CATALYST
ENTERPRISES INC.
Setting new Standards

Hot Swapping PCI cards

Using

Hot Swap Extenders
&
Utility Software

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Hot Swapping Utilities

Features

- Hot Swap PCI Boards Under Test
- Reload configuration space data without rebooting the computer.
- Automate board testing for production applications
- Software control of Extenders, for hands off power cycling of Unit Under Test
- View & change configuration registers.

Overview

The purpose of this document is to provide the user with the knowledge and application of Hot Swap utility software and extender cards for purposes of swapping PCI cards while the system power stays on. These utilities will allow the user to perform various functions with the Catalyst Enterprises, PCI Active extenders. The software allows the user to read, save and reload the configuration space data and allow the user to control the power of to the UUT during testing via the test program.

Utility Programs

1. **PCIUD:** This DOS program allows the users of MS-DOS to read, save and reload (after the BIOS has already configured the UUT at boot up) the configuration space data for PCI Devices. This program is useful if the user needs to swap out the UUT, and continue to test the UUT, in MS-Dos. Please note that the configuration space data for each device is slot specific. For more details please refer to the section below.

2. **PCIUW:** This Windows program allows the users of Windows 95/98/ME and Windows NT/2000/XP, to read, save and reload (after the BIOS has already configured the UUT at boot up) the configuration space data for PCI Devices. This program is useful if the user needs to swap out the UUT, and continue to test the UUT, in Windows. Please note that the configuration space data for each device is slot specific. For more details please refer to the section below.

3. **PARALLEL:** This program allows the user to control the ON/OFF of the PCIBX extenders via the Parallel Port, under Windows only. This program is useful when the user wishes to automate the power cycling of the PCIBX. (The parallel port is used to control the On-Off power of the extenders to minimize the loading effect on the PCI Signals to UUT). For more details please refer to the section below.

4. **Driver file for Windows NT/2000/XP:** This driver is required for user of Windows NT/2000/XP. This driver provides a software interface between the Windows NT/2000/XP Operating System and the computer's Parallel Port.

To Get Started Using the Hot Swapping Software

NOTE:

Please note that the utility programs provided here only read and write the configuration space data to UUT and do not actually assign these parameters.

On system power up the BIOS has to do the assignment and initialization of the configuration registers before the utility programs may be used.

At Power Up

Before the software in this package can be used, the following steps must be performed:

1. Power Down the Computer, remove the cover, and install the PCI Extender in a PCI Slot.

2. Install the UUT on top of the extender and be sure that the On-Off switch on the extender is in the On position.

3. Power on the computer and allow the system to go through boot.

4. When the computer has finished booting, verify that the UUT is working properly by executing your application.

5. If the UUT is working properly, you can proceed using the software provided in this package, please see the section on Operating Instructions for PCIUW or PCIUD.

6. If the UUT is not working properly, refer to the troubleshooting guide section of this document.

Operating Instructions for PCIUW Version 6.20

1. The default location for PCIUW is c:\Program Files\Catalyst\PCIutil\Windows directory.
2. Install the active extender in accordance with the users manual.
3. Place the UUT on top of the active extender, make sure the mechanical switch is in the On Position.
4. Power up the system. After the system has completed booting, select the PCI Util icon.
5. Using the arrow icons, step through the pages until the information for your UUT is displayed. Please note that the device number and the board ID type should be used in addition to the board type to recognize the UUT.
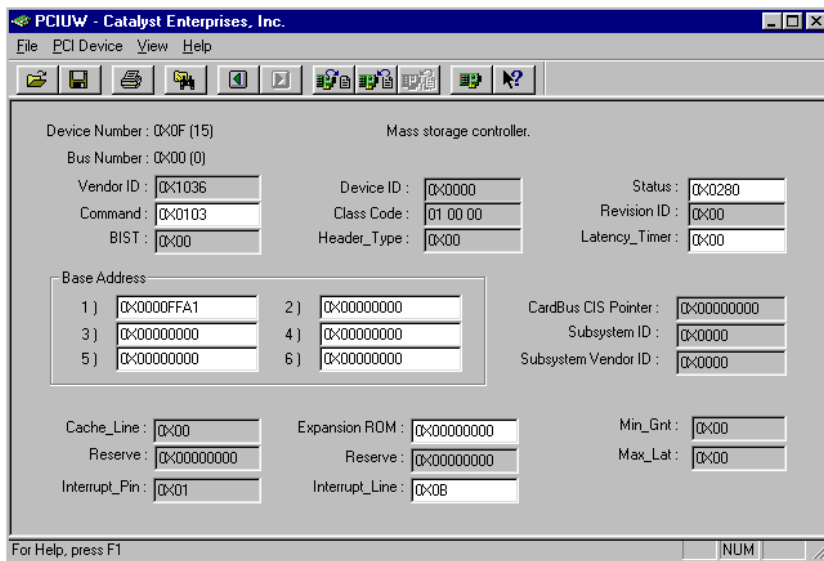
6. If the device you wish to test is not listed, press the read all devices icon. And then page through to find the UUT.

