Solflower Serial Port Adapter User Manual

for PCI Express bus

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OXmPCI954™ and OX16C954™ are register trademark of Oxford Semiconductor

PEX8111 is trademark of PLX Technology Inc.

This equipment generates, uses and can radiates radio frequency energy and if not installed and used in accordance with the Instruction Manual, may cause interference in radio communications.

Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

This document presents information for users of Solflower Computer, Inc.'s PCI-E16SRL-2CN adapters.

Although the information contained within this document is considered accurate and characteristic of the subject product, Solflower Computer, Inc. reserves the right to make changes to this document and any product described herein to improve reliability, function or design. Solflower Computer, Inc. does not assume any liability arising out of the application or use of any product or circuit described herein.

CHAPTER 1 GENERAL INFORMATION

1.1 INTRODUCTION

The Solflower Serial Port Adapter is a 16 serial port PCI Express add-in board. Its 16 serial ports can operate simultaneously with each port's error-free data rate up to 15Mbps.

This document describes the hardware specification and installation of the board.

1.2 FEATURES AND BENEFITS

- 16 serial ports available from one PCI Express slot
- Data transfer rate up to 15Mbps asynchronous, full duplex, simultaneously on all ports
- Full modem support on all ports
- 128 bytes data buffer on each channel
- On board hardware and software flow control on all ports
- Driver support for SPARC Solaris, X86 Solaris, Window 98-XP, and Linux operating systems

1.3 PRODUCT DESCRIPTION:

The Solflower PCI Express Serial Adapter board is a low cost high-speed adapter design based on OXmPCI954™ and OX16C954™ Quad UART with PEX8111 PCI Express interface. It offers high data rates, deep transmitter, receiver FIFO, delicated data buffers, and flow control processing.

The PCI Express interface is PLX's PEX8111 PCI Express to PCI Bridge. It offers x1 PCI Express lane which runs at 2.5 Gbps bi-direction. Its PCI 32-bit 33/66 MHz Bus interface is PCI Specification Revision 3.0 compliant.

The OXmPCI954 is a dual-function device. Function 0 is the PCI interface controller and four built-in serial port, and function 1 provides an interface to Quad UART OX16C954 that reside behind OXmPCI954. On the Solflower Serial Adapter board there are three OX16C954s behind the controller OXmPCI954. Each OX16C954 provides four serial channels. This makes a total of 16 serial ports along with the built-in four serial ports of the OXmPCI954. Each serial port channel in OX16PCI954 and OX16C954 can offer data rates up to 15Mbps and 128-deep transmitter and receiver

FIFOs. Deep FIFO reduces CPU overhead and ensures error-free operation especially in high speed transmitting and receiving .

1.4 BLOCK DIAGRAMS

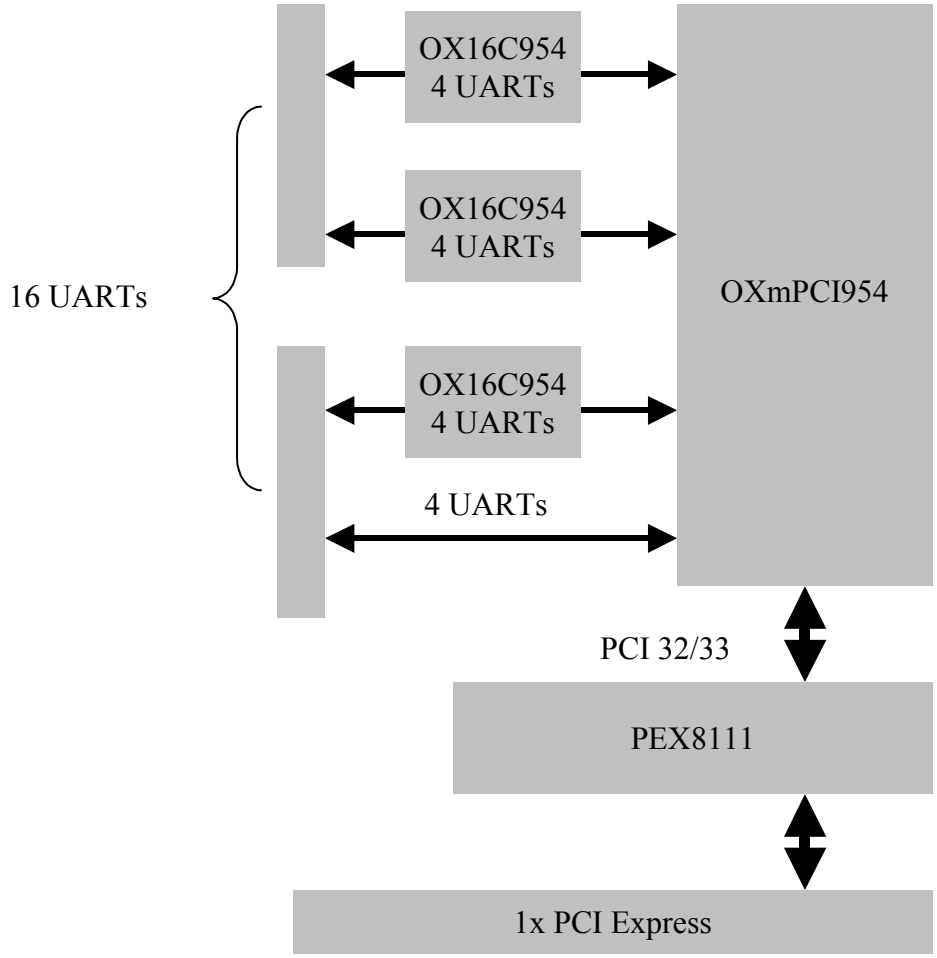
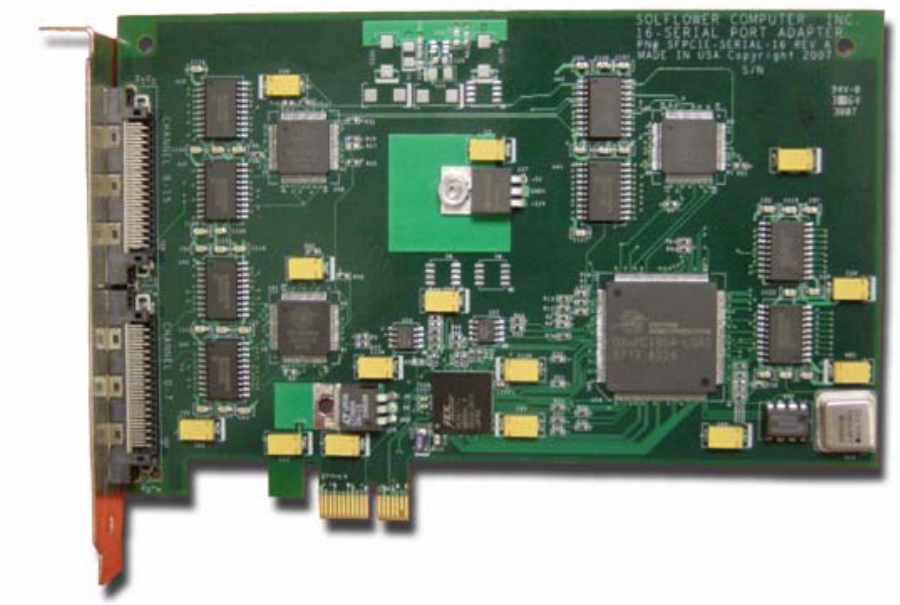


FIGURE 1 PCI-E16SRL-2CN



1.5 BOARD SPECIFICATIONS

1.5.1 Dimension

4.3 inches x 6.6 inches (height x length)

1.5.2 Power Consumption

Maximum power rating is approximately 7 watts.

