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TA700/800 Series
PCI-X, PCI, CPCI, PMC
BUS Analyzer-Exerciser
User's Manual

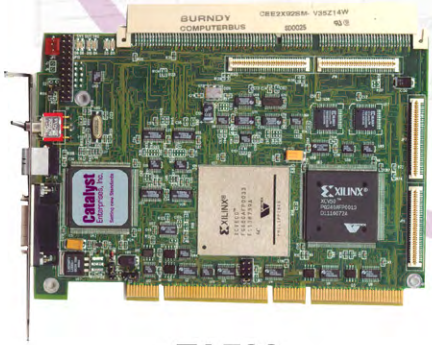
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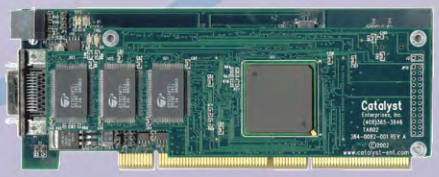
TA700PDC
PMC



TA700C
CPCI



TA700
PCI, PCI-X



TA800/TA850
PCI, PCI-X

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PCI, PCI-X, USB, Bluetooth
PCI Express, SATA, SAS

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TA700/800 Series Comparison

	TA700		TA700C		TA700PDC		TA800/850 (1)	
	PCI-X	PCI	CPCI-X	CPCI	PCI-X	PMC	PCI-X	PCI
Working Mode Configurations								
State Analyzer maximum speed MHz	100	70	100	70	66.66	66.66	133.33	70
Exerciser maximum speed MHz	66.66	66.66	66.66	66.66	66.66	66.66	133.33	70
Timing Analyzer	Y	Y	Y	Y	N	N	NS*	NS*
Asynchronous Timing Analysis	Y	Y	Y	Y	N	N	NS*	NS*
Synchronous Timing Analysis	TBI*	Y	TBI*	Y	N	N	NS*	NS*
Easy Mode	Y	Y	Y	Y	Y	Y	Y	Y
Advanced Mode	Y	Y	Y	Y	Y	Y	Y	Y
Additional Features								
Number of Sequencer States	32	32	32	32	32	32	16	16
Performance Analysis	Y	Y	Y	Y	Y	Y	Y	Y
Counters	8	8	8	8	8	8	8	8
Counter Size [Bits]	32	32	32	32	32	32	32	32
Pre-defined Projects	Y	Y	Y	Y	Y	Y	Y	Y
Simultaneous with Exerciser	Y	Y	Y	Y	Y	Y	Y	Y
Statistical Analysis	TBI*	Y	TBI*	Y	TBI*	Y	TBI*	Y
Min/Max/Avg								
Latencies								
Retry								
Data Transfers								
Command Utilization								
Bus Utilization								
Target Terminations [Various]								
User Defined Events	Y	Y	Y	Y	Y	Y	Y	Y
Display - Graphical on Screen	Y	Y	Y	Y	Y	Y	Y	Y
Save result in File for subsequent review	Y	Y	Y	Y	Y	Y	Y	Y
Special Capabilities								
Protocol Errors	Y	Y	Y	Y	Y	Y	Y	Y
Mnemonics	Y	Y	Y	Y	Y	Y	Y	Y
Compliance Testing	N/A	Y	N/A	Y	N/A	Y	N/A	Y
Interconnect to Host System								
Parallel Port	Y	Y	Y	Y	Y	Y	Y	Y
USB Port	Y Rev. D+	Y Rev. D+	Y	Y	Y Rev. C+	Y Rev. C+	Y	Y
Simulation Mode - Data Analysis Without Hardware	Y	Y	Y	Y	Y	Y	Y	Y
Easy Mode								
Pre-defined Capture and Trigger Projects	24	23	24	23	24	23	24	23
Voltage Check	Y	Y	Y	Y	N	N	Y	Y

TBI* To be implemented
NS* Not Supported

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TA700/800 Series Comparison Cont.

	TA700		TA700C		TA700PDC		TA800/850 (1)	
	PCI-X	PCI	CPCI-X	CPCI	PCI-X	PMC	PCI-X	PCI
Memory Size								
Standard	128K	128K	128K	128K	128K	128K	128K	128k
Optional	4M	4M	4M	4M	None	None	NS*	NS*
Timing								
Minimum Clock Rate [MHz]	25	25	25	25	>1KHz	>1KHz	>1KHz	>1KHz
Maximum Clock Rate [MHz]	100	70	100	70	66.66	66.66	133.33	66.66
Asynchronous Timing Clock MHz	664	664	664	664	None	None	NS*	NS*
Advanced Mode								
User Defined Projects	Y	Y	Y	Y	Y	Y	Y	Y
Definable Event Patterns	8	8	8	8	8	8	8	8
Protocol Errors	58	51	58	51	58	51	58	51
Miscellaneous								
PCI Signals sampled (Not JTAG)	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL
External Input Signals	16	16	16	16	16	16	TBI*	TBI*
Status LEDs	5	5	4	4	2	2	5	5

TBI* To be Implemented

NS* Not Supported

(1) The TA850 is a functional equivalent of the TA800 built as a low profile PCI card operating on +3V only and with the parallel port interface replaced by a 10/100 ethernet connection.

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Introduction

What's In This Manual

This manual describes the installation and operation of your Catalyst PCI/PCI-X Bus Analyzer / Exerciser. Examples of some typical applications are included.

The terms TA700 and PCI analyzer thereafter are used for referring to PCI/PCI-X, CompactPCI and PDC analyzers(See Appendix, B, C and/or D) and in cases where applicable TA800. The designation TA800 is a reference to TA800/TA850 unless otherwise stated. (For the TA800 see "APPENDIX E" on page 243 and for the TA850 see "APPENDIX F" on page 247).

Timing and External Memory Availability

Product	Timing Analyzer	Extended Memory
TA850/TA800	No	No
TA700	Yes	Yes
TA700C	Yes	Yes
TA700PDC	No	No

Overview

Your TA700/800 PCI Bus Analyzer is a powerful and versatile analysis tool that will permit you to debug and characterize PCI designs operating on any PCI system architecture. To perform analysis you simply install the analyzer card in a PCI slot in the target machine and connect it either, to the host system Bi-directional parallel port or to the USB port using the appropriate cable provided with your analyzer. A typical setup may include a Host and a Target systems interconnected via the parallel/USB port with the analyzer card installed in the Target Machine and a Windows based host running the analysis software.

If your target machine operates under Windows it may also act as the host. In this case, the analyzer card and the analysis software reside in the same machine and require you to connect the analyzer card to the Host high-speed parallel port or USB port or ethernet using the appropriate cable provided. See Figure 1 and Note 1.



Caution: Operating the analyzer in this mode, however, may impact Performance Analysis measurement accuracy since the analyzer software runs in the same system space as the application software. For a precise Performance Analysis it is recommended that you use a separate Host system.

Note 1.: Use only the parallel port or the USB port or ethernet to connect to the TA700/800, do not connect more than one port at the same time.

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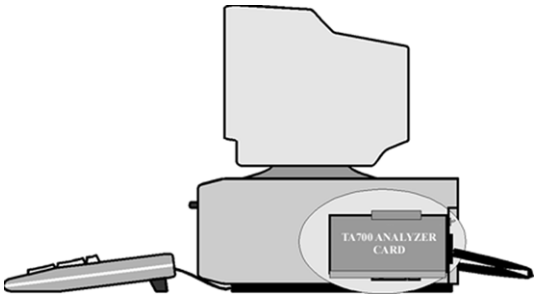


Figure 1 Target and Host Operating in the Same Machine

Optional Auxiliary PCI connector

The PCI Bus Analyzer Card incorporates a PCI connector on top which extends the system PCI bus and allows other PCI cards to be plugged into the analyzer for development or production testing. This feature allows the analyzer to monitor the same point-to-point signals such as REQ# & GNT# on the card under test without requiring any external connections. In this mode, both the analyzer and the card under test require only one PCI slot. Special design methodology has been incorporated to minimize any reflections, delay or cross-talk.

The top connector is intended for monitoring use as an analyzer only and could interfere with the exerciser. The TA700 has an On-board arbiter that allows the TA700 to be a master regardless of the board type installed in the top connector. It is recommended that there not be 2 masters in the same slot.

Note: This feature only exists on the TA700 and TA700PDC PCI analyzer and not on the TA700C, TA800 or TA850 versions.

Figure 2 illustrates such a test setup. An On-Off switch on the analyzer card enables and disables the power and signal connections between the system and the card under test allowing rapid cycling of the test cards without shutting off the system power.

Caution: The TA700 will not work with the top connector when operated at 100 MHz bus speed. It is not recommended to operate the TA700 with the extender at frequencies above 66 MHz, the extender switch must be in the Off position.

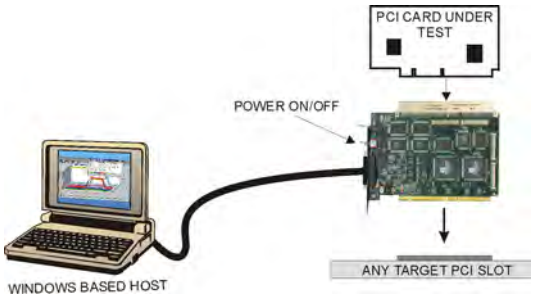


Figure 2 Testing a PCI Bus Card

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TA700 Analyzer Card

Figure 3 shows a TA700 PCI Analyzer card identifying Status LED locations, external trigger input and output connections and the external signal input connector.

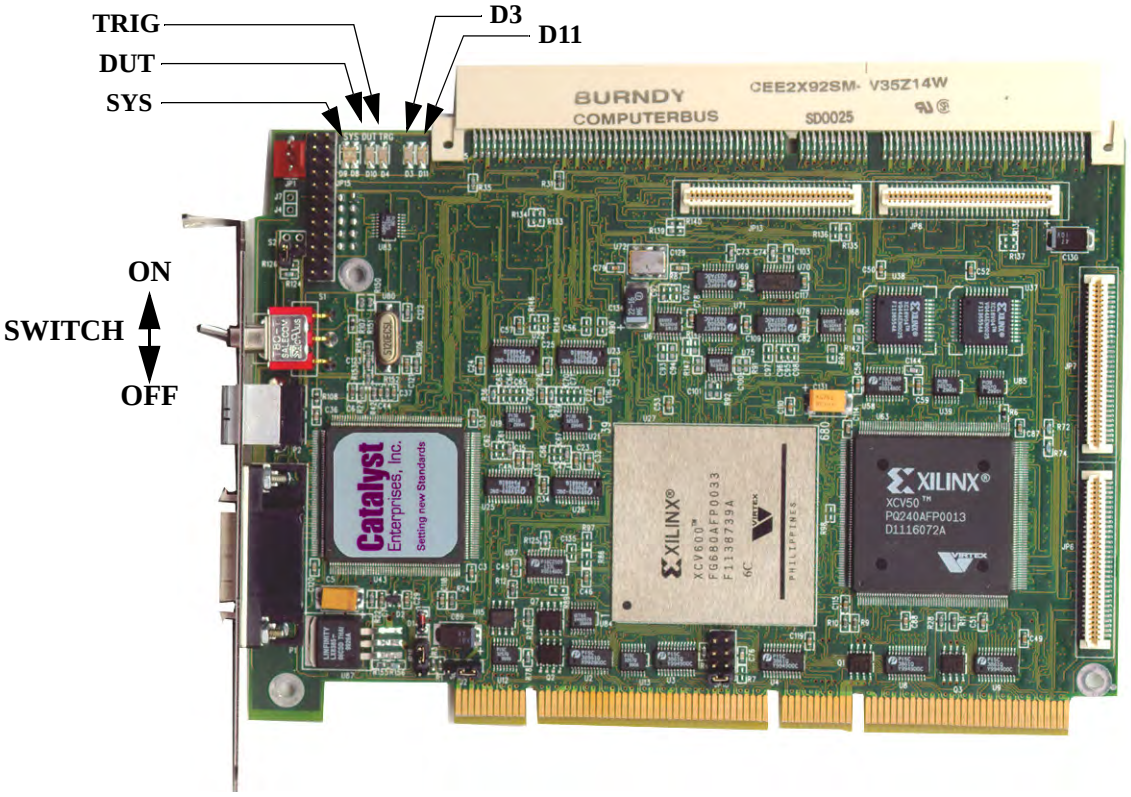


Figure 3 TA700 PCI Analyzer Card

Status LED Function Description (TA700)

For the TA700C analyzer/exerciser LED status information see APPENDIX C. For the TA700PDC LED status information see APPENDIX D, for the TA800 LED status information see Appendix E and for the TA850 LED status information see APPENDIX F.

SYS When green the system and DUT voltages are within 5% of their value. If any of +5V, +3.3V, +12V drop more than 5% the SYS LED turns red. SYS LED also comes up red as a test on power on and then if the voltages are okay it turns green once the software is executed. To enable voltages for sensing see page 15.

DUT Indicates that the voltage to the DUT is on. In this case the user may not remove or insert any card in to the top connector of the TA700

D3, **D11** When illuminated, the TA700 has been configured.

TRIG Indicates that the analyzer has met the trigger condition and is awaiting for the defined post-trigger data to be captured.

SWITCH Function In the **ON** position the TA700 is transparent and connects power and PCI bus signals to the Test Connector. In the **Off** position the TA700 isolates the power and signals to the PCI bus connector and designates the TA700 to act as a PCI Agent if jumper S2 is not installed. For jumper location see **APPENDIX B**.

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Receiving and Inspecting Your Analyzer

Your analyzer includes the following components:

- Analyzer card identified in the packing list
- Software on CD-ROM
- 10’ DB-25 to SCSI II 26 pin cable
- User’s Manual
- Cable for external signals
- 1 2M USB cable
- 3M Ethernet cable (TA850 only)
- 2 brackets for low profile or regular installation (TA850 only)

Unpacking Your Analyzer

Inspect the received shipping container for any visible damage. In the event of visible damage, retain all shipping materials until all of the contents per the packing list have been checked for completeness and absence of damage. Unpack the shipping container and account for each item on the packing list. Visually inspect each item for damage. In the event of damage notify the shipper and Catalyst Enterprises.

Host System Requirements

The following are requirements for the host system for proper operation of your TA700/800:

- PC operating under Windows 2000 or XP
- Internet connection
- E-mail client such as Outlook or Outlook Express
- Bi Directional, ECP, EPP Parallel Port, USB 1.X or 2.0 interface or 10/100 ethernet connection.
- 100 MB free hard disk space on partition with TA700/800 software
- 10 MB free hard disk space on partition with Windows
- 800 x 600 or better resolution Monitor with 16 - bit or better video card.
- CD drive

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Installing Your Analyzer

Hardware Installation

1. Make sure that the Target Machine is powered down.
2. Remove the case from your machine in accordance with the instructions supplied for it.
3. Install the Analyzer card in any available PCI slot and secure the mounting bracket to the chassis with the mounting screw.



Warning: Make sure to take precautions to avoid static electricity discharge damage to the Analyzer Card by using a grounding strap or touching a grounded metal surface just prior to handling the analyzer card. Avoid touching any components and handle card by the edges only.

4. Interconnect the Host system's bi-directional parallel port, USB port or ethernet using the cables provided.

Host and Target Same The Analyzer may be used in a configuration such that the Host and Target are the same machine.

Bi-Directional Port The Analyzer requires that The Host parallel port support Bi-directional data transfers. See LPT Port Setting for verifying that your parallel port supports and/or is set to a Bi-directional mode. If the parallel port on your Host system does not support Bi-directional data transfers you must then install a parallel port card that supports bi-directional data transfers.

Port Configuration Make sure that the installed parallel port card address does not conflict with an existing parallel port such as one for a printer.

Software Installation

On systems operating under Windows 2000 or XP:

1. Insert the CD-ROM.
2. The installation will automatically start the setup unless the auto Run is turned off, in that case select the CD-ROM from "My Computer" and click on setup.
3. After the warning for closing all other programs and before starting the installation, the Install Component selection window will open as shown in Figure 4.

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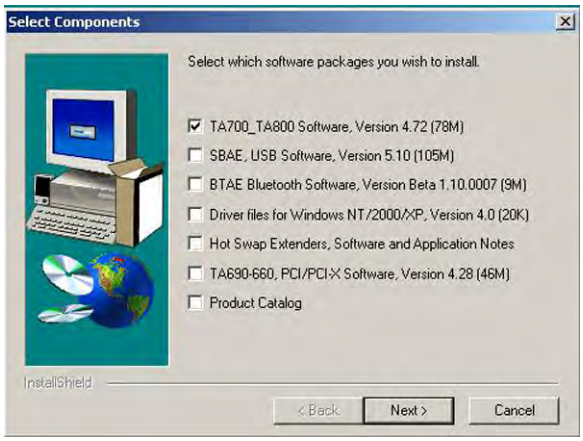


Figure 4 Install Component Selection

4. Select the desired components for installation.
5. Click Next to complete the installation.

System Restart After installing the TA700/800 software you must restart your computer before you can use your analyzer software.

USB Driver During installation of the TA700_TA800 software automatically installs the USB driver, which will require the system to be rebooted. When the TA700/TA800 is attached to the system using the USB port, the system will search for the correct driver for the TA700/TA800. This step may require some user interaction, the user should only need to press next, and the system should find the correct driver. If this step does not work, please refer to the next section for details on how to manually install the USB Driver.

PCI Driver If at the end of installation the operating System requests a PCI driver, then you must manually point to the PCI driver folder.

Manual USB Driver Installation

To control the TA700/800 via the USB bus perform the following:

1. Power Up the TA700/800
2. Connect the USB cable between the TA700/800 USB Port interface and the Host Computer USB port.
3. After Windows detects the new device, select the “Search For Best Driver for Your Device” option button.
4. Click Next.
5. Choose the “Specific location” option button and deselect all other option buttons.
    - Click Next

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- Using Browse go to:
  "c:\Program Files\Catalyst\TA700_800\Predefined\USB Driver"
  (Operating under Windows 2000 or Windows XP you need to enter the 'Win2k' directory.)

6. Click Next and then Finish to complete the TA700/800 USB port driver installation.

Manually Updating the TA700/800 USB Driver

1. Install the new TA700/800 software as described in the software installation section.
2. Click Start: Settings: Control Panel: System and click the Device Manager tab.
3. Find the Catalyst Test Tools entry.
4. Select and right click the Catalyst TA700/800 board.

Note: If the TA700/800 board is not present, please connect the TA700/800 to the host computer using the USB cable.

5. Select Properties and click the drivers tab.
6. Click "Update Driver"
7. Choose the "Specific location" option button and deselect all other option buttons.
   - Using Browse go to:
     "c:\Program Files\Catalyst\TA700_800\Predefined\USB Driver"
     (Operating under Windows 2000 or Windows XP you need to enter the 'Win2k' directory.)
   - Click OK.
8. Click Next and then Finish to complete the USB driver update.

