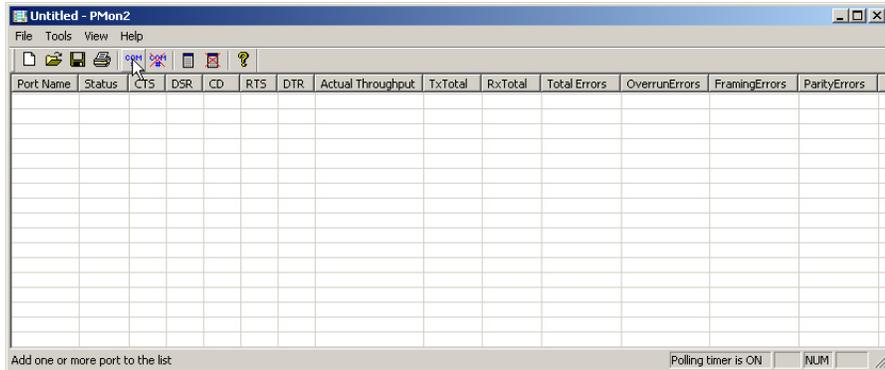
2. Click **Add Ports** using the icon or **Tools > Add Ports**, click **Driver**, **ROCKETPORT**, and click **Ok**.
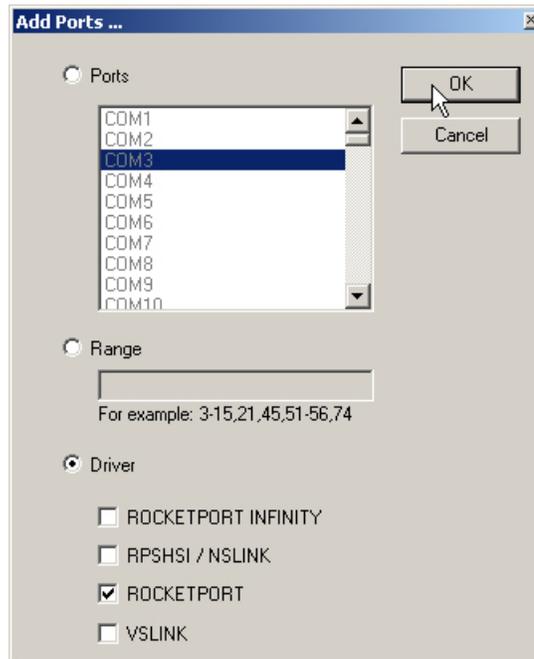
3. If the RocketPort uPCI Plus 422 is communicating with the device driver for Windows, Port Monitor should display **CLOSED** status. If a port is open for an application, it displays as **OPEN**, and displays **Actual Throughput**, **TxTotal** and **RxTotal** statistics.

Normally, there should be no data errors recorded or they should be very small. To find out what the actual errors are, scroll to the right. You will see three columns: **Overrun Errors**, **Framing Errors**, and **Parity Errors**.

If the errors are:

*   **Overrun Errors** represent receive buffer overflow errors. If this is the case, you will have to configure either software or hardware handshaking to control the flow of data. The most common errors are Overrun errors.

*   **Framing Errors** indicate that there is an synchronization error between the beginning of a data frame and the end of the data frame. A frame usually consists of a start bit, 8 data bits, and a stop bit or two. The framing error occurs if the stop bit is not detected or it occurs in the wrong time frame. Most causes for framing errors are electrical noise on the data lines, or differences in the data clocks of the RocketPort uPCI Plus 422 and the connected device.

*   **Parity Errors** occur when parity is used and the parity bit is not what is expected. This can also be caused by noise on the data lines.

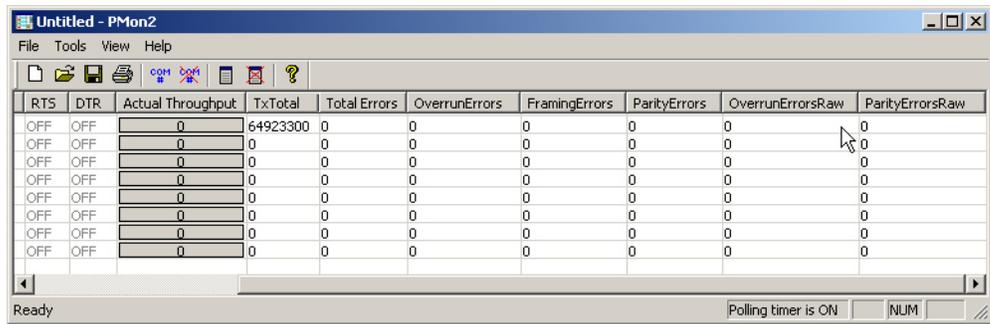4. You can view additional statistics to Port Monitor by adding columns. Click **Tools** and **Add Columns**.