1.5.3 Electrical Characteristic (power supply and signal voltage)

Input power:3.3V and 12V.

Maximum input current: 50 mA.

Logic input level: 0-3.3V.

Logic output level: 3.3V

Serial input level: -12 to +12 V.

Serial output level: -5 to +5 V.

Maximum data rate: 15Mbps each serial port.

1.5.4 Cable Connector Pinouts

There are two minidin 68-pin female connectors which house 16 serial UART channels at the front panel. There are eight serial UART channels for each minidin 68-pin connector. Each serial UART port utilizes one DB25 connector.

1.6 PARTS INCLUDED IN THE PACKAGE

1 Solflower Serial Port Adapter board PCI-E16SRL-2CN

2 1-to-8 serial cables.

1 User manual.

1.7 SAFETY RULES

To prevent damage to the board, do not handle the board without ESD precaution. Solflower Computer Inc. recommends user to ware an anti-static strap. Do not plug or unplug the board when your system is powered on. This board uses power supplies of 3.3V and 12V. This board is designed for in-door use only.

1.8 UNPACKING INSTRUCTIONS

Perform a visual inspection of the shipping carton for any handling damage. If any shipping carton is severely damaged, open the box imediately at the carrier agent's present. Carefully remove the contents and ensure that all the pieces are present. The printed circuit boards are wrapped in electrostatic-safe bags. We recommend that you save the shipping carton and the packing material for future use, in case the product must be reshipped or returned to Solflower.

Caution: Since electrostatic discharge may damage the printed circuit boards, do not remove the printed circuit boards from the static bags unless you are wearing grounding straps.

CHAPTER 2 HARDWARE INSTALLATION

Before you begin, please make sure you are electrically grounded, wearing an anti-static strap is strongly recommended, and your system should be power off.

- With your system powerred off, remove systme's cover and find a available PCI Express slot.
- Remove the blank slot metal cover, save the screw (if there is one).
- Gently insert the Solflower Serial Adapter board into a PCI Express slot. Avoid touching the on-board IC's.
- Make sure the board is firmly seated and the PCI Express connector makes fully contact with the PCI Express slot.
- Secure the board with the original screw retained from step 2.
- Place system's cover back.
- Connect the two male Minidin 68-pin connectors to the on board female connectors.
- Tighten the connector screws.
- At this point the board is installed, power on your system and procede to software installation.

CHAPTER 3 WINDOWS XP INSTALLATION

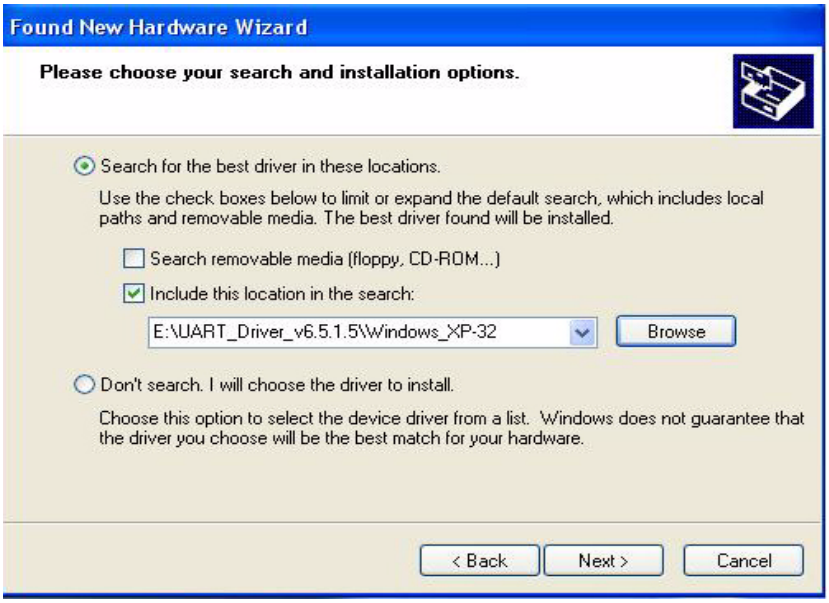
3.1 WINDOWS DRIVER INSTALLATION

Any previous release of the OXmPCI954 drivers on the system must be removed before installing the new drivers. Refer to the Removal of Card and Drivers section. All the files for Windows can be found on the CD in \OX\Windows\uart v4.08.

1. Install the card as described in chapter 2. Power up the system.Windows will detect the PCI card, start the Found New Hardware Wizard, and begin the driver installation. The driver installation proceeds in three parts: the first part installs the driver for the PCI UARTs, the second part installs the driver for the PCI bridge, and the third part installs the driver for the PCI communications ports.

2. After a new hardware is detected, the following window will appear. Make a selection as shown, and click Next to start the driver installation for the PCI UARTs.

3. The following window will appear. Make a selection as shown, and click Browse, select the CD-ROM drive which has the OX CD, and browse to the directory \UART_Driver_v6.5.1\Windows_XP-32. Click Next to start searching for a driver.