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Connecting via Ethernet

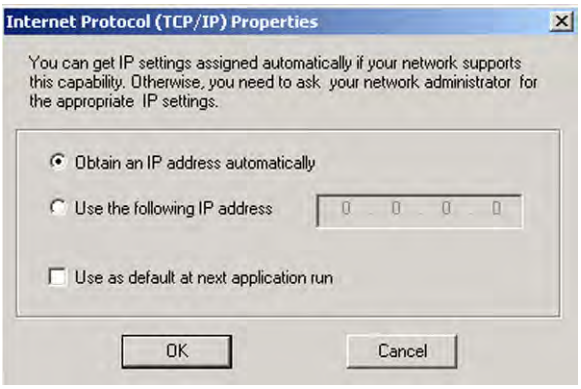
You may use the ethernet connection using any one of the following 3 supported configurations:

1. The TA700/800 connected to a network via a hub, switch, or similar device.
2. The TA700/800 connected to the host computer (machine running the application software), via a hub, switch or similar device.
3. The TA700/800 connected directly to the host computer using a crossover cable.

Connecting to a Network

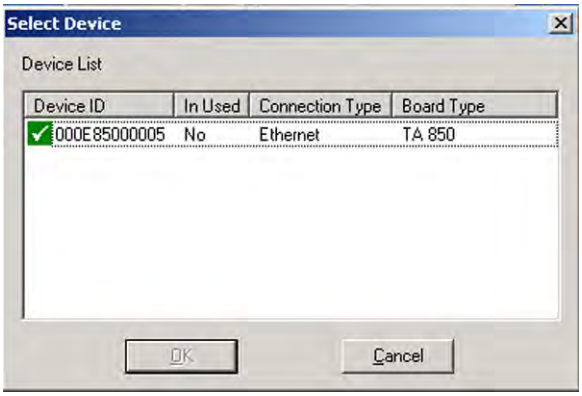
When connected to a network the TA700/800 must communicate with the DHCP server to establish a connection. The DHCP server will continually send the next available IP address to the TA700/800 until the TA700/800 software is started.

When the user starts the software, the user may be prompted if they wish the software to automatically use the offered IP address or if they wish to assign a specific IP address (the assigned IP address needs to be on the same network segment as the host computer). The menu also allows the user to save the selected option (automatic or specific address). If the assigned IP address is not available, the OS will notify the user of an IP address conflict.



After the user clicks ‘OK’ the software will search for all TA700/800 units connected to the network, and will display a list of available TA700/800 units. After the user selects the desired TA700/800 unit, the software will assign the IP address to the selected unit, completing the connection and will launch the software.

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Connecting via Hub, Switch or Similar device

When connected to the host machine via a hub, switch or other similar device or directly using a crossover cable the Catalyst board must communicate with the host computer to establish a connection. The host computer will continually broadcast the next available IP address to the Catalyst Board until the Catalyst software is started.

When the software starts, the user may be prompted if they wish the software to automatically use the offered IP address or if they wish to assign a specific IP address (the assigned IP address needs to be on the same network segment as the host computer). The menu also allows the user to save the selected option (automatic or specific address). If the assigned IP address is not available, the OS will notify the user of an IP address conflict.

After the user clicks ‘OK’ the software will search for all Catalyst boards connected to the network, and will display a list of available Catalyst boards, after the user selects the desired Catalyst board, the software will assign the IP address to the selected board, completing the connection and will launch the software.

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TA700/800 Overview

The TA700/800 PCI Bus Analyzer/Exerciser offers analysis/exerciser capability for either PCI or PCI-X applications with the following capabilities:

- A convenient, easy to use **Easy Mode** that allows you to perform 95% of your PCI bus data capture & trigger without any programming.
- An **Advanced Mode** offers you a powerful programming capability for complex triggering.
- An **Exerciser** that generates bus transactions to exercise the bus as a master or target while allowing you to monitor and capture the resulting performance. An on board target memory allows testing read/write operation of master agents.
- A **Timing Analyzer** capability is also included that allows the user to capture bus timing violations. **Not available for TA700P (PMC). Not in current version for TA800**.

Additionally, the TA700/800 includes **Performance Analysis** for real-time and statistical measurement as well as comprehensive Device Compliance Test capability.

TA700/800 Working Mode Configurations

The TA700/800 may be operated in one of 6 working mode configurations, each offering a convenient Easy Mode which requires no programming:

The working mode configuration is selectable on the Main Menu Bar.



State Analyzer Only (PCI - PCI-X)

The TA700/800 Capture and Trigger mode allows hardware or software oriented PCI/PCI-X bus debug without any programming or setup in the convenient to use **Easy Mode**. A comprehensive selection of Pre-defined setups allows a variety of data capture on several available trigger conditions for PCI and PCI-X applications.

The **Advanced Mode** provides for comprehensive user definition of complex data capture and triggering projects. Users may define up to eight events covering all PCI/PCI-X signals and employ them in a 32 level Sequencer program for a custom data capture and triggering project. Sequencer state changes in a program may be defined in terms of events, Boolean expressions of events and Protocol Errors.

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State & Timing Analyzer (PCI)

This mode of operation is not supported by the TA700PDC, TA800 or PCI-X.

To perform timing analysis for possible violation and to characterize Setup & Hold limits on all or selected signals.

State Analyzer & Exerciser (PCI - PCI-X)

To perform Device compliance testing, characterize a PCI device by emulating various bus cycles & terminations, injecting errors and generating traffics to measure the PCI bus response. The exerciser may be used as a bus master to test and debug new designs.

In **Easy Mode** the Capture and Trigger operates identically to that as in the State Analyzer Only, except that the bus signals are generated by an exerciser program that you define.

The **Advanced Mode** offers the same capabilities for analysis as the State Analyzer Only except that as in the Easy Mode the bus signals are generated by a user defined exerciser program.

Asynchronous Timing Analyzer (PCI)

This mode of operation is not supported by the TA700PDC, TA800 or PCI-X.

This option is used to perform high resolution sampling of the PCI bus signals using a 664 MHz asynchronous clock.

Additional Features

Performance Analysis

The TA700/800 provides continuous Real-Time performance analysis that operates with Pre-defined or User-defined analysis files. On-board dual ported FIFOs interface between the counters and the host system for transferring the measured data in real-time without ever having to stop the counters. This feature provides a very complete and accurate event count of up to 533 MB/Sec for TA700PCI (796 MB/Sec for TA700 PCI-X). 533 MB/Sec for TA800 PCI (1066 MB/Sec for TA800 PCI-X). An implementation of eight counters with up to 32 bits allows a virtually unlimited count of events.

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TA700/800 includes 8 counters which may be programmed to monitor the primary bus activities and point-to-point signals or signals from the secondary bus.

Your TA700/800 includes complete setups to measure the most typical parameters as well as giving you the ability to create your own setup. Real time Performance Analysis allows you to count actual data transfers for any agent or agents matching user specified address, measure and report bus utilization efficiencies, throughput, latencies and retries, on-the-fly.

You may use real time Performance Analysis simultaneously with the exerciser to generate traffic on the bus and measure performance of the target.

Performance Analysis results are presented in a Twelve-color display that you may customize with your own color preferences and record in graphical format for later review or demonstration.

Measurement intervals are selectable from 500 μsec to 10 minutes.

Statistical Analysis

Statistical Analysis is implemented by capturing data in memory and then performing software post processing.

Statistical Analysis measures and reports on Min, Max and Average occurrences for several different parameters such as Latencies, Retry, Data Transfers, Command Utilization, Bus Utilization and various Target Terminations.

The PCI Analyzer (Allowing the Master card to be plugged into the expansion slot on top) can also measure latencies from request to the 1st data transfer including all of the retries in between.

The data capture & trigger for post processing may be initiated per user defined events on the bus, therefore yielding a very repetitive and consistent result.

The parameters measured may be selected for graphical display on the screen and may be saved as graphical or list files for later review.

In the exerciser mode the TA700/800 can initiate data transfer to a target while the trace statistics measures the latency response of the target.

Special Capabilities

Several other features are included in the TA700/800 such as Protocol Errors, Mnemonics, Device Compliance Testing. Please refer to the appropriate sections for each of these features.

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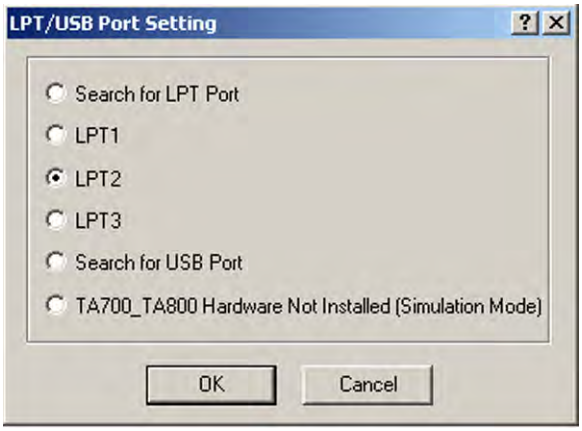
Launching Your TA700/800



Double click the TA700/800 Icon in the Program Manager Window.

The TA700/800 software is pre-configured at the factory to look for LPT2 as the selected port for the analyzer. If the software finds this port connected to the analyzer program will launch immediately otherwise the software will ask you to specify which LPT/USB port is connected to the hardware.

If you have connected your hardware to a different port e.g. LPT1, USB or Ethernet **(TA850 only)**, select the that port and click OK to launch the analyzer program.



Find LPT Port If you are not sure which LPT port your hardware is connected to, check "Search For LPT Port" then **OK** and let the software automatically locate the LPT port that is connected to the hardware.

Find USB Port If you would like to use a USB port to connect to your hardware, check "Search for USB Port" then **OK** and let the software automatically locate the available USB ports to connect to the hardware.



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Note: More than one TA700/800 may be connected via the USB bus at a time. In such cases please be sure to select the correct one using the "**Attach to device"** combo box.

1. Click OK to launch the software.

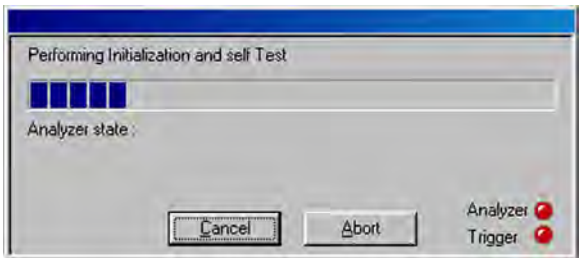
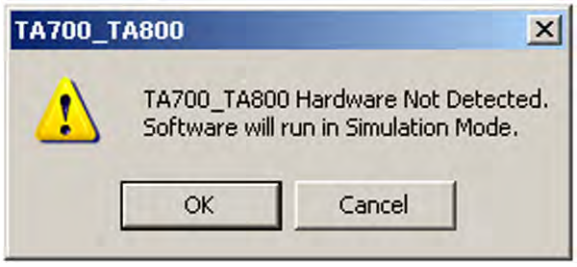




Figure 5 Analyzer Tool Bar

In the event that no LPT/USB port is found connected to the hardware, the software will display the Hardware Not Detected message. To configure a LPT port see LPT Port Setting on page 15.



Simulation Mode Clicking OK in this dialog box will launch the analyzer software to operate in the simulation mode.

LPT Port Problems If your analyzer hardware is connected to an LPT port and there is power to the analyzer, but you are still getting the message Hardware Not Detected then see the section on LPT Port setting below.

Bi-directional Port The host system LPT port must be a Bi-directional port. See LPT Port Setting on page 15.

Launch Problems In the event that you experience difficulties in launching your software, please see section on LPT Port Setting.

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Operating in Simulation Mode

Your system will operate in the Simulation Mode as default if the hardware is not detected, however, you may operate in Simulation Mode directly without installing the analyzer hardware. To operate without hardware, select Hardware Not Installed (Simulation Mode) in the LPT Port Setting dialog box and click OK.

The Analyzer program will launch and display the tool bar as shown in Figure 5, but with the limitation that the analyzer will display previously captured bus data.

Limitations

The Simulation mode lets you try all of the available functions, but keep in mind that the system is not capturing any real data and is displaying pre-captured results.

LPT Port Setting

Your system parallel port may not necessarily be set to a Bi-directional mode even if your system supports this mode.

Port not Configured

If you continue to get a Hardware Not Detected even if you have set the required LPT port, please check your system setting for your parallel port.

To set the parallel port:

1. Restart your computer and during boot, press F1 key to enter Setup (some systems may use a different key than F1, please consult your system manual).
2. Once in setup select the Advanced, then Peripheral Configuration and then Parallel Port Mode.
3. Select the Parallel Port to be configured. If your system supports Bi-directional mode you must have choices for at least one of the following:

   Bi-directional, ECP or EPP, preferably Bi-directional first then ECP and last EPP.

   Note that Standard or Compatible modes are not a Bi-directional mode.

4. When finished with the configuration press ESC to exit setup and save the new configuration.

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Configuration Menu



Click Configuration on the main menu bar to display the various configuration options.

Working Mode Allows you to select the analyzer configuration. The choices are: **PCI State Analyzer, PCI Timing Analyzer, PCI Analyzer/Exerciser, PCI Async Timing Analyzer, PCI-X State Analyzer and PCI-X Analyzer/ Exerciser.**

Protocol Errors Used to configure a Protocol Errors mask for use in triggering on protocol errors. See Protocol Errors on page 155.

Mnemonics Used to define Mnemonics. Mnemonics may be used to display user assigned names to specific patterns, in search a pattern in the display or filter data patterns from a display. See Mnemonics on page 164.

External Signal Names Allows you to assign specific names to external signals for display purposes only. “External Signals” on page 166

External Signal/Trigger Settings Allows you to configure external input and output triggers. See “External Signals” on page 166.

Voltage Check Used to select or deselect the voltages to be monitored for tolerance compliance. See “Enabling Voltage Check” on page 17. **Not available for TA700P (PMC).**

Host Bus Used to force the software to work with different bus characteristics than the ones detected by the TA700/800.

Zoom Options Used to select zoom about X or Y cursor or between X and Y cursor or Zoom Around when displaying a Wave data capture window. See Using Zoom in the Wave Window on page 139

Color Setting Used to set custom color combinations for the Analyzer Performance Analysis Window.

Software Settings Used to set global software user preferences. “Global Software Settings” on page 21.

Authorization Enables purchased system configurations. See “Authorization” on page 22

System Feature Status Displays enabled system features. See “System Feature Status” on page 23

Configuration Space Information Displays the PCI characterization of the TA700/800 that is presented to the System BIOS.

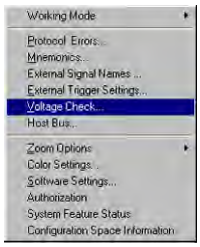
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Enabling Voltage Check

The TA700/800 is capable of monitoring the critical voltages on your PCI bus. TA700/800 monitors a 5% drop in voltage for selected voltages and turns the SYS status LED from green to red if any of the voltages drop by 5%.

Not available for TA700P (PMC).

To select voltages for monitoring:



Click **Configuration** on the main menu bar and then select **Voltage Check. . .** to open the Voltage Check dialog box.

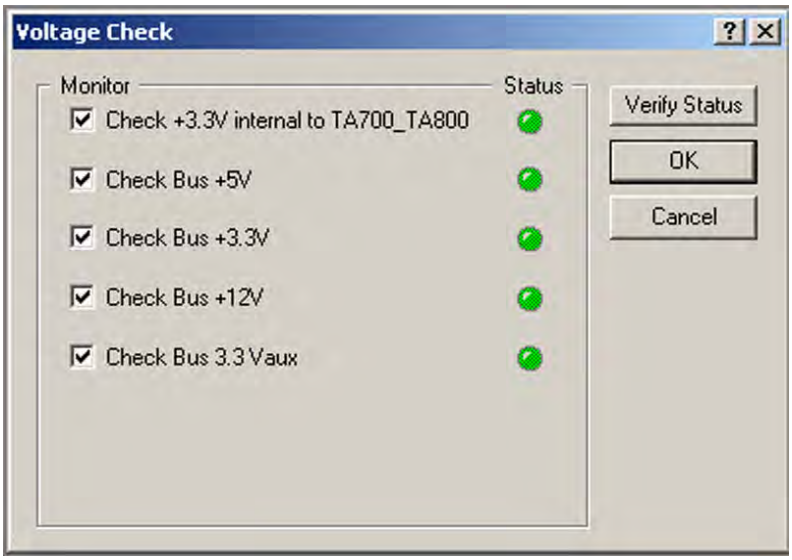


Figure 6 Voltage Check Dialog Box

Check the boxes in the Monitor column for voltages that you wish to be monitored and click OK.

Note: Top connector voltages not available for CPCI or TA800.

When the TA700/800 is powered from the bus, the Check +3.3V supply to TA700/800 and Check Bus +3.3V both display the Bus status, however when an external power supply is used the Check +3.3V supply to TA700/800 will display the external power supply status.

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After clicking **Verify Status**, the status column will display green LED for monitored voltages that are within tolerance. A red LED indication signifies an out of tolerance or missing voltage.

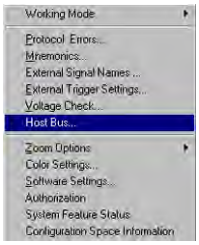
Verify that the SYS LED turns green signifying that the checked voltages are within 5% of their required values.

Host Bus

The TA700 hardware identifies the host bus type automatically at the occurrence of the rising edge of the host bus RST# and displays the result on the Status Bar at the bottom of the display.



In the event that the automatic selection does not match the host bus type of your system hit reset and restart the software. If this fails you may set it manually as follows:



Click **Configuration** on the main menu bar and then select **Host Bus** to open the Host bus type selection dialog box.

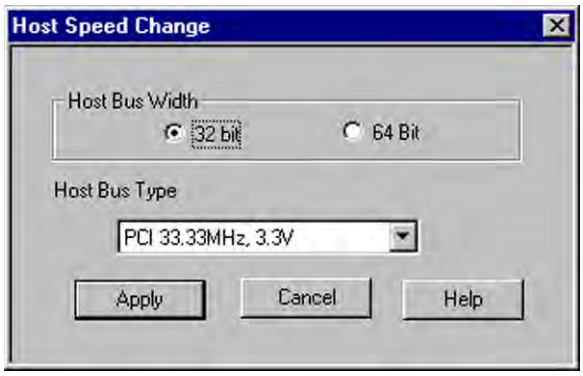
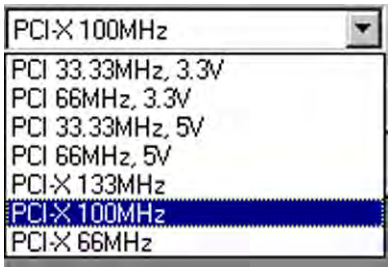


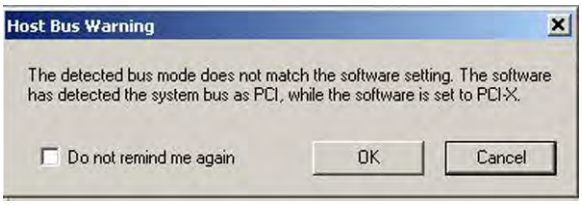
Figure 7 Host Bus Type Selection Dialog Box

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Click the down arrow next to the Host Bus Type list box and select the bus type of your system.