   ** Go to the file menu, and save the PCI configuration data if you intend to leave the utility menu and come back in later.
7. Power cycle the Active Extender (Swap UUT)
   ** Enter the utility program if you have exited it.
   ** Go to file menu, select open and load the configuration space data file.
   ** Step until desired device is displayed
8. Select Write PCI Configuration to this device, option.

For future test of the same type of board only steps 7 and 8 need to be performed.

PCIUW also has a command line to allow the user to select and reload the configuration space data for selected devices without having to enter the menu. Use the command line option as outlined below:

1. Perform steps 1 thru 6 above, exit the program
2. Go to MS-DOS or Start Run, change the directory to the locations of the PCIUW program Type PCIUW /s ww xx yy zz, where ww is the bus number, xx is the hex number of the desired device number, yy is the bus number for the second device and zz is the hex number of a second device number if needed.

   I.E. to save the configuration of device 0xB, on Bus 0; The user would input PCIUW /s 0 B

3. Power cycle the extender. (Swap UUT)
4. Type PCIUW /w to reload the configuration space data for the UUT

For future tests of board of the same type, only steps 3 & 4 need to be performed.

Operating Instructions for PCIUD Version 6.20

NOTE: THIS SOFTWARE DOES NOT WORK IN WINDOWS NT/2000/XP

1. If PCIUD was downloaded from the web, copy PCIUD.exe to desired location.
2. If PCIUD was provided as part of the Catalyst Enterprises, Inc. CD-Rom, is located at c:\Program Files\Catalyst\PCIutil\Dos directory.
3. Install the active extender in accordance with the manual.
4. Place the UUT on top of the active extender, ensuring the mechanical switch is in the On Position.
5. Power up the machine.
6. When the machine has completed booting, go to MS-DOS Prompt, change directory to the location of PCIUD.
7. Enter PCIUD
8. Using the keyboard, go to the PCI-Device menu, select next until the desire device is displayed. Note the device number.
9. Go to the file menu, and save the PCI configuration data, exit the program.
10. Power cycle the Active Extender (Swap UUT)
11. Enter PCIUD
12. Go to file menu, select open and load the configuration space data file.
13. Go to the PCI-Device Menu, and next step until desired device is displayed
14. Select Write PCI Configuration to this device, option

Now the UUT should work properly, for future tests of the same type of board only steps 10 through 14 need to be performed. If you desire to reload the configuration space data without having to enter PCIUD, there is a command line which allows the user to select which device to save, and later reload. To use this method follow the below steps.

1. Perform steps 1 through 8 above, exit the program
2. Go to MS-DOS, change the directory to the location of PCIUD
3. Type PCIUD /s ww xx yy zz, where ww is the bus number, xx is the hex number of the device number, and yy is the bus number, and zz is hex number of a second device number if needed.
4. Power cycle the extender. (Swap UUT)
5. Type PCIUD /w the reload the configuration space data for the UUT

Now the UUT should work properly, for future tests of the same type of board, only steps 4 & 5 above need to be performed.

Please Note: The information these software packages collect for each device is slot specific. This is a function of the system Bios. If you plan to perform write without a reading do not shut down the system and or move the UUT card to another slot.

Parallel Port Control Software

Controlling the Hot Swap extenders using software commands

All Hot Swap extenders can be turned On-Off via the software. In order not to effect the signal integrity of the UUT the PCI bus is not used to decode the software instructions, instead the instructions are sent via the parallel port and a cable to the PCI extenders. In none NT environment any output commands may be used to write to the parallel port, please see the user manual for each board for details on commands. For the NT operating systems utility **Parallel.exe** may be used in conjunction with the provided Catalyst IO driver. For more details, please refer to the documentation for the Parallel Software.

This program, parallel.exe, allows to user to write to the system parallel port in Windows 95, 98, NT, 2000, XP.