4. The following window will show up. Click Continue Anyway to proceed.

5. When the driver installation is done, the next window will appear. Click Finish.

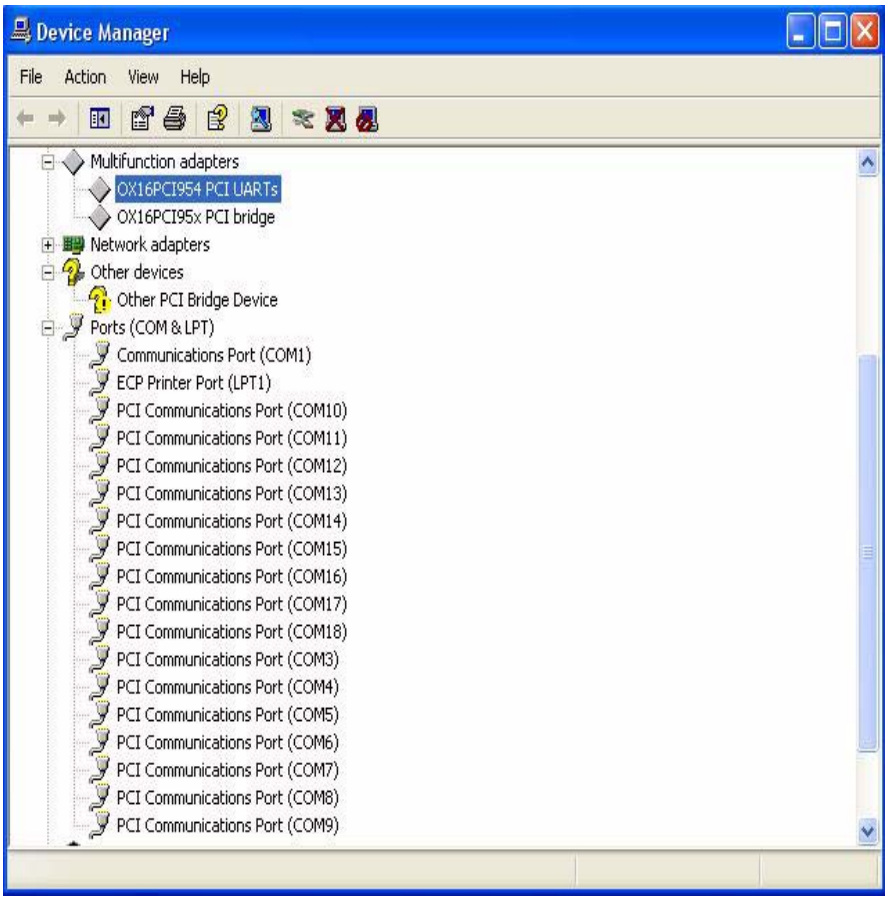
6. Repeat step 2 through 5 to install driver for OXmPCI954.

7. Repeat step 2 through 5 to install driver for PCI Communications Ports.

Windows will then search, find, and install driver for the 16 PCI communications ports automatically. Wait for the process to complete.

3.2 VERIFYING INSTALLATION

To verify the software installation, click Start, Control Panel, System. In the System Properties window, select the Hardware Tab, and click Device Manager. Click Multi-function adapters, the OX16PCI954 PCI UARTs and bridge should appear. Then click Ports (COM & LPT), the 16 PCI communications ports (COM4 through COM19) should also appear as shown in the following window.



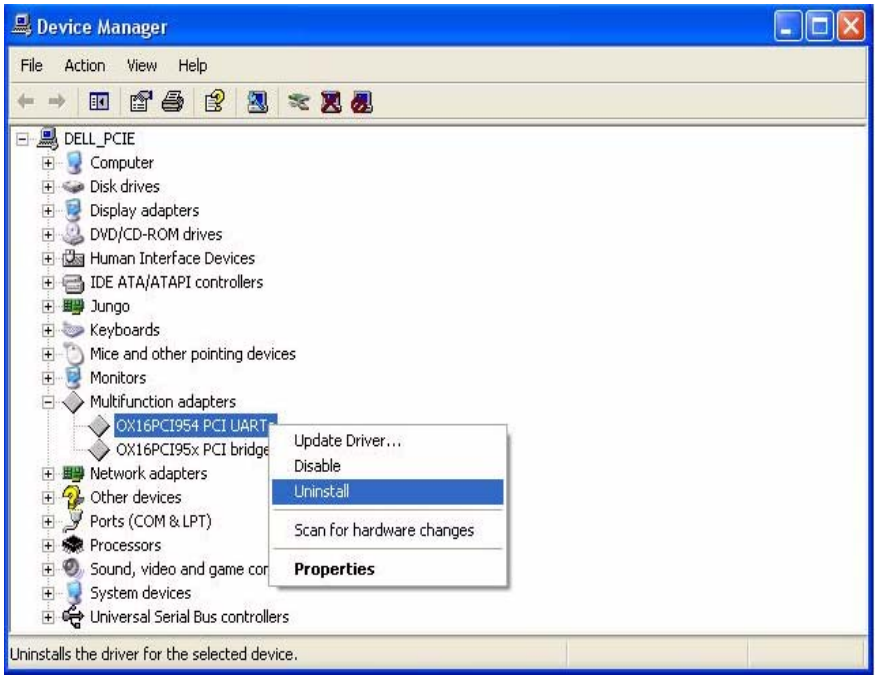
3.3 REMOVAL OF CARD AND DRIVERS

To remove the card from your system and remove its current driver:

1. Click Start, Control Panel, System.

2. In the System Properties window, select the Hardware Tab, then click Device Manager.

3. Click Multi-function adapters, select OXmPCI954 PCI UARTs, then right-click the mouse to bring up a popup menu as shown below.



4. Select the Uninstall option as shown.

5. In the Confirm Device Removal window, click the OK button.

6. Wait for the removal to finish then go back to the System Properties window, click Multi-function adapters, and select OXmPCI954 PCI bridge.

7. Repeat step 4 and 5 to remove the OXmPCI954 PCI bridge driver.

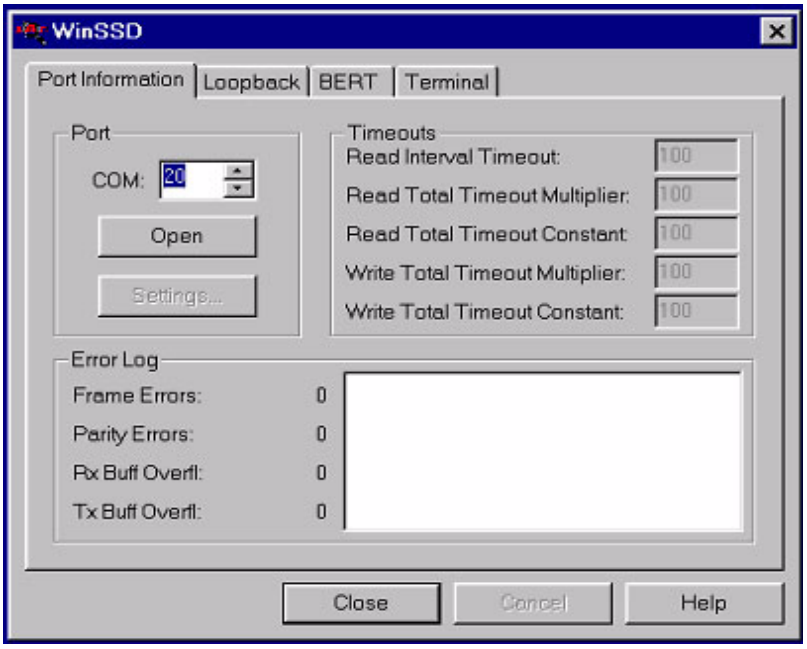
8. Shut down the computer, then remove the card by following the Hardware Installation Guide