If your protocol selection does not correspond to your Host Bus selection you will get a bus mismatch warning message.



Change the protocol to match the detected systen bus by clicking the down arrow on the Working Mode selection list box and choose the required protocol.

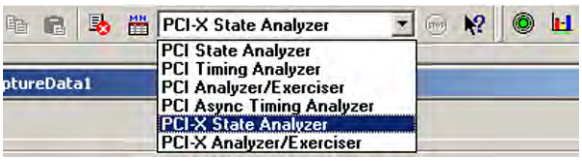
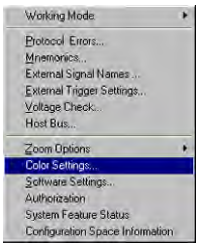


Figure 8 Protocol Selection

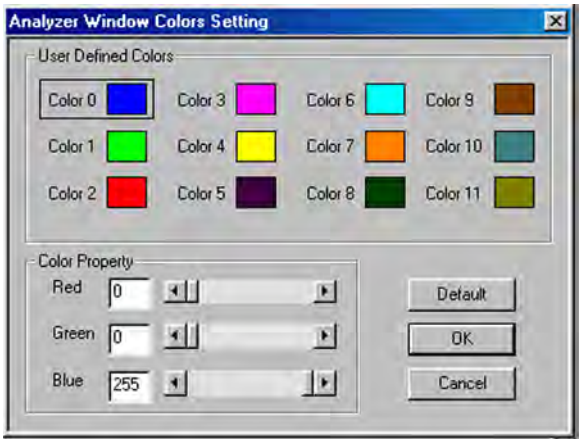
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Analyzer Window Colors



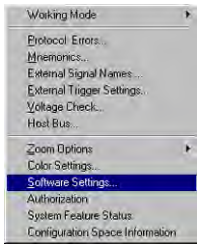
Click **Configuration** on the main menu bar and then select **Color Setting . . .** to open the Analyzer Window colors setting dialog box.

This color setting is used for the graph display in Performance Analysis and Trace Statistics Analysis.



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Global Software Settings



Click **Configuration** on the main menu bar and then select **Software Settings** to open the Global Settings dialog box.

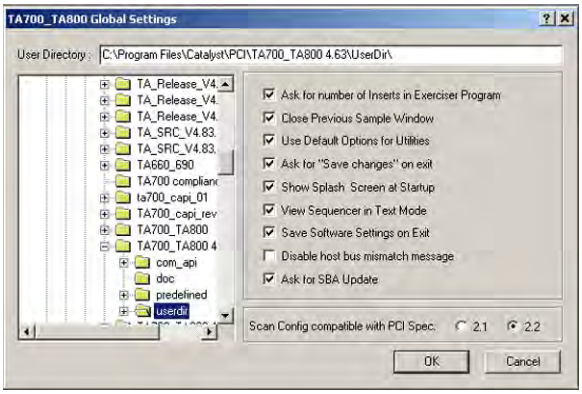


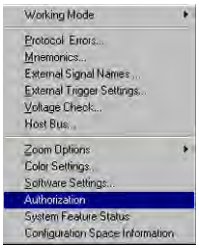
Figure 9 Global Software Settings Dialog Box

Check the options that suit your needs and click **OK.**

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Authorization

An authorization code is required to activate additionally purchased features to upgrade the TA700/800 as shipped.



To enter the authorization code, click **Configuration** on the main menu bar and then select **Authorization** to open the Authorization Code dialog box.



Figure 10 Authorization Code Dialog Box

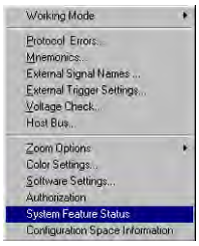
Enter the factory provided Authorization Code and click OK. You may verify that the new configuration has been enabled as described in “System Feature Status” on page 23.



Note: The **Authorization** choice may be grayed out if your product includes all of the available features.

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System Feature Status



Click **Configuration** on the main menu bar and then select **System Feature Status** to open the Features Status Display.

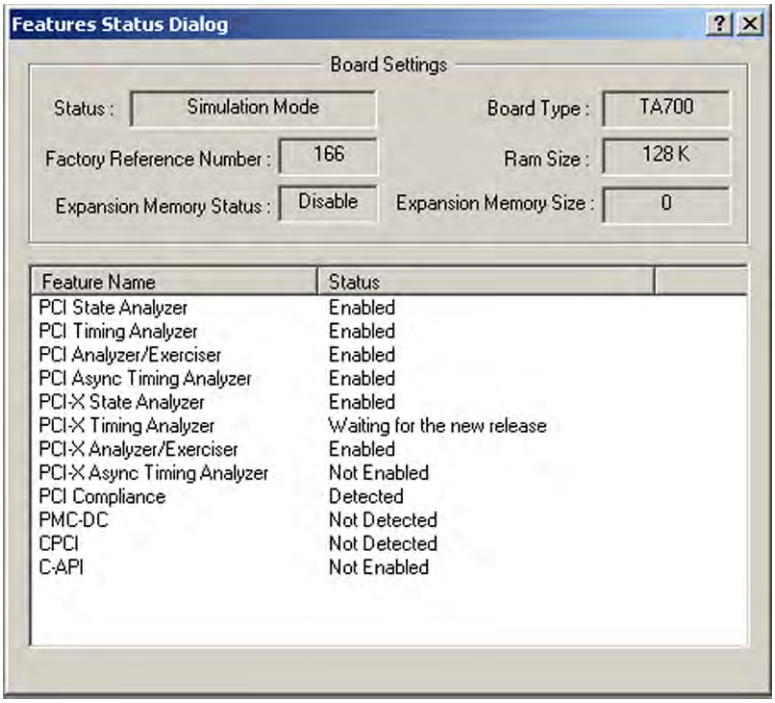


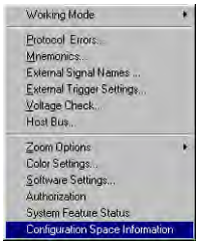
Figure 11 System Features Status Display

The display shows all of the currently authorized system features.

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Configuration Space Information

At power up the TA700/800 is automatically configured as a PCI agent and is setup to allow the system to see the configuration. However, once the Analyzer/Exerciser is programmed, the configuration space is hidden from the BIOS or any other agent trying to access the TA700/800 space configuration. The initial configuration space is stored by the software as shown below.



Click **Configuration** on the main menu bar and then select **Configuration Space Information** to open the Configuration Space Information Display.

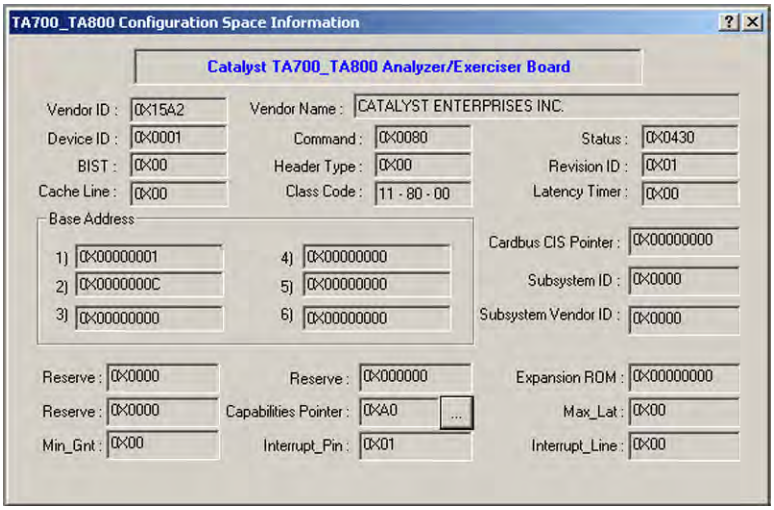


Figure 12 Configuration Space Information Display

Note: Configuration space information from the TA700/800 board is available only at power on time and is not available after the board has been configured.

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Protocol Errors

To trigger on protocol errors immediately in Easy Mode, see Protocol Errors on page 32 and for Advanced Mode operation see Protocol Errors on page 155.

External Signal Names

To assign unique names to displayed external signals see “External Signals” on page 166

Not enabled for the TA800.

External Trigger Settings

To set external trigger parameters see External Signals/Trigger on page 166.

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Easy Mode

The Easy Mode offers you the capability to perform 95% of your bus analysis tests without the need for any programming. When operating in the Easy Mode your analyzer can perform the following:

- Capture data and trigger on bus protocol immediately.
- Perform Timing Violation detection and a search for Setup/Hold limits.
- Capture bus activity while exercising the bus.
- Do Performance analysis on PCI bus activity.
- Compute Statistics on selected parameters.
- Perform Compliance Device test. (In State Analyzer & Exerciser only)

Instant Data Capture & Trigger

Make sure that the TA700/800 is in the State Analyzer Only configuration and is operating in the Easy Mode as shown on the Main Menu bar below.



1. Click the Green button on the Main Menu bar to open the Capture Data and Trigger dialog box shown in Figure 13.



Figure 13 Capture Data and Trigger Dialog Box

2. Select a Pre-Defined Trigger Point (See Table 1.) from the **Trigger On** dropdown list and click **Run**. Wait to capture data and to view result. Figure 14 and Figure 15 show a typical Wave and List result display.

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Table 1. Pre-Defined PCI Trigger Points

1	Address	Triggers on specified address
2	Any Interrupt	Trigger when any interrupt occurs
3	Burst Longer	Triggers when the burst is longer than nnn times
4	Burst Shorter	Triggers when the burst is shorter than nnn times
5	DMA Transfers	Triggers when data burst is transferred
6	Data at Address	Triggers on specified data at address
7	GNT#	Triggers when GNT# is asserted
8	Master Abort	Triggers when a master abort occurs
9	Occurrence of SERR# or PERR#	Triggers when error SERR# or PERR# occurs
10	Protocol Error	Triggers when any PCI protocol error is detected
11	REQ#	Triggers when REQ# is asserted
12	Reset De-asserted	Triggers when reset is de-asserted, at rising edge of reset.
13	Assert - De-assert	Signal xxx asserted and then de-asserted nnn times
14	Asserted	Signal xxx asserted for more than nnn times
15	De-assert - Assert	Signal xxx de-asserted and then asserted for more than nnn times
16	De-asserted	Signal xxx de-asserted for more than nnn times.
17	Signal Shorter	Triggers when signal xxx is shorter than nnn times
18	Target Abort	Triggers when a target aborts
19	Target Disconnect	Triggers when a target disconnects
20	Target Retry	Triggers when a target Retry occurs
21	Target Retry nnn times	Triggers when a consecutive target Retry occurs more than nnn times
22	Target Termination	Triggers on target termination, combination
23	Vendor & Device ID	Triggers on Vendor & Device ID access.

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Table 2. Pre-Defined PCI-X Trigger Points

1	Address	Triggers on specified address
2	Any Interrupt	Trigger when any interrupt occurs
3	Attribute	Triggers on a specific attribute phase with user defined address and command
4	Burst Longer	Triggers when the burst is longer than nnn times
5	Burst Shorter	Triggers when the burst is shorter than nnn times
6	DMA Transfers	Triggers when data burst is transferred
7	Data at Address	Triggers on specified data at address
8	GNT#	Triggers when GNT# is asserted
9	Master Abort	Triggers when a master abort occurs
10	Occurrence of SERR# or PERR#	Triggers when error SERR# or PERR# occurs
11	Protocol Error	Triggers when any PCI-X protocol error is detected
12	REQ#	Triggers when REQ# is asserted
13	Reset De-asserted	Triggers when reset is deasserted
14	Asserted-Deasserted	Signal xxx Asserted and then Deasserted for nnn times
15	Asserted	Signal xxx Asserted for more than nnn times
16	Deasserted-Asserted	Signal xxx Deasserted then Asserted for nnn times
17	Deasserted	Signal xxx Deasserted for more than nnn times
18	Signal Shorter	Triggers when signal xxx is shorter than nnn times
19	Target Abort	Triggers when a target aborts
20	Target Disconnect at Next ADB	Triggers when a target disconnects
21	Target Retry	Triggers when a target Retry occurs
22	Target Single Data Phase Disconnect	Triggers on target Disconnect termination.
23	Target Split Response	Triggers on target Disconnects during burst.
24	Vendor & Device ID	Triggers on Vendor & Device ID access

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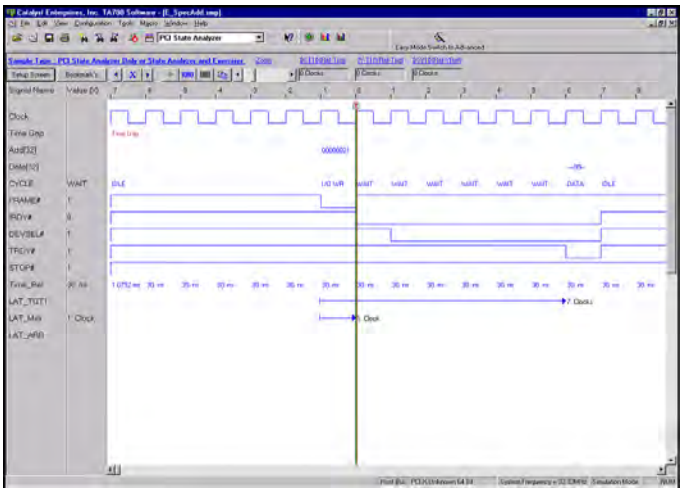


Figure 14 Wave File Output Display



To view the result as a list file output display, click the List button.

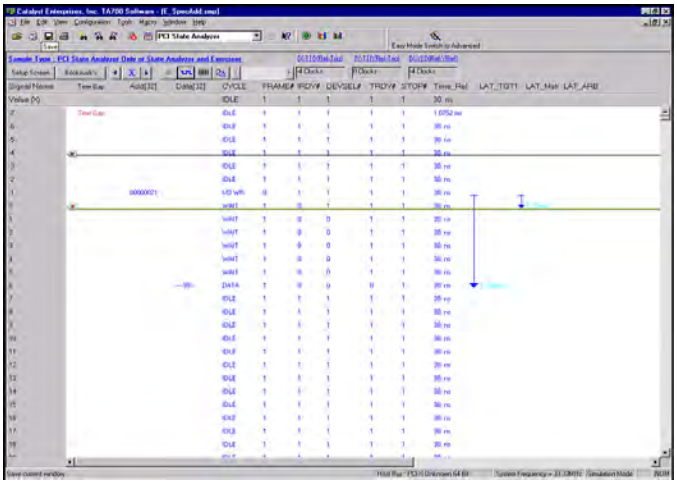
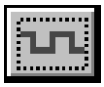


Figure 15 List File Output Display



To return to the wave file output display, click the Wave button.

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Selective Data Capture (Complete Bus)

You may refine your data capture by checking the Data Capture Selection as **Specific Address(es)**.

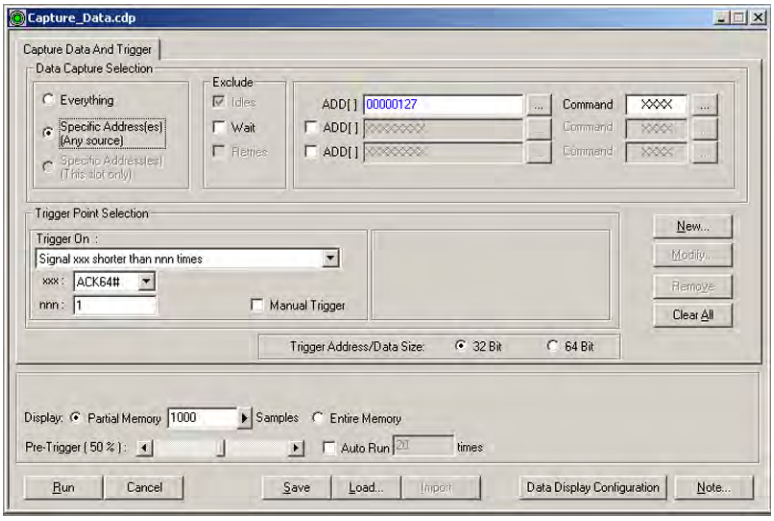


Figure 16 Capture Data At Specific Addresses Dialog Box

Selecting this option allows you to specify data capture at up to 3 address ranges with a specific associated command that is selected from the CBE# dialog box. To open the CBE Type dialog box click the ellipses button next to the Command edit box.

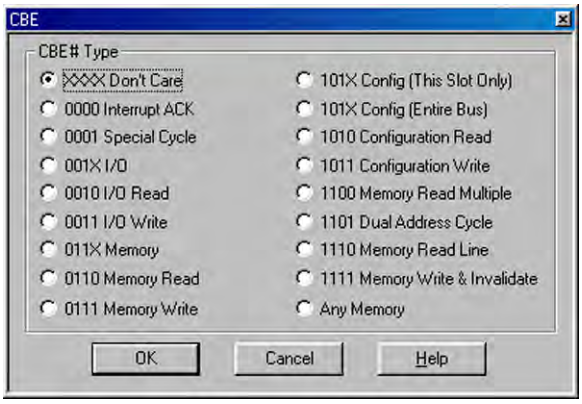


Figure 17 CBE Select Dialog Box

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Selective Data Capture (Current Slot Only)

Choosing this option allows you to further refine your capture by limiting it to the bus traffic originated at this slot only.

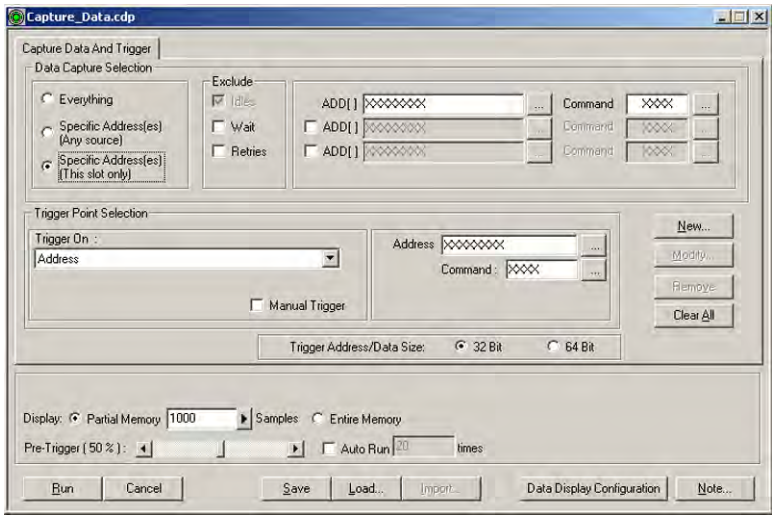


Figure 18 Capture Data for Current Slot Only.