5. Highlight or shift-click to add multiple statistics and click **Ok**.
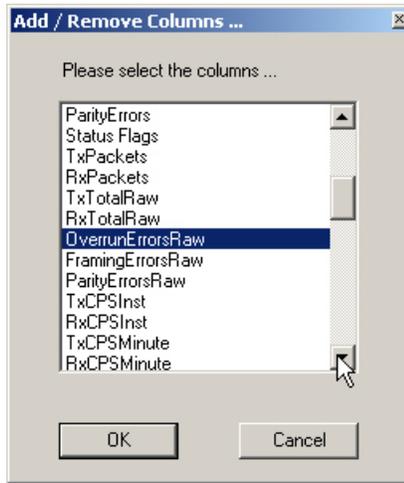
Note: *See the Port Monitor help system if you need an explanation of a column.*

6. Scroll to the right to view the new columns.

7. If you want to capture this session, you can save a current session as a report. To do this, select one of the following save options:

- **File > Save As**

- **File > Save** - if the report already exists in an older format

- **Save Active Session** 🖫 button

Reports can be opened, viewed and re-used when needed. To open and view a report:

a. **Select File > Open** or the **Open Existing Session** 📂 button. The *Open Session* dialog appears.

b. Locate the session (table), you want to open and click the **Open** button.

Optionally, if you want to continue monitoring for an existing session, you need to activate the *Polling Interval*.

- **Select Tools > Settings** to access the PMon2 *Settings* dialog

- Change the **Polling Interval** field to a value other than zero (0)

8. Leave Port Monitor open so that you can review events when using *Test Terminal* to test a port or ports.

Using Test Terminal to Test a Port

Test Terminal (WCom2) allows you to open a port, send characters and commands to the port, and toggle the control signals. This application can be used to troubleshoot communications on a port-by-port basis.

The **Send and Receive Test Data** sends data out the transmit line to the loopback plug, which has the transmit and receive pins connected thus sending the data back through the Rx line to **Test Terminal**, which then displays the received data in the terminal window for that port. This test is only testing the Tx and Rx signal lines and nothing else. A failure in this test will essentially prevent the port from working in any manner.

The **Loopback Test** tests all of the modem control signals such as RTS, DTR, CTS, DSR, DCD, and RI along with the Tx and Rx signals.

Note: *This test will fail and is expected to fail since RS-422 does not have the modem control signals that are present in RS-232 for which this test is designed.*

The following procedure shows how to use **Test Terminal** to send and receive test data to the serial ports and run a loopback test. If necessary, install the Comtrol Utility package using *Comtrol Utility* on Page 16.

1. Stop all applications that may be accessing the ports such as RRAS or any faxing or production software. See the appropriate help systems or manuals for instructions on stopping these services or applications.

   If another application is controlling the port, then **Test Terminal** will be unable to open the port and an error message will be shown.

2. From the **Start** menu, select **Programs** > **Comtrol** > **Utilities** > **Test Terminal (WCom2)**.
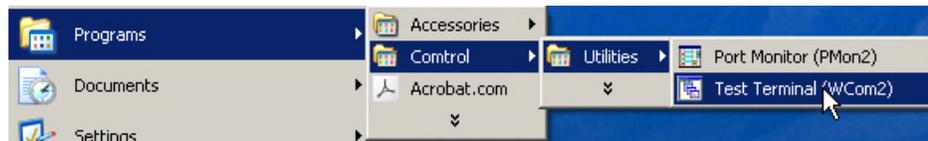
3. Select **File** > **Open Port**, the appropriate port (or ports) from the *Open Ports* drop list and **Ok**.