CHAPTER 4 SERIAL PORT TESTS FOR WINDOWS

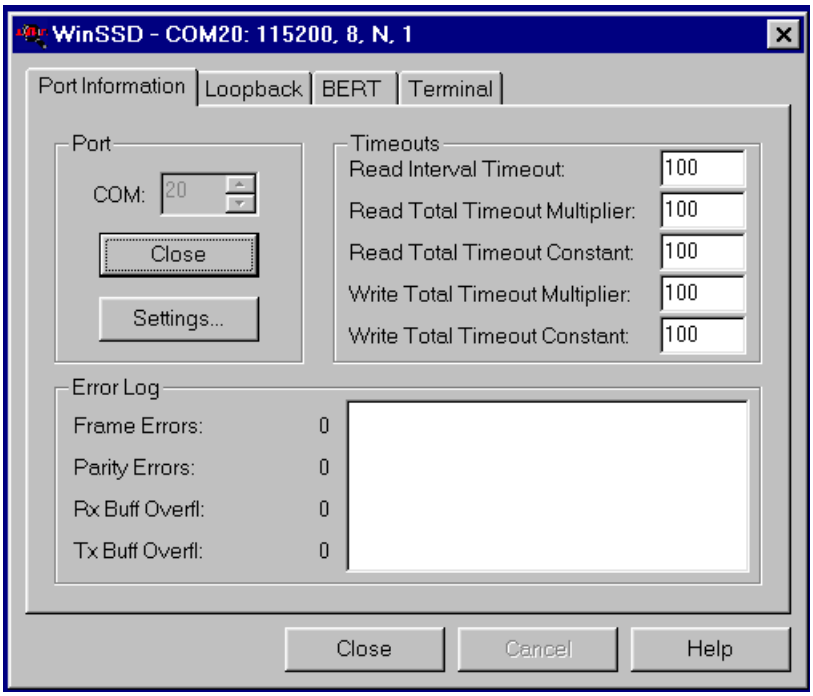
4.1 WINSSD SERIAL DIAGNOSTICS

WinSSD can be downloaded at: http://www.sealevel.com/seacom6112/seacom6112.asp. It can also be found on the CD in \OX\Windows\Tests.