1. To install the Parallel.exe program perform one of the following steps
   a. If Parallel.exe was download form the Catalyst Web site. Run Parallel.exe. This program will install all the required files on your hard drive. (For installations in Windows NT, the computer mu st be restarted in order to start the Parallel Port Driver.)
   b. If Parallel was provided as a part of the PCI Utilities package. Execute Setup.exe, located on disk one. The package will bring up a section screen, select the software you wish to install. (For installations in Windows NT, the computer must be restarted in order to start the Parallel Port Driver.)
2. To operate the software, use the following commands.
   a. From Run Menu or from MS-DOS prompt of Windows, type path\Parallel A B CC
      - Where path is the location of the program
      - A is the Parallel port you wish to use 1 for LPT1 (378), 2 for LPT2 (278), 3 for LPT3 (3bc)
      - B is the base address offset 0 for data register, 2 for command register
      - CC is the data to be sent to the parallel port in Hex.
      - If you wish to use the run menu, ensure to include to entire path to Parallel.exe and the desired data.

      For example to issue commands to the PCIBX, the user must enter the directory where the parallel.exe program is

         "c:\program files\catalyst\parallel\parallel.exe"

      and then type the commands

         parallel 1 2 de   set LPT port to write mode

   b. **To insert a call command in your software.** Insert a **system** call in your software to perform the above operation.
      - In Microsoft C++ and Borland C++ for Windows, the command is **system("dir"),** to use this command in your program to write 80 to the LPT1 data register insert:

      system("C:\\Program Files\\Catalyst\\ parallel 1 2 de")

Examples

Control for the PCIBX

|	
parallel 1 2 de	set LPT port to write mode
parallel 1 0 63	set address for global register
parallel 1 2 d6	strobe address
parallel 1 2 de	return strobe
parallel 1 0 01	set data to global register
parallel 1 2 dc	strobe data
parallel 1 2 de	return strobe
parallel 1 0 64	set address for on-off register
parallel 1 2 d6	strobe address
parallel 1 2 de	return strobe
parallel 1 0 00	set data to turn the board on
parallel 1 2 dc	strobe data
parallel 1 2 de	return strobe

Using MS-Dos Prompt

1. Change the directory to the location of "Parallel.exe"
2. Type parallel 1 0 80
3. Repeat step 2 as needed changing the offset and data information as needed.

Using Start:RUN command
1. Click on Start on the Windows Task Bar
2. Click on Run
3. Click on browse
4. Change the directory to the location of "Parallel.exe"
5. Select Paralell.exe
6. Click Open
7. After the path display in the run box enter the parameters to be used, as highlight below.
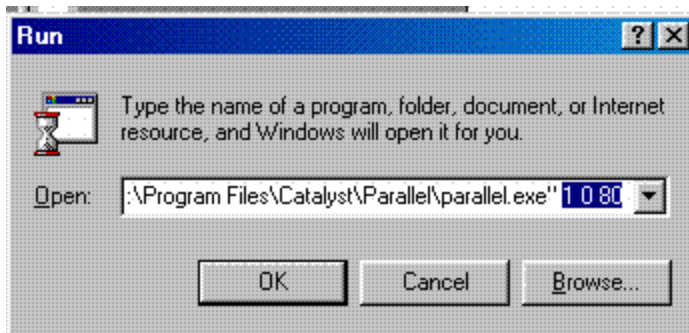
Production Automation