Setup for this option is identical to the Selective Data Capture for the complete bus. You may specify data capture at up to 3 address ranges with a specific associated command that is selected from the CBE# dialog box. To open the CBE Type dialog box click the ellipses button next to the Command edit box.

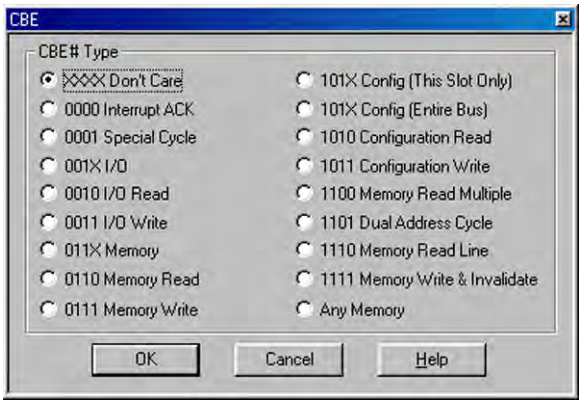


Figure 19 CBE Select Dialog Box

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Data Capture & Trigger Examples

The capture data and trigger dialog box changes depending on the type of **Trigger On** chosen. The following are some examples.

Signal on shorter than nnn times. With this Trigger selection you must choose a signal from the xxx dropdown list and specify the number of times in the nnn edit box.

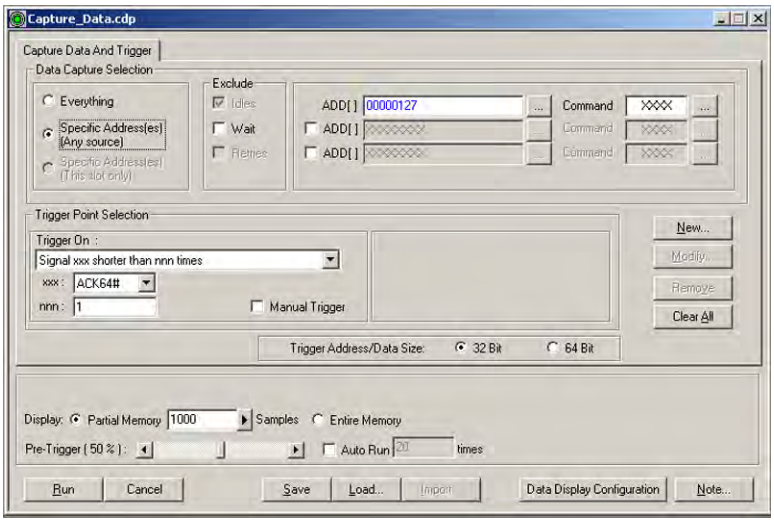


Figure 20 Specify Signal And Number of Times

Protocol Errors When this **Trigger On** selection is chosen, note the **PE** button next to the Trigger On list box. Clicking this button opens the Protocol Error mask.

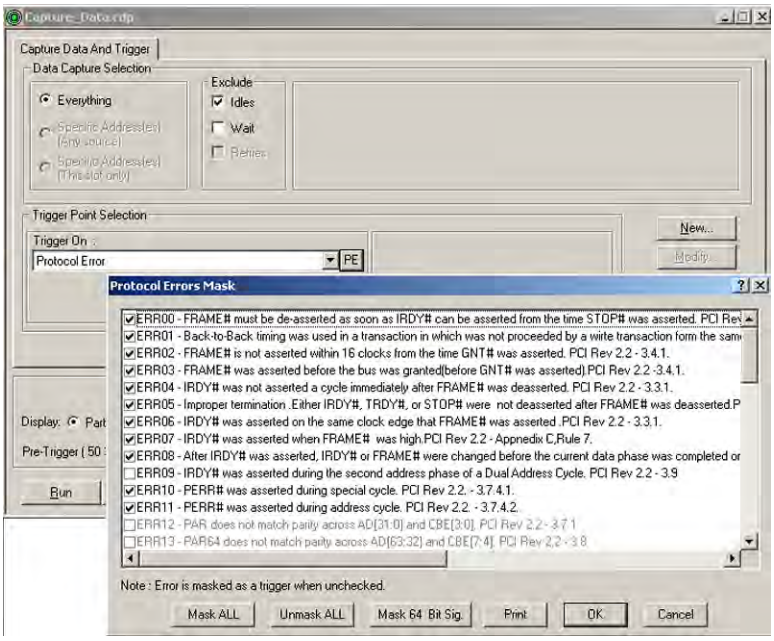


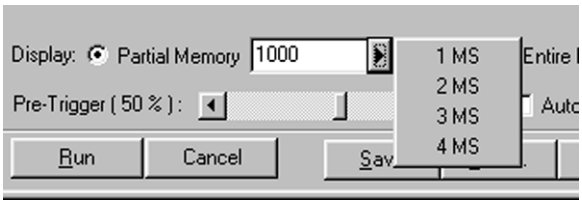
Figure 21 Trigger on Protocol Error

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Data Capture Options

Memory Display You may limit the captured data display to a specific number of samples by checking Partial Memory and entering the number of Samples to be captured or, you may check entire memory to allow the capture for the entire memory.

Extended Memory If your TA700/800 or TA700C has the optional extended memory, you may limit the capture to 1MS, 2MS, 3MS or 4MS. The memory limit flyout becomes active whenever the extended memory card is detected as present.



Address/Data Size Choose 32 bit or 64 bit addressing and data size.

Pre-Trigger Pre-Trigger is set by default at 50% which defines the percentage of data to be captured before and after the triggering event. You may change this percentage by dragging the slider to the desired value.

Pre-Trigger Data The capture of the specified percentage of the data prior to the triggering event cannot be guaranteed and may in some cases be 0. This can occur in cases where the triggering event occurs before the required number pre-trigger event data can be stored. In these cases the data display will show fewer than the specified data points prior to the triggering event. For more detail see **Set Trigger** on page 81.

Manual Trigger Select this option when you wish to manually interrupt the data capture based on some external event. With this option selected, data will be continually captured to memory and overwritten as required until you stop the data capture.

Auto Run Continually captures data for the number of times specified. A separate data file is generated each time that a capture is performed.

Exclude Cycles To simplify the captured data display you may check the options to exclude: **Idles**, **Wait States** and **Retries**.

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Performance Analysis



Click the Performance Analysis Icon on the menu bar to open the Performance Analysis dialog box

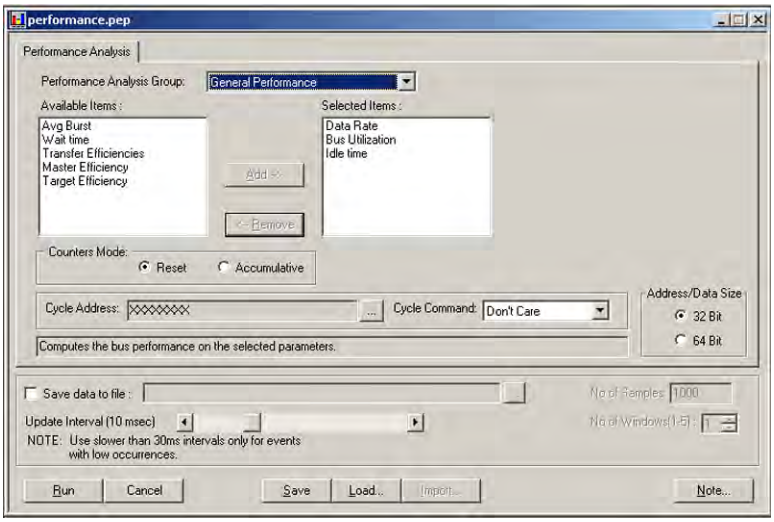


Figure 22 Easy Mode Performance Analysis Dialog Box

To perform an immediate Performance Analysis:

1. Click the down arrow next to the Performance Analysis Group list box and select one of the four available analysis groups.



2. Select the parameters for analysis from the Available Items list.
3. Select the counters mode, Reset or Accumulate and click Run.

Reset/Accumulate With Reset selected, the measurement counters are reset at the beginning of each interval. With Accumulative selected, the measurement counters will continue to add up.

Save Settings To save the measurement setup, first select Save to open the Save As Dialog Box, enter a new file name to save as a *.pep file and click Save.

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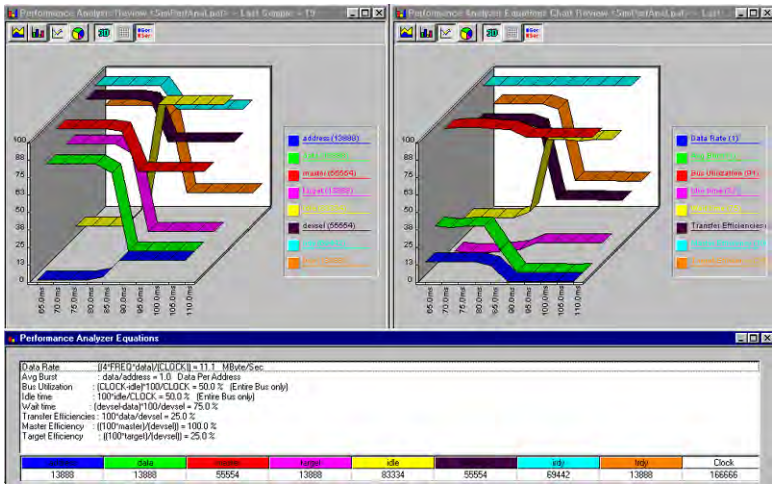


Figure 23 Performance Analysis Result

Save Results If you would like to save the analysis results, click **Save to File** enter the number of samples you wish to save and the name of the output file.

Review Results For instructions on reviewing a saved performance analysis file, see Saved Performance Analysis Review on page 81.

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Trace Statistics

PCI-X not supported in current version.

Trace Statistics analysis is implemented by capturing data in memory and then post processing it with software. The analysis software is capable of measuring important parameters such as Minimum and Maximum latency occurrences for any target or user defined specific target, command utilization such as how many times an I/O write versus I/O read occurs or, how many times memory commands occur. Available Trace Analysis parameters that may be selected for a report are listed on page 39.

Obtaining Trace Statistics



Click the **Trace Statistics Icon** on the menu bar to open the Trace Statistics dialog box

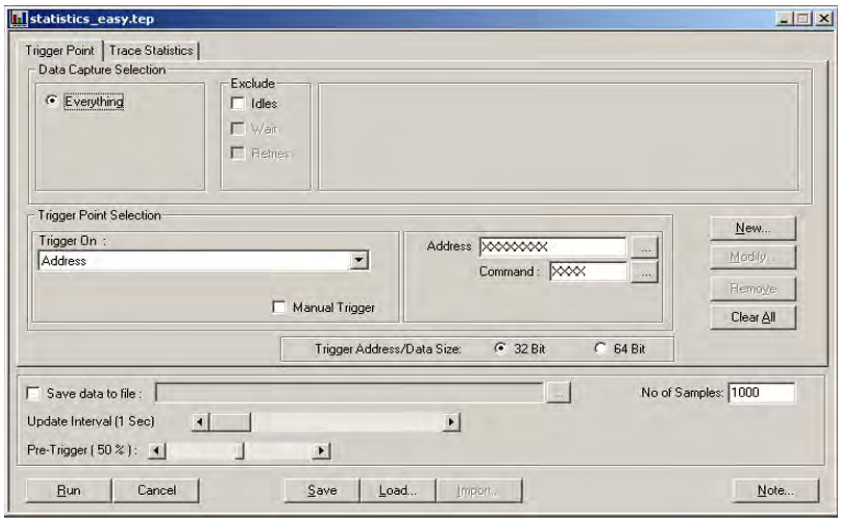


Figure 24 Trigger Point Selection

1. Select a Trigger Point from the Trigger On dropdown list and then select the **Trace Statistics** tab to set the trace statistics options. For a list of available choices see Trace Analysis Options on page 39.

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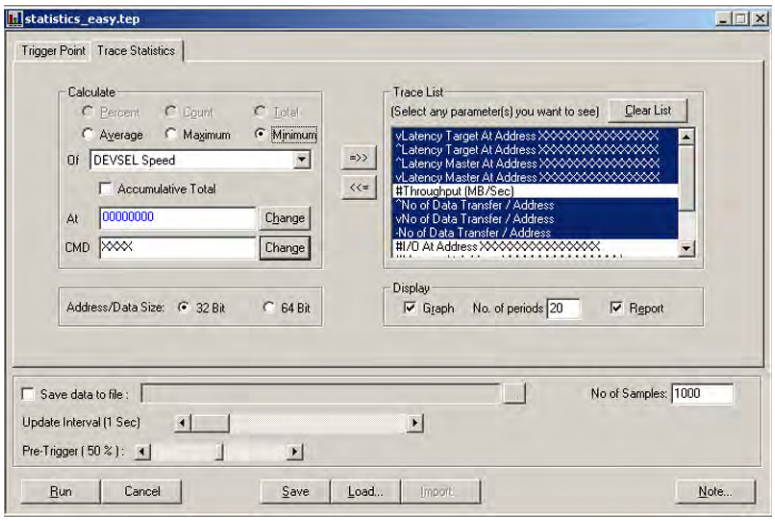


Figure 25 Easy Mode Trace Statistics Dialog Box

Selecting Parameters Select the parameters to be measured from the Analyze List **Of** shown in Figure 25. Move the selected parameter to Trace List window for software to perform interrogation on that parameter during post processing by clicking the =>> button next to the **Of** edit box. Parameters may be defined as **minimum, average, maximum or count and or percent** depending on which unit applies. Parameters may also be defined, if applicable, by address type.

Choose for Processing Highlight the parameters in the Trace List that you wish to have processed.

Number of Samples Set the amount of data to be captured in the memory for post processing for each interval. The larger the number of samples the more time is required for downloading and processing, Therefore you should select an optimum number of samples to be captured to memory such as 1000. This takes about one second to process. If your application requires more data then a larger number should be entered.

Update Interval If a small number of data samples is expected to be captured, say 1000, and the application does not require repeated measurement, you may want to sample data once every 5 or 10 seconds by changing the Update Interval to 5 or 10 seconds as required. The larger of the two number of data samples or faster update rate will be the dominating setup for data capture time.

Address/Data Size Choose 32 bit or 64 bit addressing and data size.

Graph, Report Checking either or both the **Graph** or Report check boxes will produce a corresponding graphical and or statistical report.

Pre-Trigger Pre-Trigger is set by default at 50% which defines the percentage of data to be captured before and after the triggering event. You may change this percentage by dragging the slider to the desired value.

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Pre-Trigger Data

The capture of the specified percentage of the data prior to the triggering event cannot be guaranteed and may in some cases be 0. This can occur in cases where the triggering event occurs before the required number pre-trigger event data can be stored. In these cases the data display will show fewer than the specified data points prior to the triggering event. For more detail see **Set Trigger** on page 81.

2. When all the parameters have been specified, click Run to capture the specified data and perform the trace statistics determination.

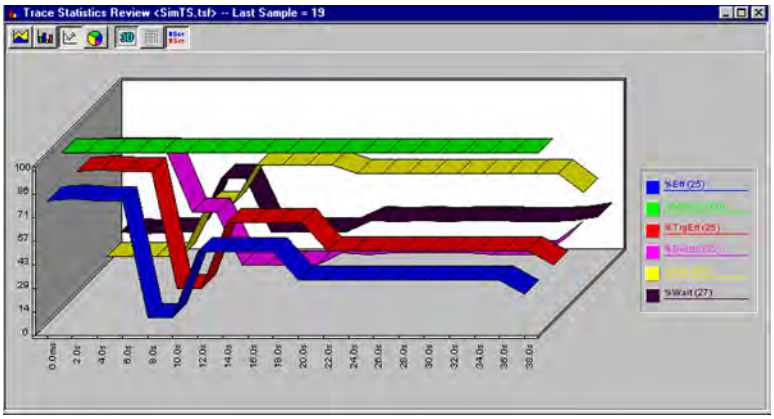


Figure 26 Trace Statistics Graphical Display

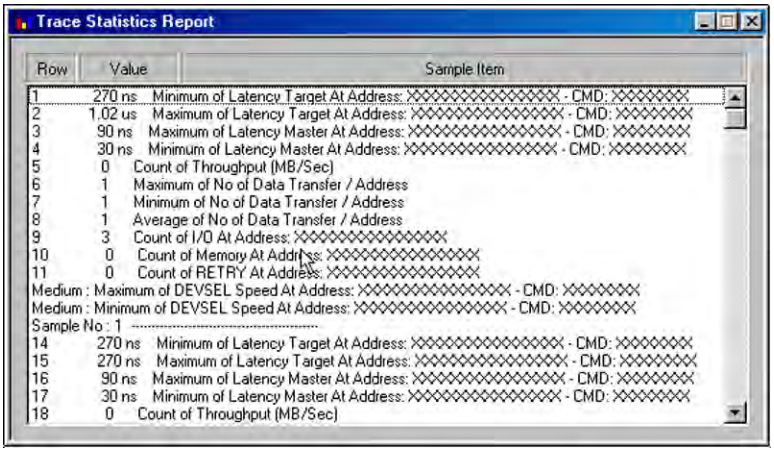


Figure 27 Trace Statistics Report

Save Measurements

All measurements may also be saved and reviewed later, select **SAVE** and specify the output file name. The results may be selected and reviewed from the View option on the Main Menu bar.

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Trace Analysis Options

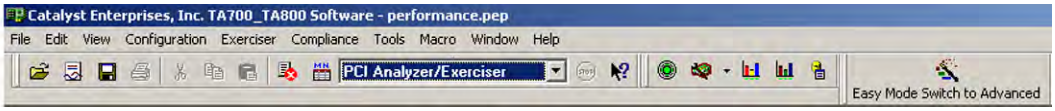
Latency Target	*Number of waits due to TRDY before first data phase
Latency Master	*Number of waits due to IRDY not asserted
Latency Arbiter	Number of clocks from REQ to GNT (master board must be plugged on top of the TA700)
Efficiency	Efficiency in percent for the duration of the captured data
Target Efficiency	*Number of TRDY# asserted over DEVSEL# asserted
Master Efficiency	*Number of IRDY# asserted over DEVSEL# asserted
Throughput Mb/Sec	Number of data transferred over time
Bus Utilization	Number of cycles DEVSEL# asserted over time
IDLE	Number of IDLE cycles
No. of Data Transfer/Addr	*Size of data burst
Wait	Number waits or wait time in percent
Int Ack	Number of INT ACK
I/O	*Total number of I/O Commands
I/O RD	*Number of I/O Read Commands
I/O WR	*Number of I/O Write Commands
Memory	*Number of Memory Commands
Mem RD	*Number of Memory Read
Mem WR	*Number of Memory Writes
Configuration	*Number of Configuration Cycles
CFG RD	*Number of Configuration Read
CFG WR	*Number of Configuration Write
MEM RM	*Number of Memory Read Multiple
DU ADD	*Number of Dual Address Commands
MEM RL	*Number of Memory Read Line Commands
MEM W&I	*Number of Memory Write and Invalidate
Total No of Data	*Number of Data Transferred during capture
RETRY	*Number of Target Retry
TABORT	*Number of Target Aborts
DIS+DATA	*Number of Target Disconnect + data
DIS-DATA	*Number of Target Disconnect - data
MABORT	*Number of Master aborts
Latency, REQ# to Data	Latency time from REQ# asserted until data transferred, including retries
DEVSEL Speed	Reports Target Decode speed

* Indicates a total or number at specified address or an address range

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Exercise and Capture

Make sure that the TA700/800 is in the S**tate Analyzer & Exerciser** configuration and is operating in the **Easy Mode** as shown on the Main Menu bar below.