1. Start WinSSD. Select a COM port to test, then click Open.

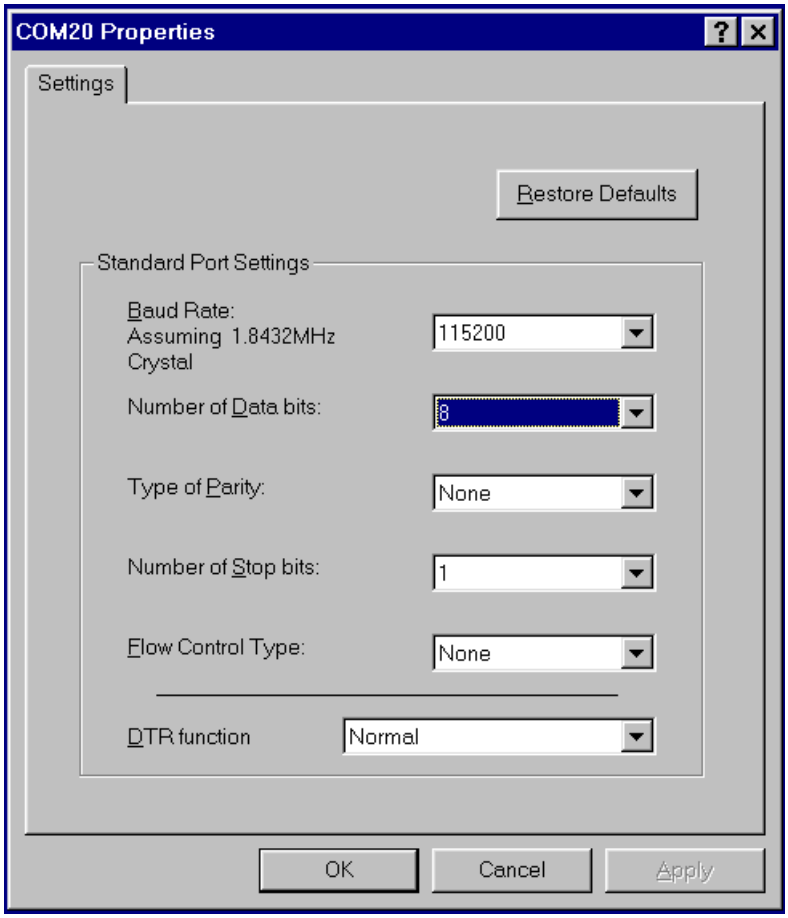


2. The following window will appear. Click Settings to view or change the port's properties.

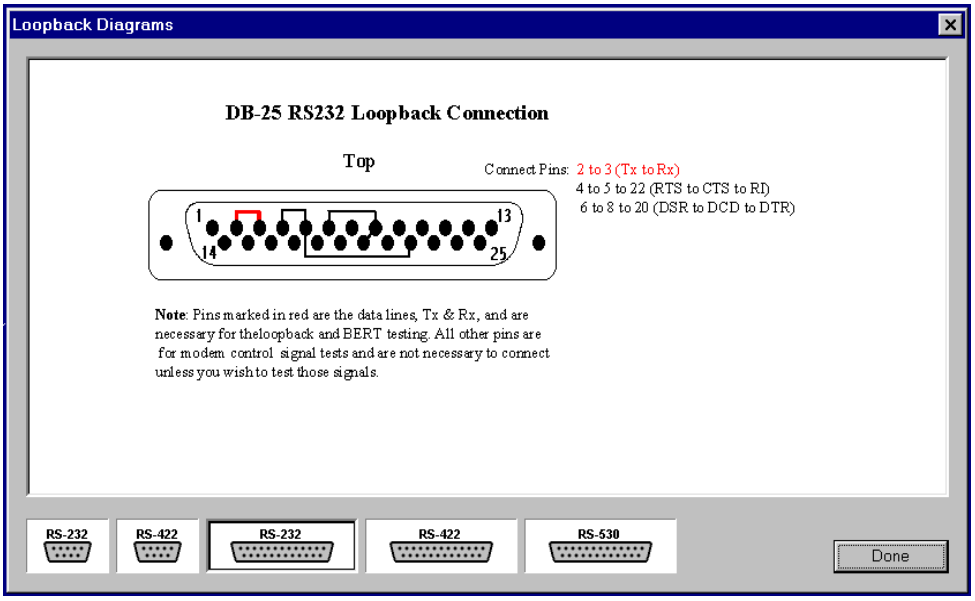


3. The COM Properties window will appear. Make any necessary changes.

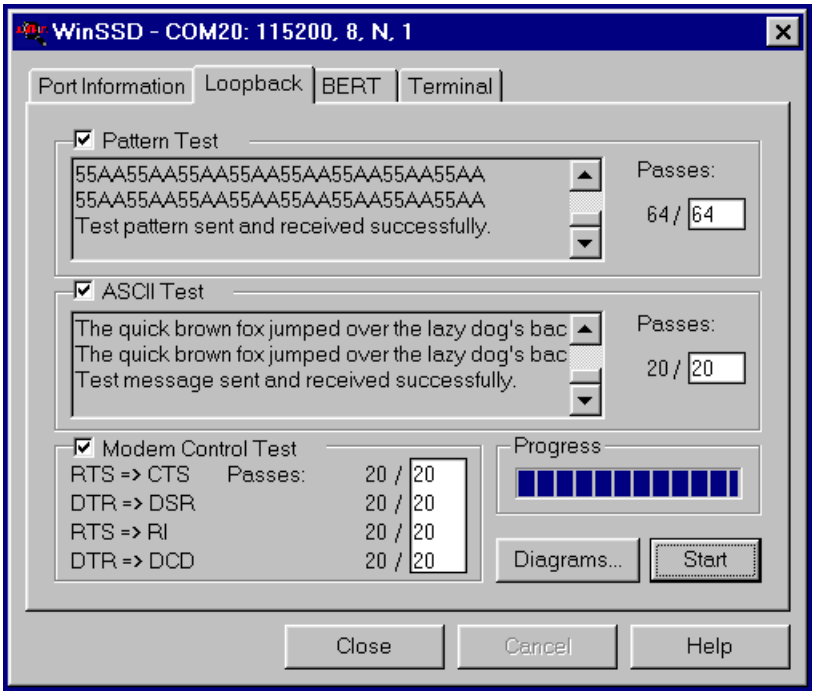
   Then Click OK to save the settings.



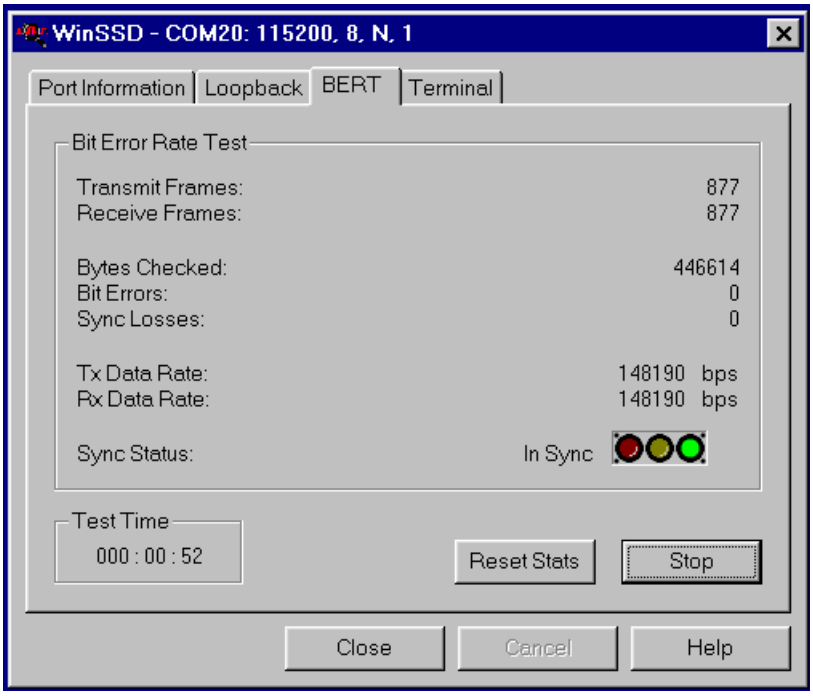
4. In the WinSSD window, click Loopback. Click Diagrams to check the loopback connection needed for each particular connector as shown. Click Done to go back to the WinSSD window.



5. If there is only a Tx and Rx loopback connection, leave the Modem Control Test unchecked.Otherwise, check the Modem Control Test, then click Start. The window below shows all three loopback tests completed successfully.



6. Click BERT (Bit Error Rate Test). Click Start. The following window shows a running BERT on COM20. If there is an error, it will be shown in the Port Information window.



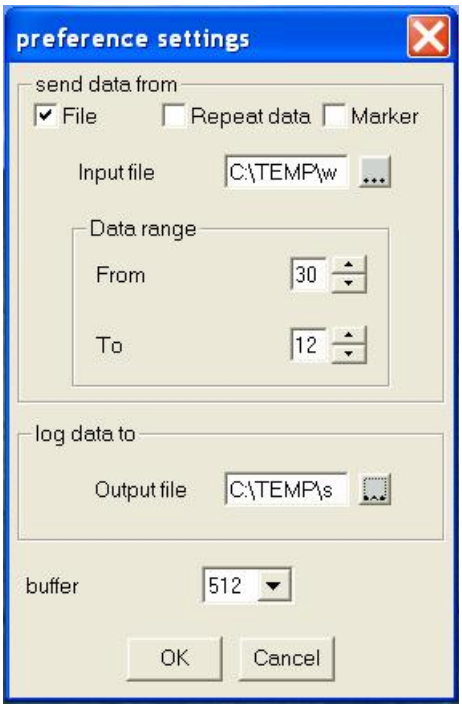
4.2 SERIAL COMMUNICATION PROBE - SERTEST

sertest can be downloaded at: http://www.iftools.com/samples.html.

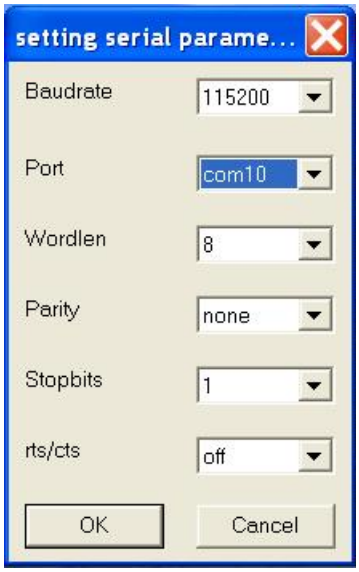
It can also be found on the CD in OX\Windows\Tests.sertest can be used to transfer data between two COM ports on a computer or even between two COM ports on two different computers.

1. Connect the two COM ports being tested. Start sertest. Click the Preferences button as shown below.

2. In the preference settings window, select the input and output files, then click OK.



3. Click Port, then select Open Port. Select the port being tested to open. Change other settings if needed, then click OK.