   Note: *If you left Port Monitor open from the previous subsection, you should show that the port is open.*

4. Install the loopback plug (*DB9 Loopback Plugs* on Page 11) onto the port (or ports) that you want to test.

5. Select **Port** > **Send and Receive Test Data**.
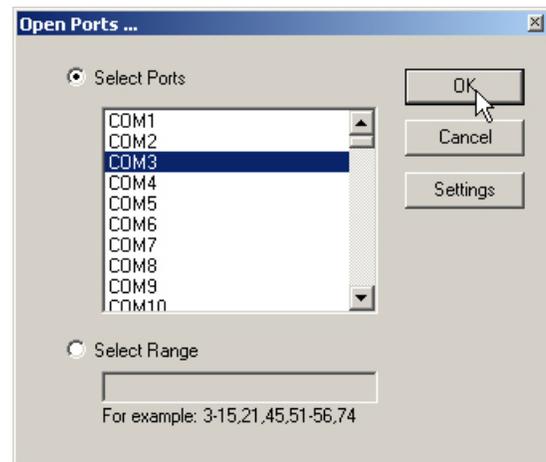
You should see the alphabet scrolling across the port. If so, then the port installed properly and is operational.

Note: *If you left Port Monitor running, it should show data sent and received and show the average data throughput on the port.*

6. Select **Port > Send and Receive Test Data** to stop the scrolling data.

7. Close **Test Terminal**.

If this test successfully completed, then the port is operational as expected.

Note: *Do NOT forget to restart the communications application.*
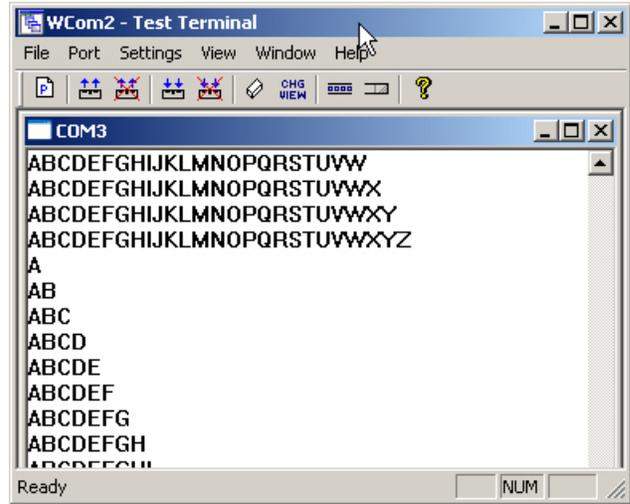
Troubleshooting Linux Systems

You can use the following subsections to test the serial ports.

lcom(1)

Comtrol has available **lcom**(1), which is a multiport serial I/O test program. You can use **lcom** in test mode to send test data to any serial port.

lcom is available on the *Software and Documentation CD* or you can <u>download</u> the latest version.

Note: *For assistance using lcom, use the manual page, lcom(1) that accompanies the program.*

File Transfer

You can transfer a file using the following information. The default settings are 9600, 8, n, 1, and no parity. To send a file you can redirect output to a device; for example:

```
cat /etc/inittab > /dev/ttyR0
```

Sends the contents of the **/etc/inittab** file to the **ttyR0** device at 9600 baud, 8, n, 1, and no parity.

Changing Serial Port Settings (stty)

Use the following information if you need assistance changing or viewing the baud rate settings.

To change the baud rate, use the following example, which changes the baud rate to 19200:

```
stty 19200 </dev/ttyR0
```

To view the current serial port settings for **ttyR0**, enter:

```
stty -a </dev/ttyR0
```

Note: *Settings changes via stty are only valid during current log in session. For permanent setting changes, use the /etc/inittab file.*

Setting Up Terminals and Modems (mgetty, getty)

Add the appropriate line or lines to the **/etc/inittab** file then restart.

Terminal Example:

```
T0:23:respawn:/sbin/agetty -L ttyR0 57600 vt100
```

Modem Example:

```
T1:23:respawn:+/sbin/mgetty -m '"" AT&F OK' -D -x9 -s 115200 ttyR0
```

Note: *If necessary, see the manual pages for more information on mgetty.*

Testing with minicom

You can also use **minicom**, which shipped with most Linux distributions, to test the serial ports. A Comtrol document is available for using <u>minicom</u>.

Technical Support

Comtrol has a staff of support technicians available to help you. You should review *Before Calling Technical Support* on Page 13 before calling Technical Support. If you call for Technical Support, please have the following information available:

- Model number
- Serial number
- Interface type
- Operating system type, release, and service package, and if Linux, the kernel version
- Device driver version
- Computer make, model, speed, and single or dual processor
- List other devices in the computer and their addresses

Contact Method	Corporate Headquarters
Support	http://www.comtrol.com/pub/en/Support
Web site	http://www.comtrol.com
Phone	763.494.4100
Downloads	ftp://ftp.comtrol.com/html/default.htm

Note: See *Locating the Latest Drivers and Documentation* on Page 6 for additional links.

Index