Click the **Green** button on the Main Menu bar to open the Capture Data and Trigger dialog box shown in Figure 28.

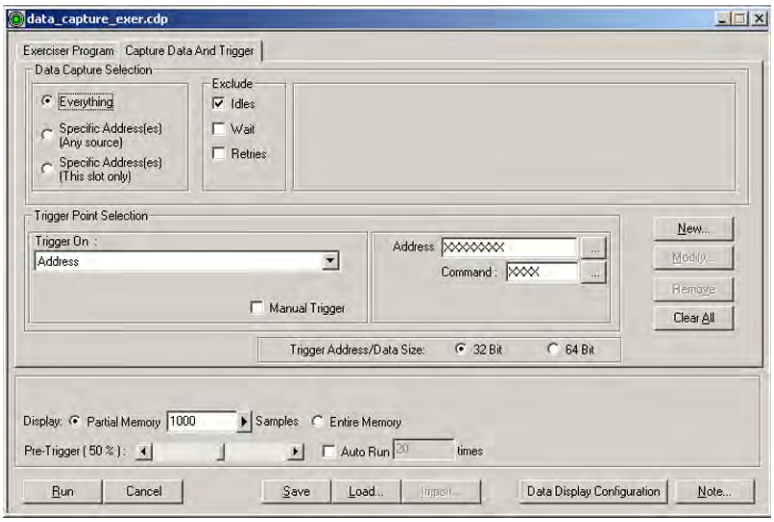


Figure 28 Capture Data and Trigger Dialog Box

The data capture and trigger operation behaves identically to that as in the State Analyzer Only configuration, with the exception, that the bus signals are generated by an exerciser program that you define.

For details of setting up a capture see "Instant Data Capture & Trigger" on page 26.

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Defining an Exerciser Program

1. Click on the Exerciser Program tab to open the Exerciser Program definition dialog box as shown in “Exerciser Program Definition Dialog Box” on page 41.

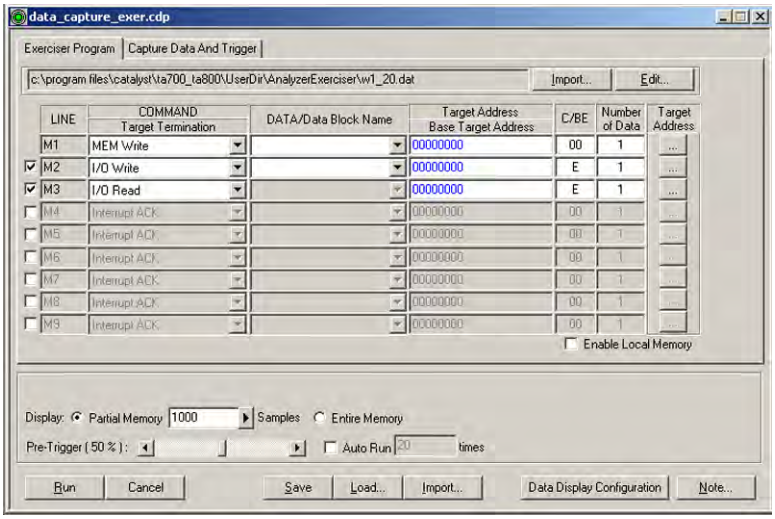


Figure 29 Exerciser Program Definition Dialog Box

2. Define up to 9 exerciser program lines by selecting a command type, data to be written or a previously defined data block if applicable, target address, and data size.
3. Set the exerciser options as described on page 42.
4. Click **Run** to perform data capture and trigger with exerciser generated signals.

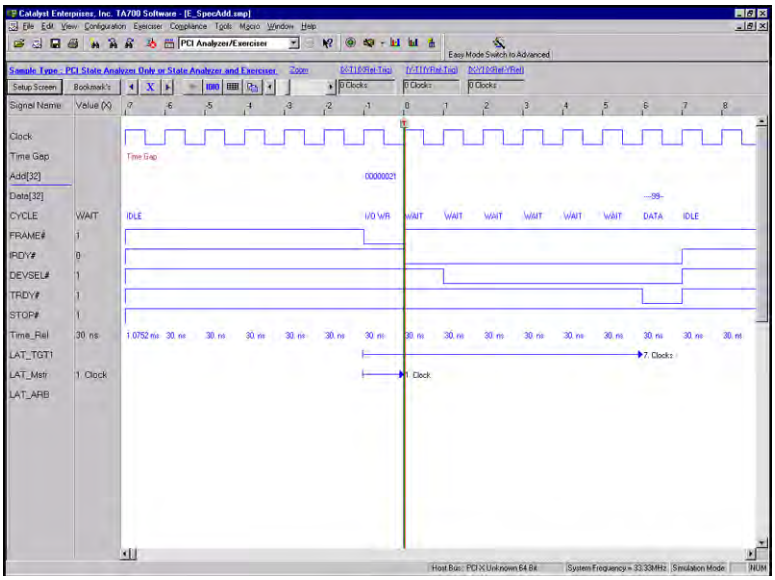


Figure 30 Wave File Output

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Setting Exerciser Options



To set the exerciser options, click **Exerciser** on the menu bar and select **Options** from the drop down list to open the exerciser dialog box as shown in Figure 31.

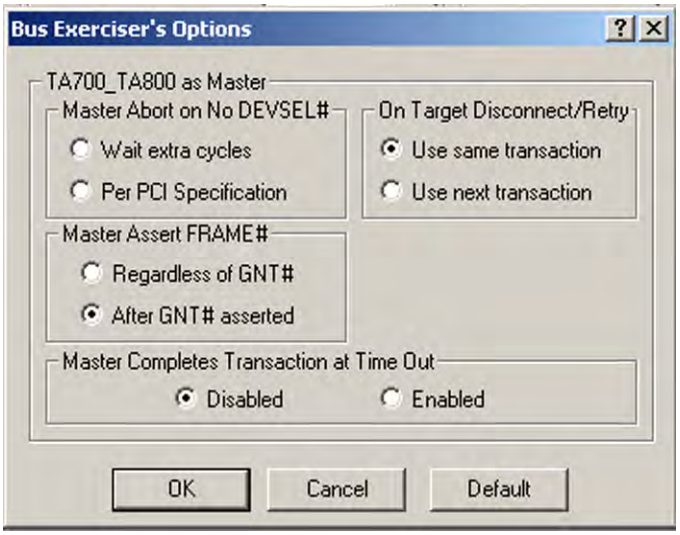


Figure 31 Exerciser Options Dialog Box

On Target Disconnect Retry

Use Same Transaction — Completes from the disconnect point on, regardless of the number of times the target issues a disconnect. The TA700/800 will take it from where the target disconnect was issued and try to complete the transaction from that point on.

Use Next Transaction — The TA700/800 will bypass all of the transactions in the current command and will jump to the transaction for the next command.

Master Abort on No DEVSEL#

Wait Extra Cycles — FRAME# says asserted 10 additional clock before issuing a Master Abort.

Per PCI Specification — A Master About will be issued on the 5th click if no DEVSEL# is asserted.

Master Assert FRAME#

Regardless of GNT# — Once the TA700/800 is set to become a master, it asserts the frame and starts the transaction regardless of the status of the GNT#.

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After GNT# Asserted	The TA700/800 will request the bus and start the transaction only after the GNT# is asserted.

Master Completes Transaction at Time Out

Disabled	The TA700/800 continues to complete the transaction for however many clocks it takes regardless of GNT# being deasserted.
Enabled	The TA700/800 completes the current transaction as soon as possible after GNT# is deasserted.

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Creating a Data Block File



To create an exerciser data file click the Data Block Icon on the Main Menu bar to open the Data File dialog box shown in Figure 32.

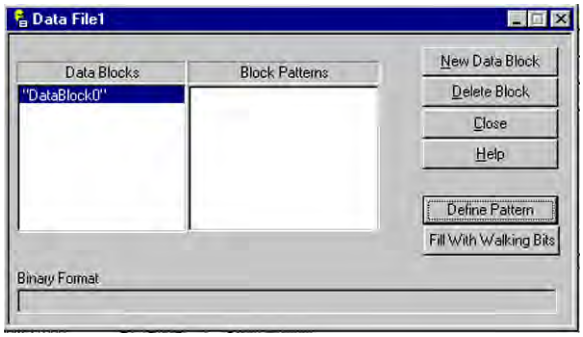


Figure 32 Data File Definition Dialog Box

Click **New Data Block** in the Data File Definition dialog box to enter a data block **("Data Block 0")** in the Data Blocks area. With the new data block highlighted you may define a specific block pattern or create a walking bit type pattern.

Fixed Data Pattern

Click the **Define Pattern** button to open the Define Data Pattern dialog box.

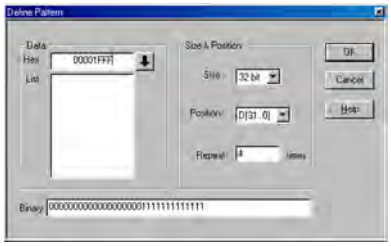


Figure 33 Define Data Pattern Dialog Box

Enter a pattern and select the number of times that pattern is to be repeated and click OK.

Multiple Line Pattern

You may define a block of multiple lines that can be automatically repeated. Figure 34 shows the definition of a two line pattern to be repeated 3 times. To add a new line, enter the data in the edit box and then click on the down arrow to include it in the list.

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Figure 34 Define Multiple Line Pattern

Figure 35 shows the resulting block pattern where the defined pattern is replicated 3 times.

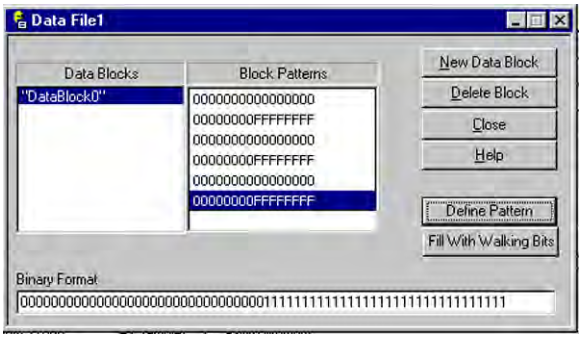


Figure 35 Resulting Multiple Line Pattern

Walking Data Pattern

Click the **Fill With Walking Bits** button to open the Fill With Walking Bits dialog box as shown in Figure 36.



Figure 36 Fill With Walking Bits Dialog Box

Enter the walking bit options desired and the number of times the data pattern is to be written and click **OK**.

Figure 37 is an example of a walking bit “1” set in a direction of left to right to be written 4 times.

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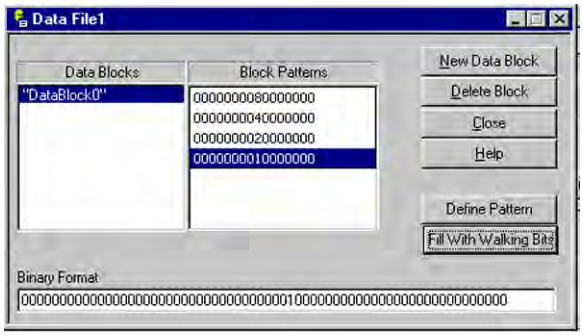


Figure 37 Walking Bit Data File Example

To save the newly created Data file click Close click Yes In the Save Changes to the Data File Dialog box.

Enter a file name **name.dat** in the Save As dialog box and click Save.

The newly created data file is now available for use with the current exerciser program.

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Archiving a Project

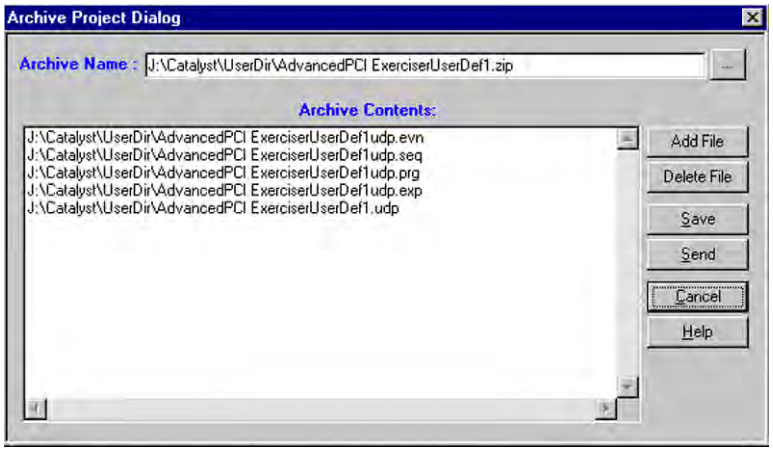
Once you have completed a project and saved it under a unique project name you may easily archive all of the project files in one operation.



To archive an open, but saved project, click **File** and choose **Archive**

The Archive Project Dialog opens displaying all of the applicable project files. As a convenience, you may also add other relevant files to the archive by clicking **Add file** and then choosing the file from the Add File to Archive dialog.

Note: Make sure that your sample file is included in the Archive Contents list.



To complete the archive click **Save.**

E-mail archive

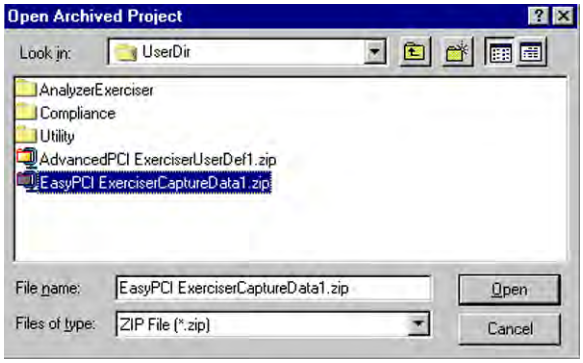
To e-mail the archived project click **Send** and complete the e-mail address in the e-mail dialog. This feature is useful for obtaining product support from the factory.

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Restoring a Project



To restore an archived project, click **File** and choose **Restore Project** to open the Open Archived Project dialog



Choose an archived project and click **Open.**

E-mail Archived Project



To e-mail an archived or currently open project, click **File** and choose **E-mail to** open the e-mail dialog.

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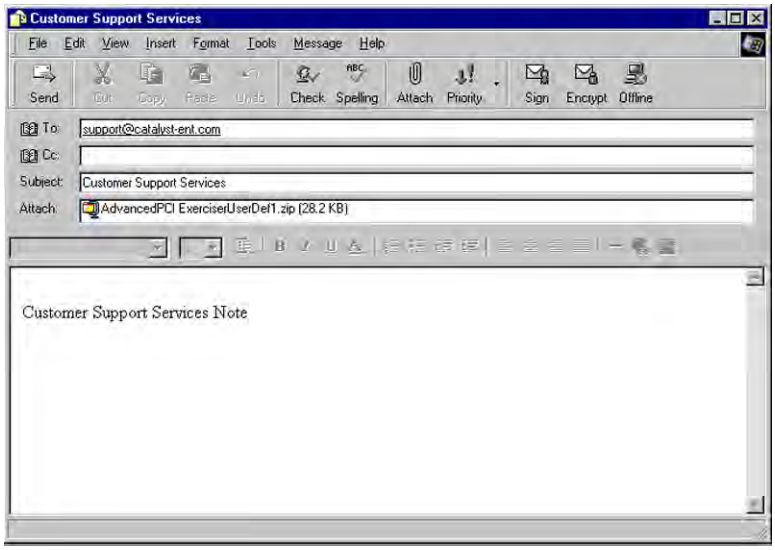


Figure 38 E-mail Dialog box

Default E-mail Client The E-mail dialog box reflects the default E-mail client installed on your system.

Default Recipient The default recipient of your E-mail is Catalyst Enterprises customer support, but you may change that to any valid E-mail address.

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Exerciser Utilities

Dump Memory



To perform a memory dump select **Dump Memory** from the Exerciser dropdown list on the menu bar. This will open the Dump Memory dialog box.

Enter a Start address and an End address or Count and click **OK** to perform a memory dump as selected.

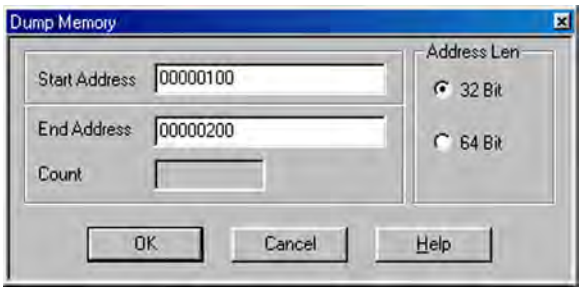


Figure 39 Dump Memory Dialog Box

The resulting memory dump will be displayed as shown in Figure 40.

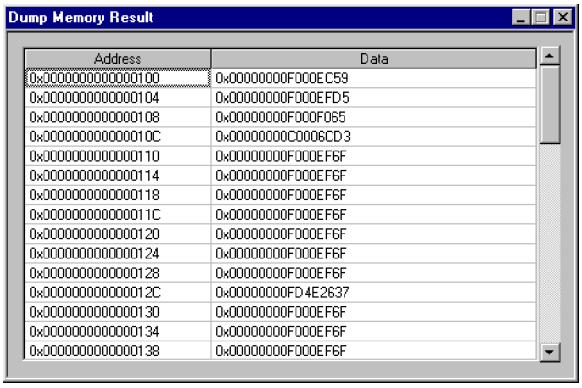
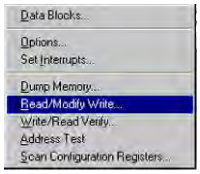


Figure 40 Dump Memory Result

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Read/Modify Write



To perform read/modify write select **Read/Modify Write . . .** from the Exerciser dropdown list on the menu bar. This will open the Read/Modify Write dialog box.