4. Start another sertest. Repeat step 1 through 3 to open the other COM port. In one window click Log, and in the other window, click Play.The following screen shows a file transfering between COM10 and COM11.


serial tester 0.780
File Port
port 8N1 115200 //./com10 connect
load 12%
infile C:\TEMP\whale.jpg
outfile C:\TEMP\sertest.out
state [100%] RECEIVE...
total 19968
errors break: 0 framing: 0 overrun: 0 parity: 0
RTS DTR CTS DSR DCD RI Speed Brk Stop Log Play
serial tester 0.780
File Port
port 8N1 115200 //./com11 connect
load 12%
infile C:\TEMP\whale.jpg
outfile C:\TEMP\sertest.out
state [100%] SEND...
total 20096
errors break: 0 framing: 0 overrun: 0 parity: 0
RTS DTR CTS DSR DCD RI Speed Brk Stop Log Play

CHAPTER 5 LINUX INSTALLATION (KERNEL 2.4.18)

1. Install the card as described in chapter 2. Power up the system.

2. Linux will detect the PCI card and start the Hardware Discovery Utility. Click Configure.

3. To verify the installation, use dmesg(8), and the following text should appear.

The 16 ports are ttyS4 through ttyS19.

Serial driver version 5.05c (2001-07-08) with MANY_PORTS MULTIPORT SHARE_IRQ SERIAL_PCI ISAPNP enabled

ttyS00 at 0x03f8 (irq = 4) is a 16550A

ttyS01 at 0x02f8 (irq = 3) is a 16550A

ttyS04 at port 0xff20 (irq = 11) is a 16C950/954

ttyS05 at port 0xff28 (irq = 11) is a 16C950/954

ttyS06 at port 0xff30 (irq = 11) is a 16C950/954

ttyS07 at port 0xff38 (irq = 11) is a 16C950/954

ttyS08 at port 0xf880 (irq = 5) is a 16C950/954

ttyS09 at port 0xf888 (irq = 5) is a 16C950/954

ttyS10 at port 0xf890 (irq = 5) is a 16C950/954

ttyS11 at port 0xf898 (irq = 5) is a 16C950/954

ttyS12 at port 0xf8a0 (irq = 5) is a 16C950/954

ttyS13 at port 0xf8a8 (irq = 5) is a 16C950/954

ttyS14 at port 0xf8b0 (irq = 5) is a 16C950/954

ttyS15 at port 0xf8b8 (irq = 5) is a 16C950/954

ttyS16 at port 0xf8c0 (irq = 5) is a 16C950/954

ttyS17 at port 0xf8c8 (irq = 5) is a 16C950/954

ttyS18 at port 0xf8d0 (irq = 5) is a 16C950/954

ttyS19 at port 0xf8d8 (irq = 5) is a 16C950/954

ttyS20 at port 0xf8e0 (irq = 5) is a 16450

ttyS21 at port 0xf8e8 (irq = 5) is a 16450

ttyS22 at port 0xf8f0 (irq = 5) is a 16450

ttyS23 at port 0xf8f8 (irq = 5) is a 16450

4. To test these ports, use dt which can be downloaded at:

   http://www.bit-net.com/~rmiller/dt.html.

   It can also be found on the CD in /SOLFOXT/RELOC/OPT/SOLFOXT/LINUX.

   Here is a result of dt run on ttyS18 and ttyS19:

dt if=/dev/ttyS18 of=/dev/ttyS19 bs=8 limit=1k

Total Statistics (1655):

```
 Input device/file name: /dev/ttyS18 (device type=terminal)
Type of I/O's performed: sequential (forward)
Terminal characteristics: flow=xon_xoff, parity=none, speed=9600
     Data pattern read: 0x39c39c39
Total records processed: 128 @ 8 bytes/record (0.008 Kbytes)
Total bytes transferred: 1024 (1.000 Kbytes, 0.001 Mbytes)
 Average transfer rates: 492 bytes/sec, 0.481 Kbytes/sec
Number I/O's per second: 61.538
 Total passes completed: 1/1
  Total errors detected: 0/1
    Total elapsed time: 00m02.08s
     Total system time: 00m00.00s
       Total user time: 00m00.00s
         Starting time: Wed Oct  9 14:04:17 2002
           Ending time: Wed Oct  9 14:04:19 2002


Total Statistics (1654):
   Output device/file name: /dev/ttyS19 (device type=terminal)
   Type of I/O's performed: sequential (forward)
  Terminal characteristics: flow=xon_xoff, parity=none, speed=9600
     Data pattern written: 0x39c39c39 (read verify disabled)
   Total records processed: 128 @ 8 bytes/record (0.008 Kbytes)
   Total bytes transferred: 1024 (1.000 Kbytes, 0.001 Mbytes)
    Average transfer rates: 948 bytes/sec, 0.926 Kbytes/sec
```

Number I/O's per second: 118.519

Total passes completed: 1/1

Total errors detected: 0/1

Total elapsed time: 00m01.08s

Total system time: 00m00.00s

Total user time: 00m00.00s

Starting time: Wed Oct 9 14:04:17 2002

Ending time: Wed Oct 9 14:04:19 2002

5. A version of sertest for Linux is also available on the CD. Please refer to chapter 4 for more information about this test program.

CHAPTER 6 SOLARIS 8 INSTALLATION

6.1 SOFTWARE INSTALLATION

1. Install the card as described in chapter 2. Power up the system.

2. Insert the CD that came with the card. The CD should be mounted automatically.
   If not, in a shell, use volcheck(1) to mount the CD.

3. Use df(1) to see where the CD is mounted. It can be mounted on /cdrom/cdrom as below:

```
# df -k
Filesystem            kbytes    used   avail capacity  Mounted on
/vol/dev/dsk/c0t6d0/cdrom    1612    1612       0   100%   /cdrom/cdrom
```

4. Go to the directory where the CD is mounted. Use pkgadd(1) to install software for the card.

```
# cd /cdrom/cdrom
# pkgadd -d `pwd`

The following packages are available:
  1  SOLFoxt     OX16PCI954 UART Test and Doc Package for Solaris 8 UltraSPARC
                 (sparc.sun4u) 1.0 REV 0.0
  2  SOLFoxu     OX16PCI954 UART Driver Package for Solaris 8 UltraSPARC
                 (sparc.sun4u) 1.0 REV 1.0

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]: all
```

Processing package instance <SOLFoxt> from </cdrom/cdrom>

5. Press the Return key to install both packages. Type y to answer any questions that ask if you want to continue with the installation. At the end of the installation, you should see the following message. Type q to end the installation process.

Installation of <SOLFoxt> was successful.

Installation of <SOLFoxu> was successful.