PCI Test I/F Package

- Hot Swap up to 2 UUT boards on an enclosed system
- Low cost, easy to replace Connectors
- Designed to be used with the PCIBX series extenders.
- May be used in test environments where it is not desirable to leave the PC Chassis open.
- LEDs provide visual indication of UUT power.
- Easy automation of the power up and power down cycles, through software control.
- Minimizes the extender board connector wear-out.
- This fixture is designed for a 6" high PC Chassis, the user must cut a hole in the top cover of the chassis. This fixture will connect to the installed PCIBX64-5/PCIBX64-3 extenders, via a provided adapter PCIMM. After the fixture is installed the PC cover may be installed again.
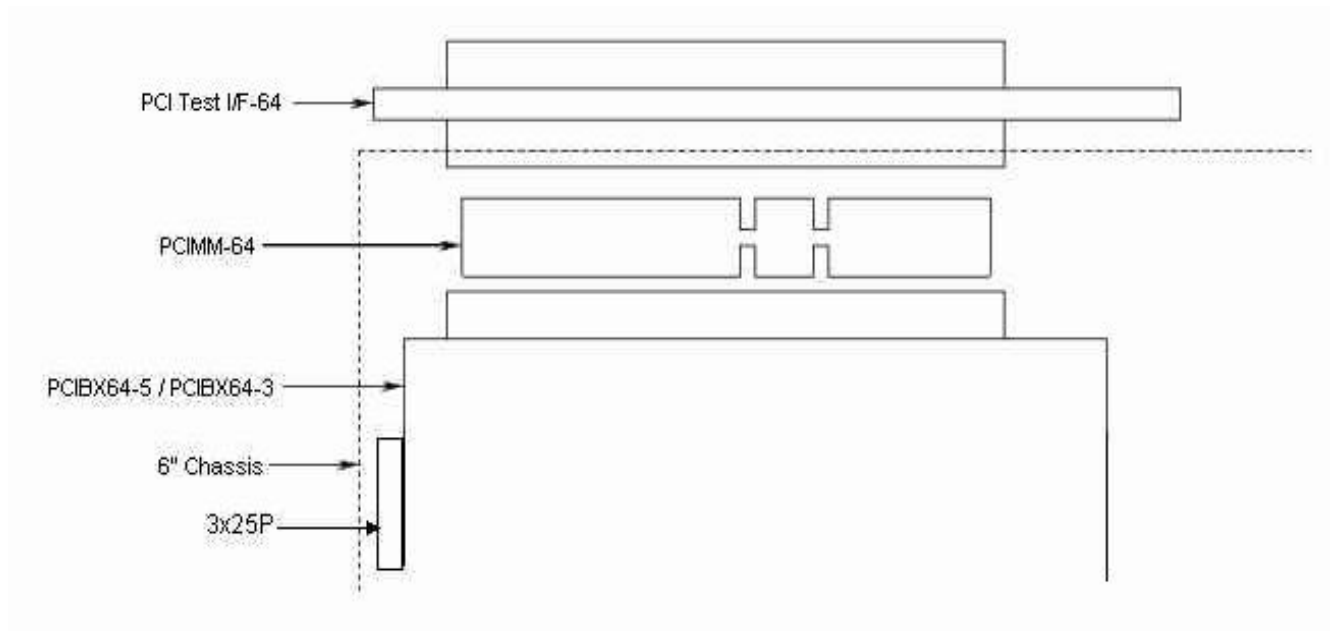
Troubleshooting Guide

- **UUT works when plugged directly on the motherboard, but does not work when plugged on top of a PCI Extender.**

    Assuming the PCI extender is in good condition and has not been damaged, this condition occurs on motherboards where the IDSEL line is connected to an address line through a resistor larger than ~ 51 ohms. To verify this move the extender and UUT to another machine with a different type of mo therboard, if the UUT works on the second system, the problem is the IDSEL line on the first system. You can also find the resistor for the IDSEL and measure it by an Ohmmeter. This resistor is usually right next to the IDSEL pin next to each connector.

- **UUT stops working after cycling the power switch of the extender, but when the PC is booted with the UUT on top of the extender, the UUT works fine.**

    The reason the UUT stopped working, is that the UUT has lost the configuration data when the PCI Extender was powered down. To solve this problem you must use the PCIUD or PCIUW software to read, save and reload the configuration data.

    Note: In addition to reloading the configuration space data, some devices require the driver to be stopped and restarted before the device will work properly.

- **Computer crashes when the extender power switch is cycled OFF and then ON, with UUT installed in top connector of extender.**
    This condition can occur if any of the following conditions exist:

    A. Devices on the UUT require a special timing sequence at the time of power up,

       Check the devices on the UUT to determine if it contains a PCI Controller or other Bridge Chips. If it does, install a 22 uF Capacitor between Pin 3 of U9 (PCI532, PCIX6432 and PMC2PCI) or U13 (PCIAX532 and PCIAX564), and GND. This capacitor will slow down the time between when the +5V goes high and the time the Chip enable is driven low.

    B. Some of the control signals of the PCI device on the UUT may be noisy or have glitches during power up. This may be corrected in most cases by providing pull up on these signals. PCIAX564 has these pull ups but other extenders do not.

       With the UUT installed on top of the extender use a scope to check the signals SERR#, DEVSEL#, LOCK#, FRAME#, TRDY# and STOP#, as the ext ender power switch is cycled, see if any of these signals spike below 2V and then return to 5v, if this occurs, install a 10K pull up resistor to +5V on the signal which caused the spike. After all the required signals have pulled up, test to verify the extender can now be cycled without causing a system crash.

    C. The extender is damaged.

       Several different UUT cards may be tested on an extender to see if all cards cause a system crash (which points to the extender) or the problem is depended on any specific type of UUT.

- **Computer crashes when the extender power switch is turned OFF.**

    A. This can occur if the ICs on the extender card have been damaged and have internal leakage, This leakage can cause some of the signals to be shorted to ground, VCC, or to each other.

    B. The UUT is being used, by the system software, at the time the extender power switch is turned off the software is looking for the board and system hangs when it can not find the UUT board.

- **Computer crashes when the extender power switch is in the OFF position and a new UUT is inserted.**

    This can occur if the extender card is damaged, and some of this signals are not fully turned off.