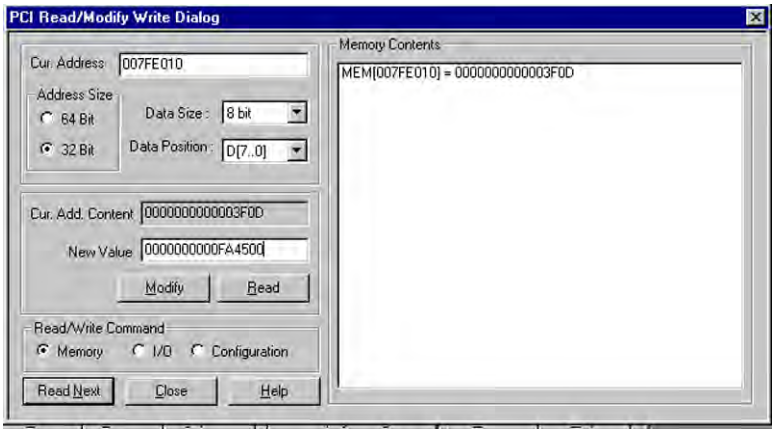


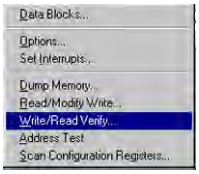
Figure 41 Read/Modify Write Dialog Box

1. Enter an address the contents of which you wish to modify in the Current Address edit box.
2. Enter the value to be written to that address in the New Value edit box.

NOTE: This feature assigns the TA700/800 to be a bus master and may be used to read or write to any register or memory address of a target device without having to use a programming menu.

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Write/Read Verify



To perform Write Read Verify select **Write/Read Verify** from the Exerciser dropdown list on the menu bar. This will open the Write/Read verify dialog box.

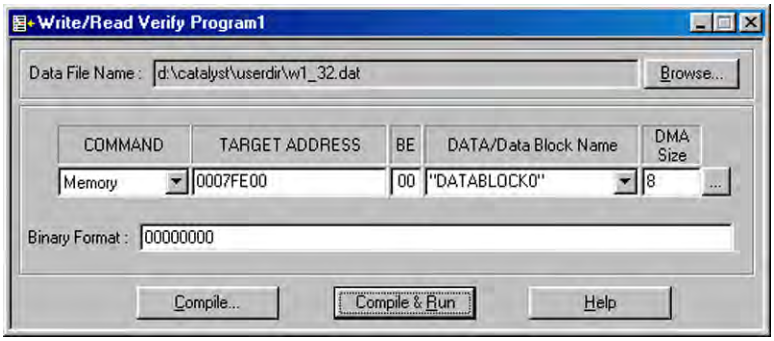


Figure 42 Write/Read Verify Dialog Box

1. Select the command type from the Command dropdown list, enter the Target address, BE and either the data to be written or a previously defined data block and a DMA size.
2. Click **Compile & Run** to perform the Read/Write verification.
3. To view the executable code as shown in Figure 43 click **Compile** and then to perform the Read/Write verification click **Run**.

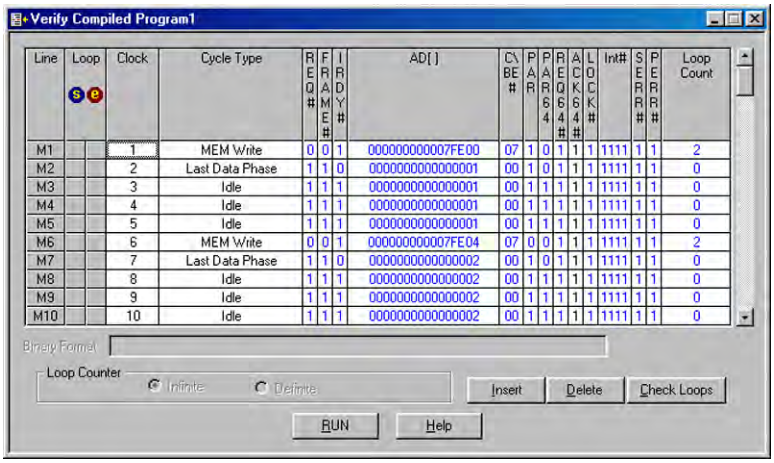


Figure 43 Write/Read Verify Compiled Program

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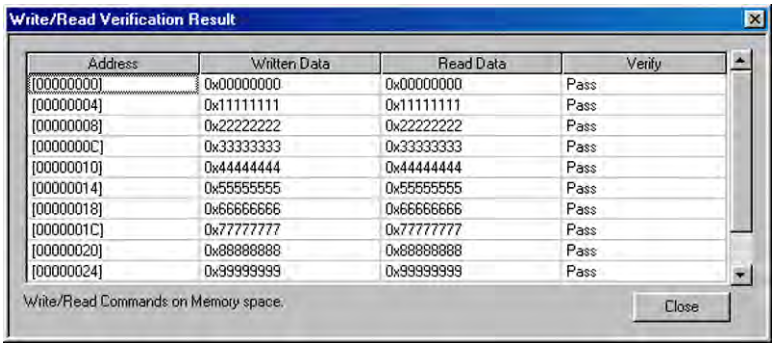
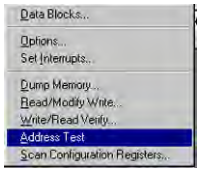


Figure 44 Write/Read Verification Result

Address Test



To perform an Address Test select **Address Test** from the Exerciser dropdown list on the menu bar to open the Address Test Program dialog box.

1. Enter the starting address to be tested and the number of addresses (Length) to be tested.

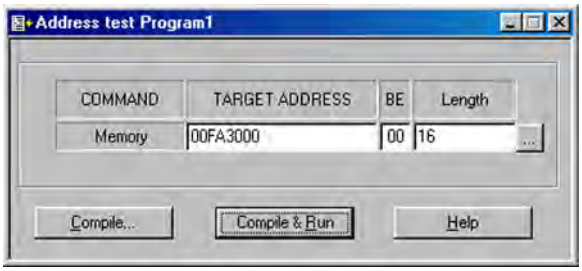


Figure 45 Address Test Program Dialog Box

2. Click the ellipses button next to the Length edit box to set the Read/Write properties, click OK and then Compile & Run. The test results are displayed as in Figure 47.

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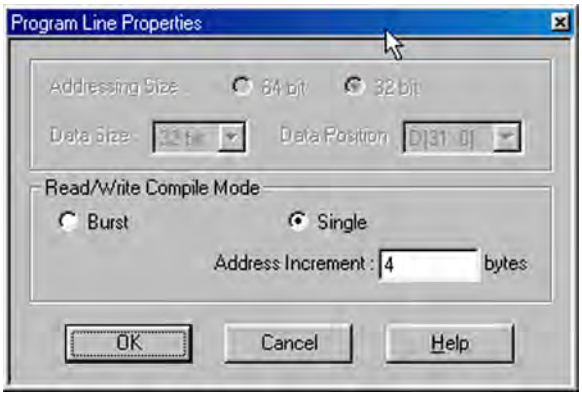


Figure 46 Set Read Write Compile Mode Dialog Box

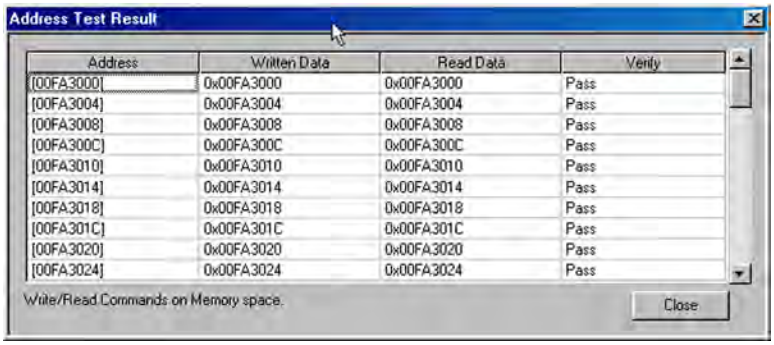


Figure 47 Address Test Result

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Scan Configuration Registers



To perform a configuration scan select **Scan Configuration Registers** from the Exerciser dropdown list on the menu bar.

The system will search for PCI devices on the bus and display the configuration as shown in Figure 48. All devices on the bus are reported. To see information on additional devices click **Next>**.

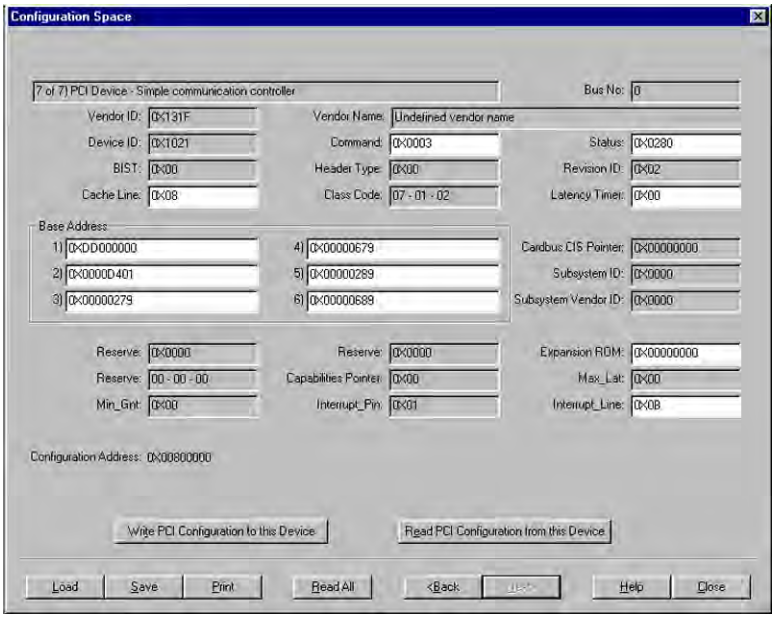


Figure 48 Configuration Header Display Dialog Box

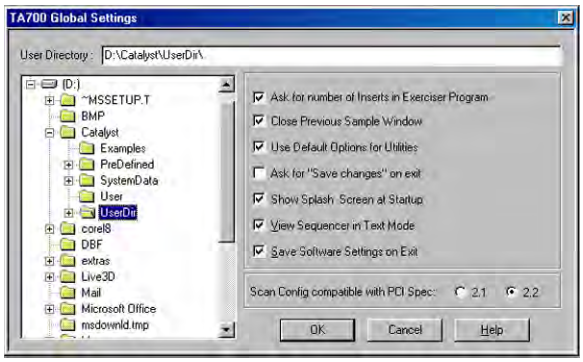
You may edit all of the parameters displayed in white, if your hardware allows it. Edit the field and then click on the “Write PCI Configuration to this Device” button.

To save configuration read all devices, find your device and save it to a file.

PCI 2.1 or PCI 2.2 Specification

Scan check may be performed to either the PCI 2.1 or PCI 2.2 specification. The selection of which specification is made on the Software Global Settings dialog box. To set these options click **Configuration** on the main menu bar and then choose **Software Settings**.

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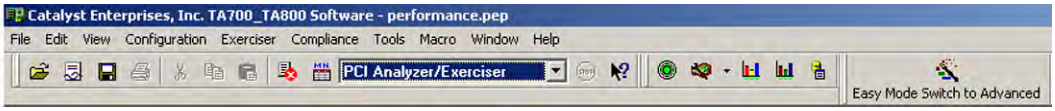
Scan Direction Limitation The TA700/800 may be used in any bus location including downstream from a bridge. Since the TA700/800 can only scan subsequent buses through a bridge in a forward direction devices above the bridge will not be found.

Device Compliance To perform an immediate device compliance on a device, see **Compliance Device Test** on page 116.

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Generate Traffic and Measure Performance

Make sure that the TA700/800 is in the State Analyzer & Exerciser configuration and is operating in the Easy Mode as shown on the Main Menu bar below.



Performance Analysis with exerciser requires you to define an exerciser program as described in Defining an Exerciser Program on page 41.



Click the Performance Analysis Icon on the menu bar to open the Performance Analysis dialog box as shown in Figure 49.

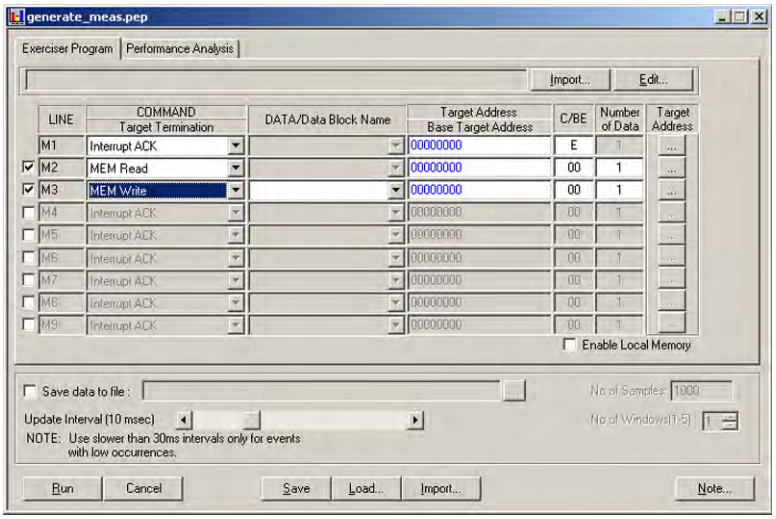


Figure 49 Performance Analysis with Exerciser

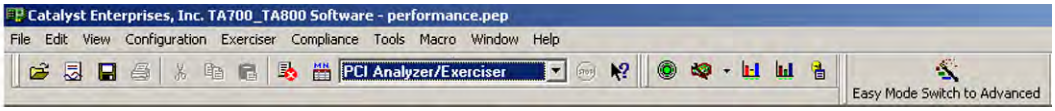
To perform Performance Analysis with the exerciser:

1. Define the exerciser program, such as reading or writing to a known memory location.
2. Click the Performance Analysis Tab and set up the Performance Analysis as described in Performance Analysis on page 34.
3. Click **Run.**

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Generate Traffic and Measure Statistics

Make sure that the TA700/800 is in the State Analyzer & Exerciser configuration and is operating in the Easy Mode as shown on the Main Menu bar below.





Click the Trace Statistics Icon on the menu bar to open the Trace Statistics dialog box as shown in Figure 50.

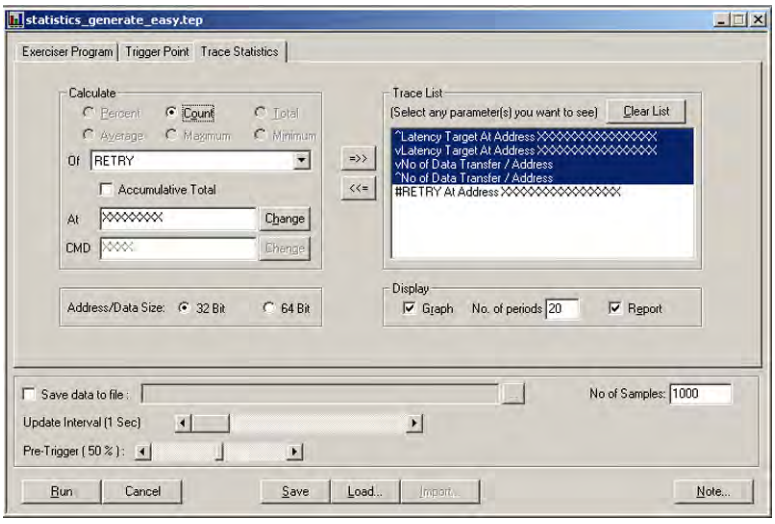


Figure 50 Trace Statistics With Exerciser

To obtain Trace Statistics with the exerciser:

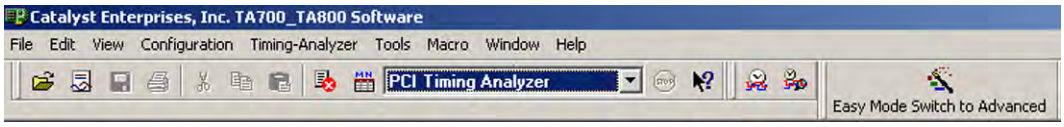
1. Set the trace statistics options and the Trigger Point as described in Obtaining Trace Statistics on page 36.
2. Click the Exerciser Tab and define the Exerciser Program as described in Defining an Exerciser Program on page 41.
3. When all the parameters have been specified, click **Run** to capture the specified data and perform the statistics reporting.

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Timing Analysis - Synchronous

Make sure that the TA700/800 is in the State & Timing Analyzer configuration and is operating in the Easy Mode as shown on the Main Menu bar below.

This mode of operation is not supported by the TA700PDC, TA800 or PCI-X



In this mode you may immediately detect and capture timing violations on all bus signals. Any bus “glitch” of 1.5 ns or greater is captured as a timing violation.

You may also perform a Setup/Hold Limits search on any or all PCI bus signals by using a convenient signal mask.

Caution: When performing measurements at 66.6MHz, make sure extender switch if OFF.



To perform an immediate timing analysis, click the Timing Violation Icon to open the Timing Violation Analysis dialog box.

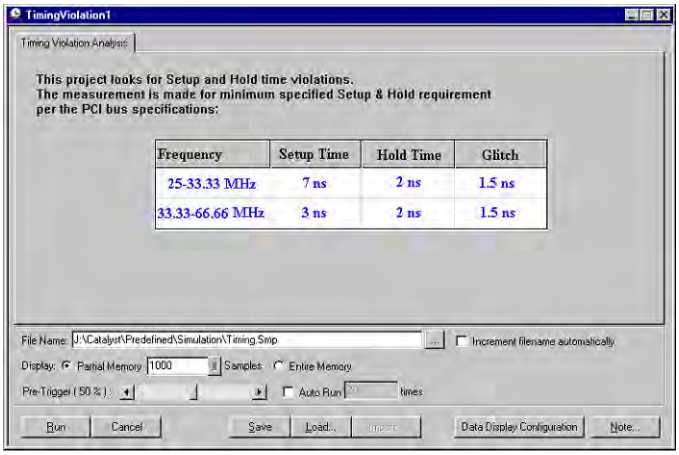


Figure 51 Timing Violation Analysis Dialog Box

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Timing Violation Capture

1. Set the desired data capture options such as Pre-Trigger percent, Display Memory etc. and click Run.

The occurrence of the first timing violation will cause a trigger and open the Timing Violation Results display as shown in Figure 52. The red signals represent a timing violation. Bus signals are shown in a code. As an example 00000080 indicates that the timing problem is for AD7, and 1000000C indicates the problem is for AD28, AD3 & AD2 signals.

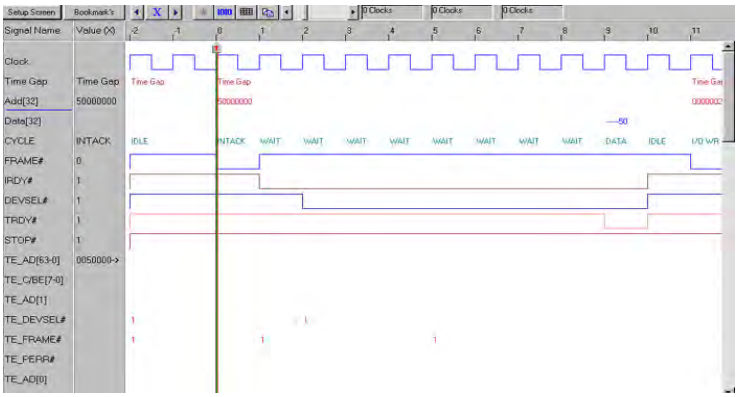


Figure 52 Timing Violation Results Display

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Search for Setup & Hold Limits



To search for setup and hold limits click the Setup/Hold Limits search Icon to open the Setup and Hold Limits Mask definition dialog box.