The following packages are available:

1 SOLFoxt OX16PCI954 UART Test and Doc Package for Solaris 8 UltraSPARC (sparc.sun4u) 1.0 REV 0.0

2 SOLFoxu OX16PCI954 UART Driver Package for Solaris 8 UltraSPARC (sparc.sun4u) 1.0 REV 1.0

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]: q

6. Reboot the system with option -r.

6.2 VERIFYING INSTALLATION

1. Use dmesg(1) to see if the 16 serial ports are installed.

ox: [ID 766547 kern.notice] OX16PCI954 UART Driver, Version 1.1

ox: [ID 600729 kern.notice] Copyright (c) 2002 by Solflower Computer, Inc.

ox: [ID 588111 kern.notice] Built: Thu Dec 19 16:21:46 PST 2002

ox: [ID 749261 kern.notice] Solflower Driver Kit, Module: DRV-util, Version 1.1

ox: [ID 600729 kern.notice] Copyright (c) 2002 by Solflower Computer, Inc.
ox: [ID 588111 kern.notice] Built: Thu Dec 19 16:20:57 PST 2002
ox: [ID 697747 kern.notice] ox0 uart0 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox0 uart1 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox0 uart2 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox0 uart3 16550 compatible: 128 Byte FIFO
ox: [ID 819724 kern.notice] PCI interrupt level 1 vec 7d8
simba: [ID 370704 kern.info] PCI-device: serial@4, ox0
genunix: [ID 936769 kern.info] ox0 is /pci@1f,0/pci@1,1/serial@4
ox: [ID 697747 kern.notice] ox1 uart0 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart1 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart2 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart3 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart4 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart5 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart6 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart7 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart8 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart9 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart10 16550 compatible: 128 Byte FIFO
ox: [ID 697747 kern.notice] ox1 uart11 16550 compatible: 128 Byte FIFO
ox: [ID 819724 kern.notice] PCI interrupt level 11 vec 7d9
simba: [ID 370704 kern.info] PCI-device: pci1415,1@4,1, ox1
genunix: [ID 936769 kern.info] ox1 is /pci@1f,0/pci@1,1/pci1415,1@4,1

2. Use prtconf(1) to verify if the drivers for the card are attached.
   There should be the following two lines in the output of prtconf(1):

   serial, instance #0
   pci1415,1, instance #1

3. If these two lines are:

serial, instance #0 (driver not attached)

pci1415,1, instance #1 (driver not attached)

Then go to /opt/SOLFoxu/bin and run r_ox to remove the drivers and a_ox to attach them again. Use prtconf(1) to verify if the drivers are attached this time.

6.3 SERIALDEMO IN JAVA COMMUNICATIONS API

The Java Communications API can be downloaded at: http://java.sun.com/products/javacomm/.

It can also be found in /opt/SOLFoxt/solaris after the package SOLFoxt is installed on the system.

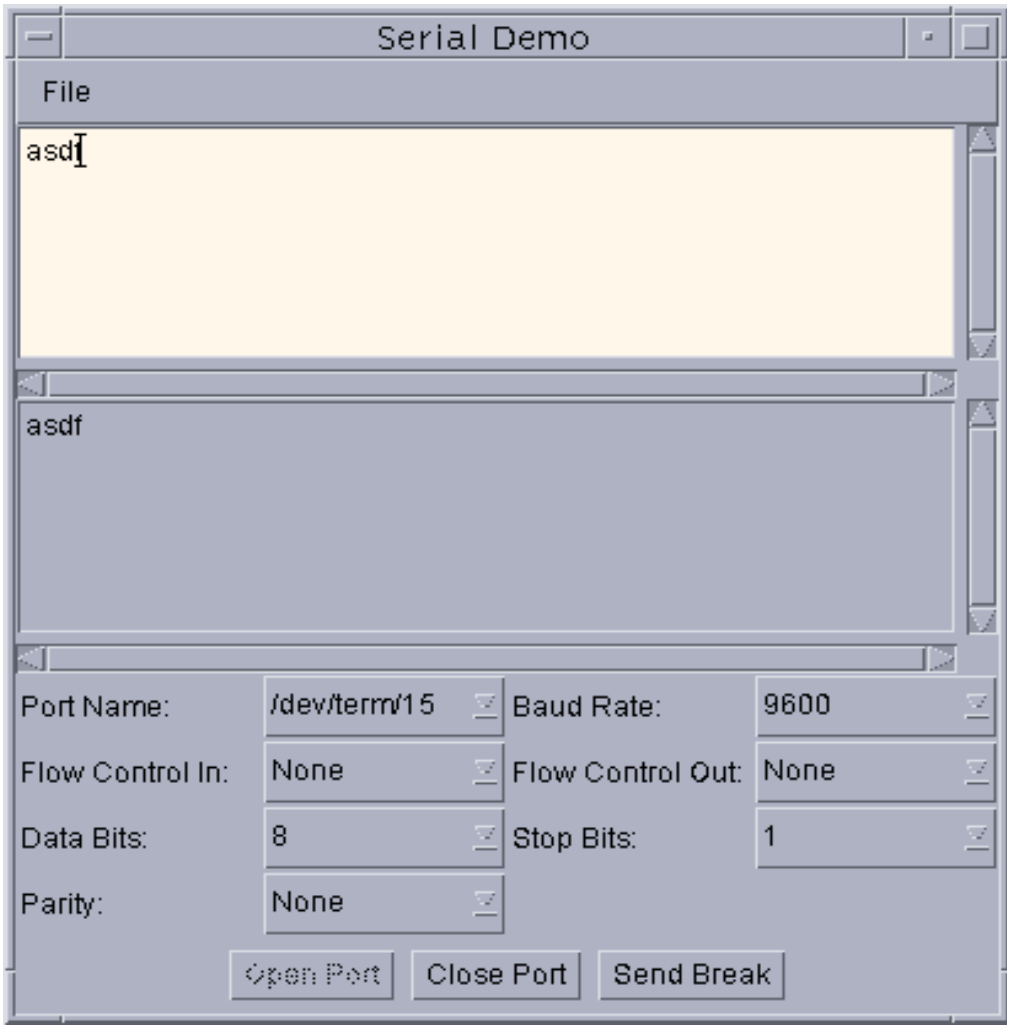
1. Download and uncompress the software.

zcat javax_comm.-2_0_2-solsparc.tar.Z | tar xvf -

2. Install the software by following the instructions in PlatformSpecific_Solaris.html

3. Go to the directory commapi/samples/SerialDemo and compile the SerialDemo program.

4. Run the SerialDemo program. The 16 serial ports are /dev/term/0 through /dev/term/15. The following picture shows a loopback test running on /dev/term/15.



5. SerialDemo can also be run on two different ports, for example, /dev/term/7 and /dev/term/15. Connect these two ports and open two Serial Demo windows. Open these two ports, then type some text in one window. The text should be displayed in the other window.

6.4 DATA TEST PROGRAM (dt)

dt can be downloaded at: http://www.bit-net.com/~rmiller/dt.html.