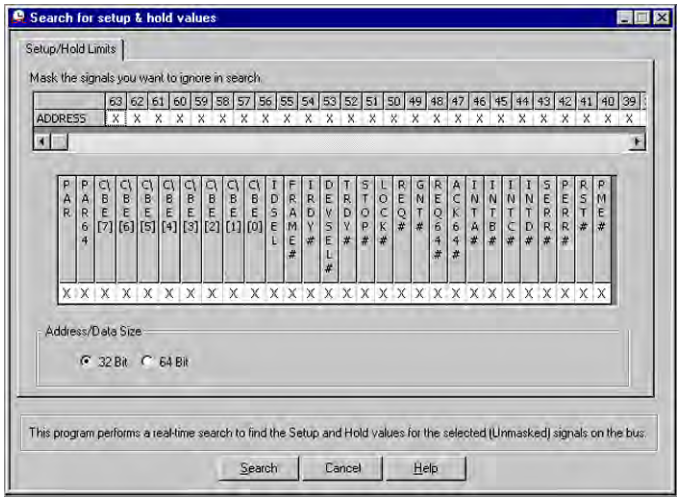


Figure 53 Setup and Hold Limits Mask Definition Dialog Box

Select the signals that you wish to ignore in the search and then click **Search**. At the completion of the search the result is displayed as shown in Figure 54.

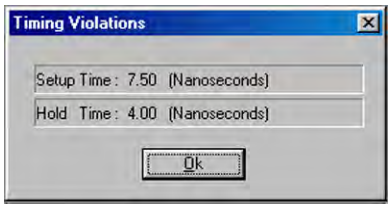


Figure 54 Setup and Hold Limits Search Result

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Timing Analysis - Asynchronous

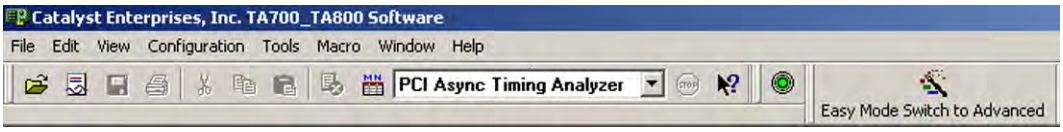
Not available for TA700PDC

PCI-X and TA800 asynchronous timing not supported.

Asynchronous timing analysis uses a 664 MHz independent clock to sample PCI bus signals. This clock is asynchronous to the PCI bus clock and allows a very high resolution sampling of the bus signals.

Caution: The TA700/800 may draw as much as 4.0 A during an asynchronous timing test, the TA700/800 board must be configured to operate from the + 3.3V bus power. JP2 shunted between pins 2 - 3.

To perform an asynchronous timing analysis, make sure that the TA700/800 is in the PCI Async Timing Analyzer working mode as shown on the Main Menu bar below.





Click the **Green** Icon on the Main Menu bar to open the Capture Data and Trigger dialog box shown in Figure 55.

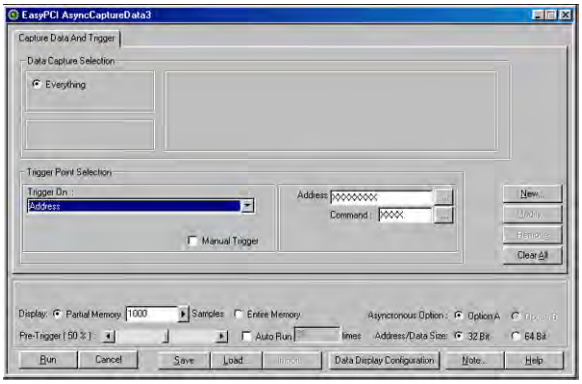


Figure 55 Asynchronous Timing Capture Data And Trigger Dialog

1. Select a Pre-Defined Trigger Point (See Table 1. on page 27) from the **Trigger On** dropdown list, select the Asynchronous Option A or B and set the desired

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data capture options as outlined on page 33 and click **Run.** Wait to capture data and to view the result as shown in Figure 56.

Asynchronous Option A Samples PCI control signals and addresses AD[31 . . 0]

Asynchronous Option B Samples PCI control signals and addresses AD[63 . . 32]

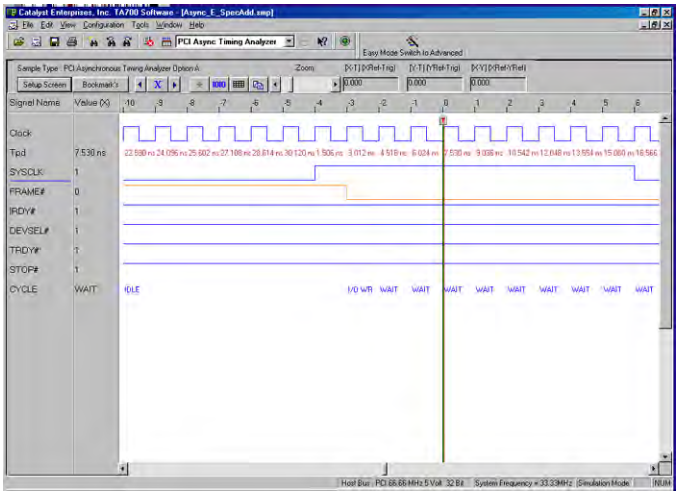


Figure 56 Asynchronous Timing Data Capture Wave Display

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Advanced Mode

The Advanced Mode expands the analyzer capability by allowing you to program special custom debugging projects and define complex triggering levels. Such projects are programmed by defining event patterns for triggering and triggering sequences om convenient Event Pattern definition and Sequencer programming menus.

The State & Timing analyzer configuration, in addition to the special programming with event and sequencer files, also expands the Timing Violation Analysis by allowing you to chose leading and trailing edge timing values.

With this expanded capability you may perform all of the same analysis functions as in the Easy Mode but with much customizing.

- Setup complex triggering level to Capture data and trigger using custom projects.
- Perform timing characterization timing violation detection.
- Capture bus activity and the device under test response under different conditions using the exerciser.
- Do Performance Analysis on PCI bus activities.
- Measure and report Statistics on selected parameters.

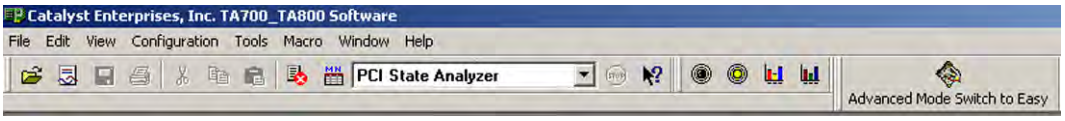
Easy Mode Access As a convenience to allow you to get a quick snapshot of bus activity, the Advanced Mode menu bar includes a Yellow button that gives you access to an Enhanced Easy mode.

Enhanced Easy Mode Accessing the Easy mode from the Advanced mode expands the exerciser programming capability to include program loops

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Custom Capture Data Project

With the TA700/800 operating in the **Advanced Mode** as shown on the Main Menu bar below, make sure that the Working Mode is **PCI State Analyzer** or **PCI-X Analyzer**.



For a custom project you must define/program:

- A set of Events
- A sequencer Program

Example Files

Your analyzer includes a set of pre-defined Project, Event and sequencer files. You may load a complete Project or import Events and Sequencer programs to perform pre-determined tasks. For more detail see Example Files on page 113.

1. Click the Black button on the Main Menu bar to open the Custom Project dialog box shown in Figure 57.

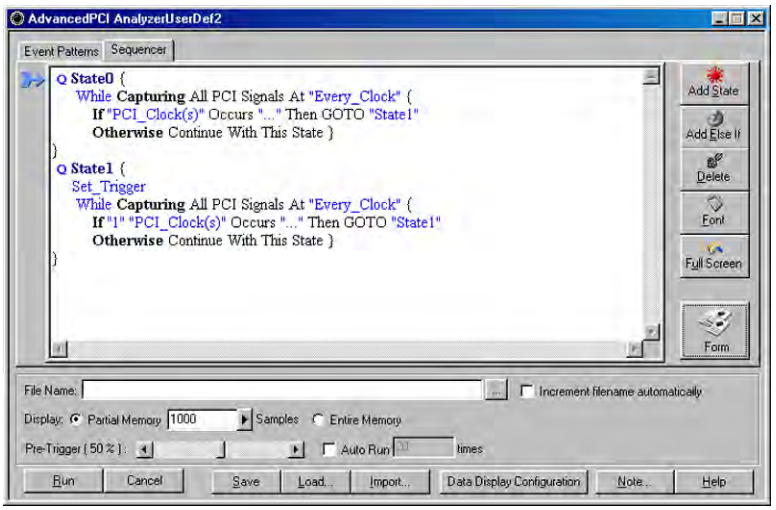


Figure 57 Custom Project Dialog Box

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Defining Event Patterns

An Event pattern defines the PCI/PCI-X bus signals, including address, data and control signals to:

- Define the data capture manipulation.
- Define events that are used for Performance Analysis and Bus Utilization measurement.

You may define up to 8 events identified as follows:

EV1 - EV8 8 Events with identical capability.

DEFAULT NAMES **EV1 - EV8** are default event names that may be changed to a user defined descriptive name for reference in the Sequencer and Performance analysis displays.

PCI SIGNALS All PCI bus signals are included except JTAG which is used for boundary scan testing.

EXTERNAL The TA700 & TA850 supports 16 external signals that are all sampled and captured in memory in synch with the PCI bus signals. **Not available on the TA800.**

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Creating an Event Pattern

Click the Event Patterns tab to open the Event Pattern Definition dialog box.

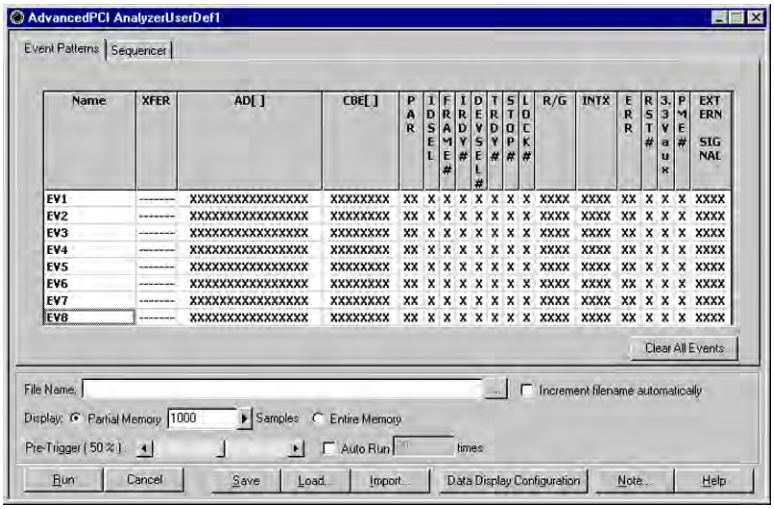


Figure 58 PCI Event Pattern Definition Dialog Box

To enter a parameter or edit a previously entered parameter, double-click in the appropriate data field to open a corresponding dialog box, enter the required data, and click **OK**. The changes entered will be reflected in the edited data field.

Keyboard Edit

You may also edit all of the data fields by using the keyboard by moving through the available data fields using the arrow keys and pressing Enter on the desired field to either open the associated dialog box or to change the contents from X to 0 to 1.

Name an Event

For example, to define EV1 as mem_addr, double click in the EV1 field to open the **New Event Setting** dialog, enter the new event name and click **Rename**.

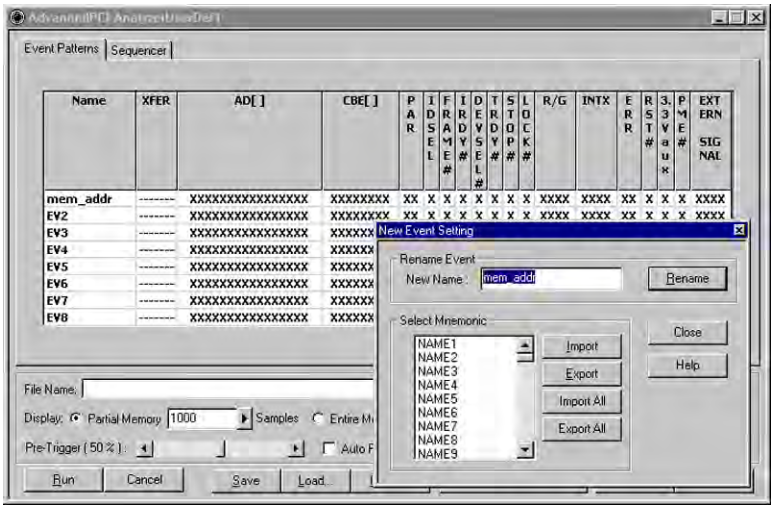


Figure 59 Naming an Event

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Mnemonics as Events

To use a pre-defined Mnemonic as an Event, double click in an Event field, then select a Mnemonic from the Select Mnemonic window in the **New Event Setting** dialog an click **Import.** For a detailed description of Mnemonics see “Mnemonics” on page 164.

External Signals

External input signals are an extension of event definition. You may include an external signal with an event definition by double clicking the in the External Signal data field and entering an external signal number between 0 and 0xFFFF.

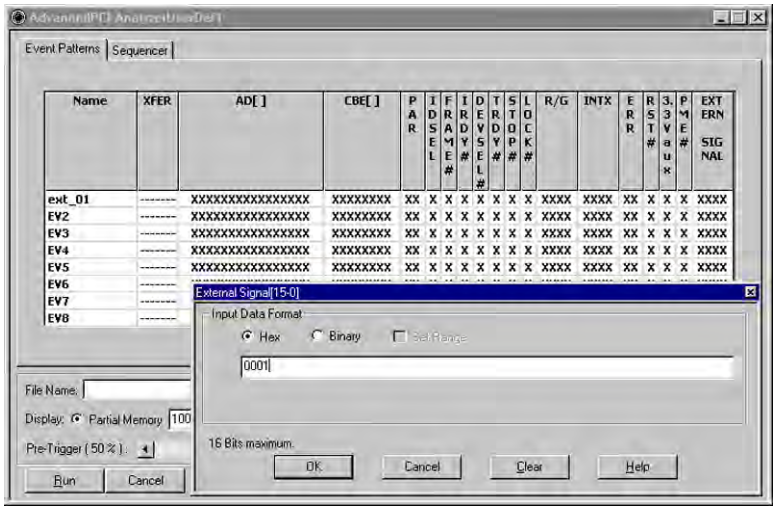


Figure 60 Invoking an External Signal

Set Default

To set all of the PCI signals to the default value of don’t care, X, for any given event EVx, position the highlighted cursor anywhere in that row and hit the “del” key.

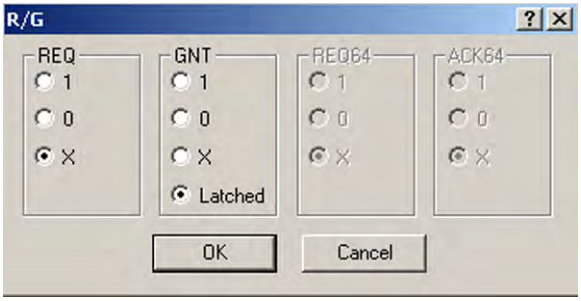
Set Transfer Type

The transfer type selection dialog box shown in Figure 61 controls the pre-determined signal settings and address limits based upon the **XFER** type selected. For example, with A32 selected as shown, the address field is automatically limited to 32 bits, a limited CBE dialog as shown in Figure 62 is enabled, 64 bit settings in the PAR dialog and the R/G dialog are grayed out. Additionally the **IDSEL**, **FRAME#**, **IRDY#**, **DEVSEL#**, **TRDY#** and **STOP#** are pre-defined and unchangeable.

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Limit to Current Slot

You may qualify an event to be applicable to the transaction started at the current slot only by setting the **"Latched"** option in the R/G dialog.



Alternate qualification

A different way to qualify an event to the current slot is to double click the **XFER** field and then select the desired latched transfer type **LA32, LMX32, LA64 or LMX64**. These options are the same as A32, MX32 etc. except that they apply only to the slot that the TA700/800 is installed in.

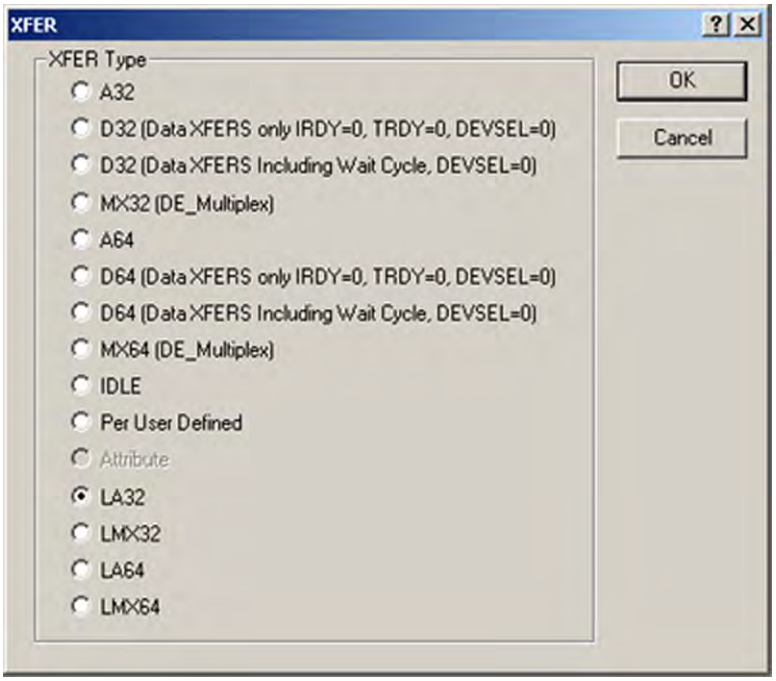


Figure 61 PCI Transfer Type Selection Dialog Box

PCI-X Attributes

When operating as a PCI-X analyzer an additional transfer type choice, **Attributes**, is enabled. See "PCI-X Attributes" on page 73 for description.