It can also be found in /opt/SOLFoxt/solaris after the package SOLFoxt is installed on the system.

1. Download and uncompress the source.

2. Build the program.

cp Makefile.solaris Makefile

make clean; make depend; make

3. Run dt on the port(s) to be tested. For examples:

To write a 1M file to the port /dev/tty0 with the speed of 115200 bps and 64 bytes transferred each time:

dt of=/dev/tty0 bs=64 limit=1M speed=115200

If two ports /dev/tty0 and /dev/tty8 are connected together, to write to /dev/tty8 and read back from /dev/tty0:

dt if=/dev/tty0 of=/dev/tty8 dsize=128 bs=64 limit=1M speed=115200 rdelay=1 wdelay=1 enable=microdelay

4. If the first 8 ports are connected to the last 8 ports, then a script called dts which uses dt can test all the 16 ports as the following:

dts

/dev/tty0 -> /dev/tty8 PASSES = 3

/dev/tty0 <- /dev/tty8 PASSES = 3

/dev/tty1 -> /dev/tty9 PASSES = 3

/dev/tty1 <- /dev/tty9 PASSES = 3

/dev/tty2 -> /dev/tty10 PASSES = 3

/dev/tty2 <- /dev/tty10 PASSES = 3

/dev/tty3 -> /dev/tty11 PASSES = 3

/dev/tty3 <- /dev/tty11 PASSES = 3

/dev/tty4 -> /dev/tty12 PASSES = 3

/dev/tty4 <- /dev/tty12 PASSES = 3

/dev/tty5 -> /dev/tty13 PASSES = 3

/dev/tty5 <- /dev/tty13 PASSES = 3

/dev/tty6 -> /dev/tty14 PASSES = 3

/dev/tty6 <- /dev/tty14 PASSES = 3

/dev/tty7 -> /dev/tty15 PASSES = 3

/dev/tty7 <- /dev/tty15 PASSES = 3

CHAPTER 7 TROUBLESHOOTING

1. System can't boot up.

Check if the board makes full contact with the PCI Express slot. In some case the system cannot recognize any ambiguous signals because of the bad connection. The system will be stuck for this reason.

If the system is a SPARC machine, use the Open Boot PROM to check if the board is there. This example is from an Ultra AXi system:

ok cd /

ok ls

f007fbf8 SUNW,afb@1e,0

f007f378 SUNW,UltraSPARC-IIi@0,0

f0066fb4 pci@1f,0

f004fe04 virtual-memory

f004f824 memory@0,0

f002dac4 aliases

f002da54 options

f002d91c openprom

f002d8b0 chosen

f002d840 packages

ok cd pci

ok pwd

/pci@1f,0

ok ls

f0067dbc pci@1

f00677b0 pci@1,1

ok cd pci@1,1

ok ls

f0090d3c pci1415,1@4,1

f0090a6c serial@4

f008929c network@1,1

f0068a80 ebus@1

ok

If the board is installed properly, the pci1415 and serial nodes should appear. If these nodes do not show up, try to re-insert the board.

2. The serial ports can't perform any data transfers.

The first thing to check is the cable connections. Are they connected tightly? If this still doesn't work, check if the software is installed properly. Please refer to the Verify the Installation section for your particular operating system. If the software is not installed properly, try to reinstall the software and reboot the system. If it still does not work, please contact Solflower Computer Inc.

3. Some ports work, but some don't.

Check the cable connections. Check the settings of the ports. Use the test programs that are mentioned in the software installation chapters to see if the ports can perform some basic functions such as loopback

CHAPTER 8 SERIAL CABLE CONNECTOR PINOUTS

There are two groups of signals, A and B. Each group consists of four serial channels, 0 to 3. The Minidin 68-pin connectors are the main connectors that connects to the board.

Signal name	Minidin 68 Pin#	DB25 Pin#
CGNDA0		1
TXDA0	37	2
RXDA0	36	3
RTSA0	2	4
CTSA0	3	5
DSRA0	1	6
SGNDA0	5	7
DCDA0	35	8
		9-19
DTRA0	38	20
		21
RIA0	4	22
		23-25
CGNDA1		1
TXDA1	41	2
RXDA1	40	3
RTSA1	7	4
CTSA1	8	5
DSRA1	6	6
SGNDA1	5	7
DCDA1	39	8
		9-19
DTRA1	42	20
		21
RIA1	9	22
		23-25
CGNDA2		1
TXDA2	45	2
RXDA2	44	3
RTSA2	11	4
CTSA2	12	5
DSRA2	10	6
SGNDA2	47	7
DCDA2	43	8
		9-19
DTRA2	46	20
		21
RIA2	13	22
		23-25

Signal name	Mindin 68 Pin#	DB25 Pin#
CGNDA3		1
TXDA3	50	2
RXDA3	49	3
RTSA3	15	4
CTSA3	16	5
DSRA3	14	6
SGNDA3	47	7
DCDA3	48	8
		9-19
DTRA3	51	20
		21
RIA3	17	22
		23-25
CGNDB0		1
TXDB0	54	2
RXDB0	53	3
RTSB0	19	4
CTSB0	20	5
DSRB0	18	6
SGNDB0	22	7
DCDB0	52	8
		9-19
DTRB0	55	20
		21
RIB0	21	22
		23-25
CGNDB1		1
TXDB1	58	2
RXDB1	57	3
RTSB1	23	4
CTSB1	25	5
DSRB1	24	6
SGNDB1	22	7
DCDB1	56	8
		9-19
DTRB1	59	20
		21
RIB1	26	22
		23-25

Signal name	Mindin 68 Pin#	DB25 Pin#
CGNDB2		1
TXDB2	62	2
RXDB2	61	3
RTSB2	28	4
CTSB2	29	5
DSRB2	27	6
SGNDB2	64	7
DCDB2	60	8
		9-19
DTRB2	63	20
		21
RIB2	30	22
		23-25
CGNDB3		1
TXDB3	67	2
RXDB3	66	3
RTSB3	32	4
CTSB3	33	5
DSRB3	31	6
SGNDB3	64	7
DCDB3	65	8
		9-19
DTRB3	68	20
		21
RIB3	34	22
		23-25

CHAPTER 9 Warranty and Repair

Solflower products are warranted against defective materials and workmanship within the warranty period of one year from date of invoice. Within the warranty period, Solflower will, free of charge, repair or replace any defective unit covered by this warranty, shipping prepaid. A Return of Materials Authorization number (RMA #) should be obtained from Solflower prior to the return of any defective product.

Solflower's warranty is limited to the repair or replacement policy described above and neither Solflower or its agent shall be responsible for consequential or special damages related to the use of their products.

Any questions or requests for repair or technical support should be directed to:

Solflower Computer, Inc.
3337 Kifer Road
Santa Clara, CA 95051

Phone: (408) 733-8100
Fax: (408) 733-8106