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Figure 62 Limited CBE Dialog Box

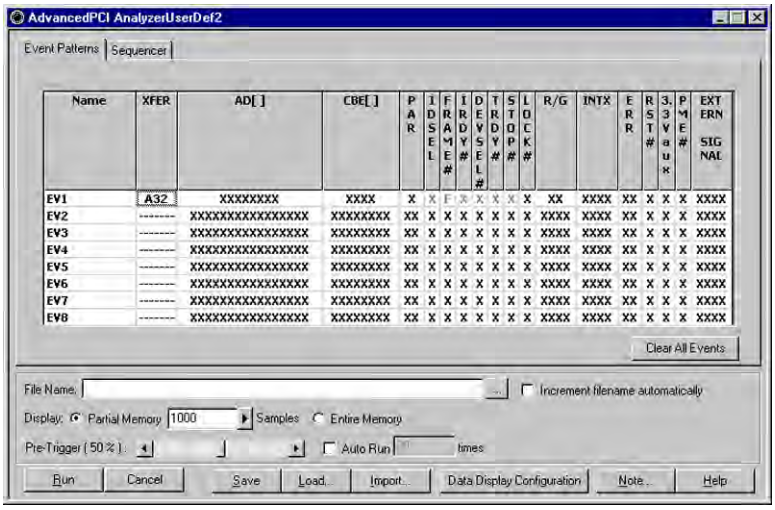


Figure 63 PCI Event File Setup for XFER Type A32

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Set Address Range

To set an address range for an event, select an address XFER type and double click in the **AD[]** field to open the data entry dialog. Check the **Set Range** box, enter the address range values and click OK.

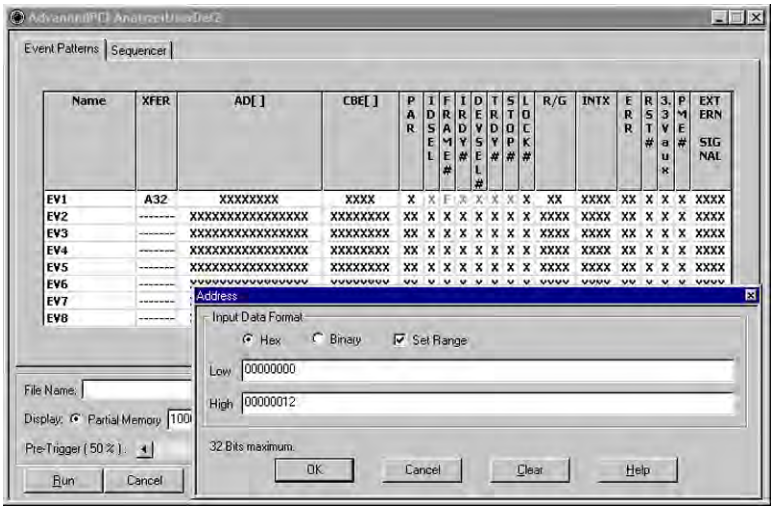


Figure 64 Setting an Address Range

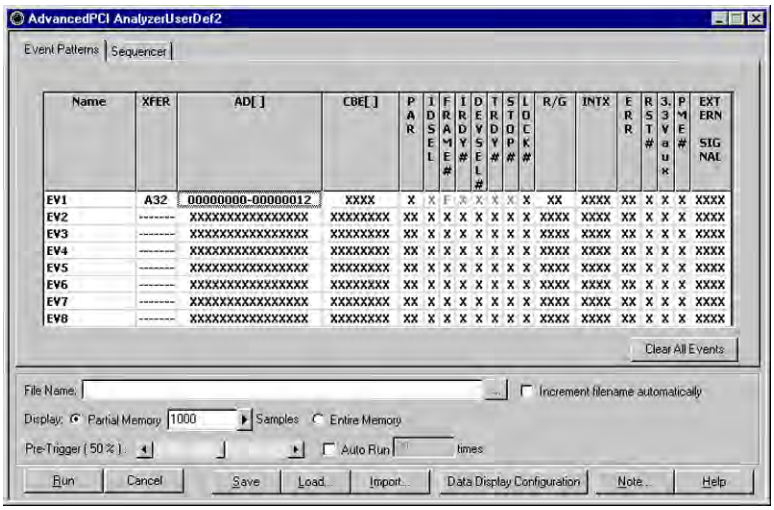


Figure 65 Address Range Set

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PCI-X Attributes

To define an Event with Attributes double click the XFR field in the event pattern definition dialog and choose **Attributes** in the PCI-X transfer type dialog box.

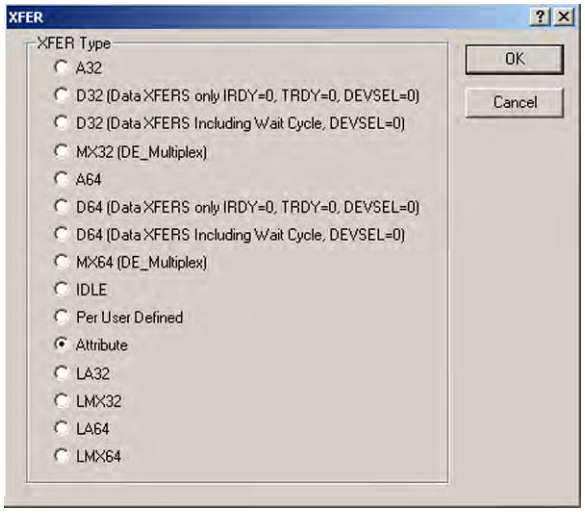


Figure 66 PCI-X Transfer Type Selection Dialog Box

Note that for the event chosen with Attributes as XFER, the AD[] and CBE[] fields are merged.

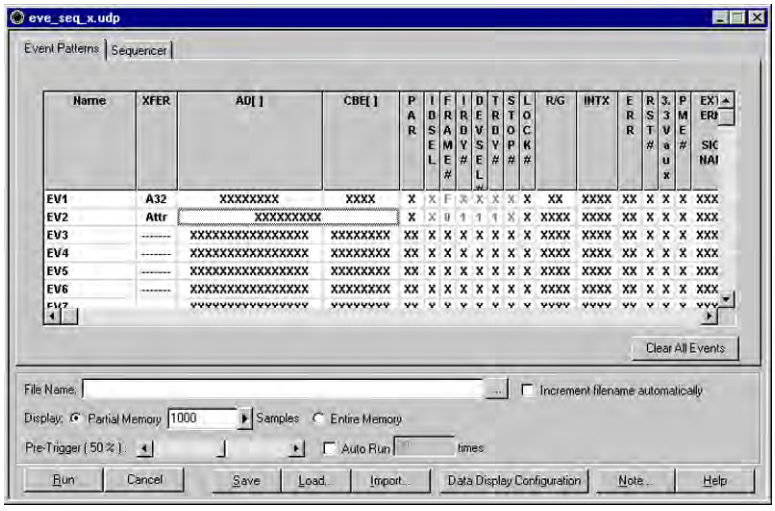


Figure 67 PCI-X Event Pattern Definition Dialog Box

To Set Attributes Double click the merged AD[] and CBE[] fields to open the **Set Attributes** dialog as shown in Figure 68.

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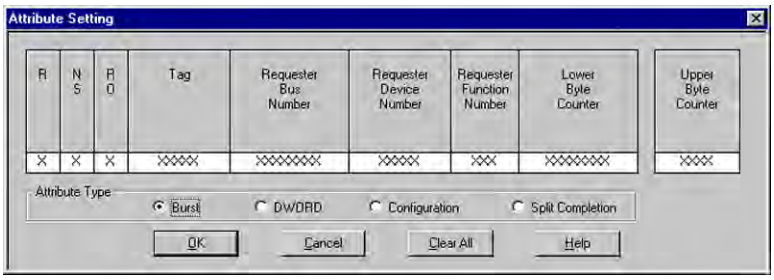


Figure 68 Attribute Setting Dialog

Check the desired **Attribute Type** and enter the required parameters.

Abbreviations The following is a definition of the abbreviation designated fields:

With **Burst** or **DWORD** attribute type is selected:

R Reserved

NS No Snoop

RO Relaxed Ordering

When **Configuration** attribute type is selected:

R Reserved

When **Split Completion** attribute type is selected:

BCM Byte Count Modified

SCE Split Completion Error

SCM Split Completion Message

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Programming the Sequencer

The sequencer is used for data capture manipulation, generating complex triggering on bus events and starting the exerciser (if required).

The TA700/800 Sequencer includes 32 states, S0 to S31 (Limited to 16 states in TA800). The Sequencer always starts at S0. Each state can be programmed to go to any other state depending on the occurrences of specified patterns in that state. Jump to any state is conditional. At any of the states S1-S30, the Sequencer may jump to several other possible states depending on which of the specified conditions have been met first.

A Trigger may be set in the Sequencer to occur:

1. Unconditionally at any state
2. On protocol error (PE).
3. On occurrences of Events or on Boolean expressions of Events.
4. On occurrence of a timing error. **Not supported on TA700PDC (PMC) and TA800.**
5. On occurrence of an external signal input. **TA800 does not support external signals.**

Unconditional trigger is mostly useful when data sampling requires more than one Sequencer state. So the trigger may be set to occur at S1 and then continue to sample data based on several sequences of events.

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The data capture choices for every state are:

All	Captures all data on every cycle
None	Captures no data
EV1 - EV8	Captures data as specified for each events
!EV1-!EV8	Captures all data outside the specified address or data range
Expression	Captures data as defined by a Boolean expression

The state transition events for every state are:

Any	Unconditional
Protocol Error	A Protocol Error
Timing Error	Only in **PCI Timing Analyzer. Not supported on TA700PDC (PMC) and TA800.**
EV1 - EV8	Predefined events
!EV1-!EV8	If not pre-defined
Expression	A Boolean equation of events. e.g. EV1+!EV2
External	External signals

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Programming the Sequencer as Text

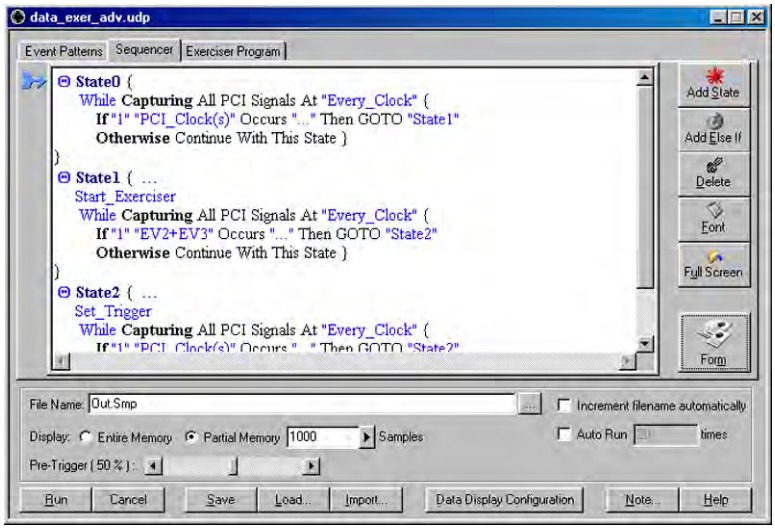


Figure 69 Prototype Text Programming Window

The text programming window opens with three default prototype states with all programmable parameters displayed in blue.

Additional States You may add up to 30 additional states by clicking the **Add State** button. Programmable parameters are displayed as blue.

Maximize Display You may maximize the programming window by clicking the **Full Screen** button.

To Change Parameters

1. Position the display cursor over the parameter and double click the left mouse button to open a list box with available choices for that parameter. See Figure 70.
2. Choose the desired parameter with the display cursor and double click the left mouse button.

To Delete a Parameter Double click the parameter to be deleted and select delete.

Add Else If You may include Else If statements in your program by clicking the **Add Else If** button. To remove the added Else If, double click on it and choose <Delete> from the open list box.

Tag and Discard Tag and Discard allows the user to delete a portion of the capture memory. Setting Tag places a marker in capture memory and setting Discard causes the deletion of all captured data between Tag and Discard.

Click the ellipses after **If** [Event_A occurs] "..." and choose **Tag_Event** at the point after which you expect a result. Then click the ellipses after **ElseIf** [Event_B occurs] "..." in the state where you expect the result and choose **Discard**. Data will be discarded between the last Tag_Event set and the Discard set.

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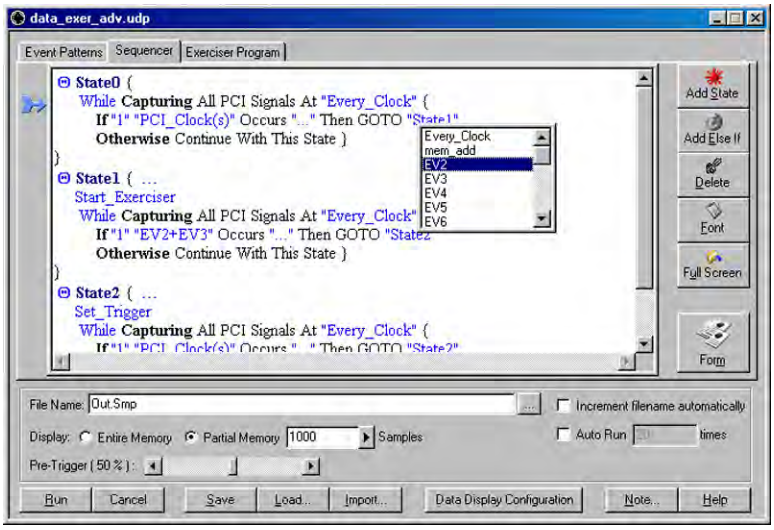


Figure 70 Changing the Programmable Parameters

Optimum Workspace

To avoid scrolling the display in long sequencer programs you may minimize completed states by double clicking the symbol next to the state to be minimized. To expand the minimized state, double click the state name.

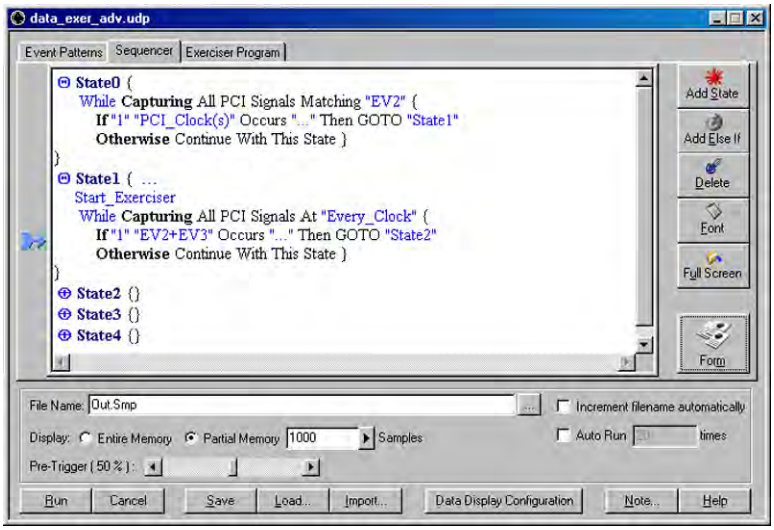


Figure 71 Minimized State Display

Deleting a State

To delete a state, place the cursor in the text for that state and click the **Delete** button.

Pre-Trigger

The Sequencer menu includes a Pre-trigger xx% function which lets you set the percent of data to be captured before and after the triggering event. This percentage is set by default to 50%. For more details see "Set Trigger" on page 81

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Programming the Sequencer With Menu Form



To program the sequencer with a menu form click the **Form** button in the Sequencer programming window to open the form window as shown in Figure 72.

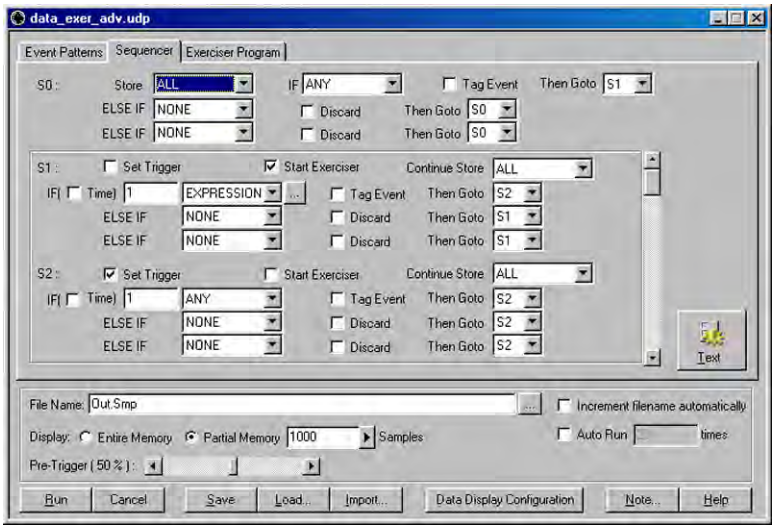


Figure 72 Sequencer Menu Form Style Programming Dialog Box

Unlimited Else If The menu form allows only 2 Else If statements but in the **Text Form** the user may add as many Else If statements as desired.

To View and Program As Text Click the Text button on the Sequencer Form menu.

Pre-Trigger The Sequencer menu includes a Pre-trigger xx% function which lets you set the percent of data to be captured before and after the triggering event. This percentage is set by default to 50%. For more details see "Set Trigger" on page 81

The Sequencer definition dialog box shown Figure 72 displays the programmable states as follows:

S0	The starting state, displayed always.
S1 - S31	These states can be viewed and programmed two at a time by using the scroll bar on the right side of the screen.

Tag and Discard Tag and Discard allows the user to delete a portion of the capture memory. Setting Tag places a marker in capture memory and setting Discard causes the deletion of all captured data between Tag and Discard.

Click the ellipses after **If** [Event_A occurs] "..." and choose **Tag_Event** at the point after which you expect a result. Then click the ellipses after **ElseIf** [Event_B occurs] "..." in the state where you expect the result and choose **Discard**. Data will be discarded between the last Tag_Event set and the Discard set.

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Defining a Boolean Expression

To define an expression, scroll down the list of options in the dropdown list where you wish to use an expression and click on Expression to open the Expression Editor window as shown in Figure 73.

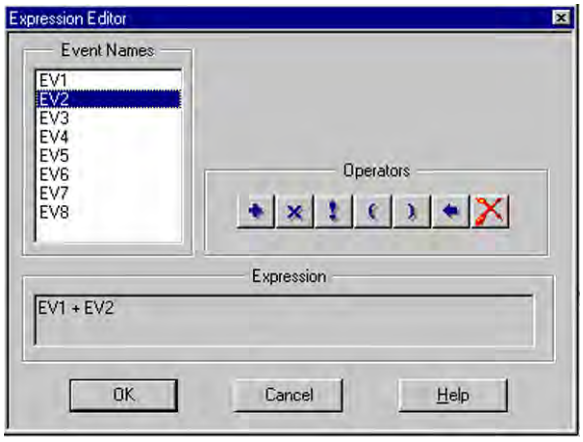


Figure 73 Expression Editor Window

Double click the Event Names and Operators as required to define the desired Boolean expression and click **OK**.

The available Boolean operators available from left to right are: Logical Or, Logical And, Negation, Parentheses, Backspace and Clear.

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Set Trigger

Set trigger is available to be set by the user for states S1 - S31. When set trigger is selected, a trigger is enabled, when the Sequencer enters that state for the first time. The amount of data to be captured before and after the trigger may be set as a percentage of pre-trigger, between 0% and 100%. This may be done by positioning the pre-trigger slider to the desired percentage. This feature allows the evaluation of bus activity leading up to and after the triggering event. The operation of the pre trigger in the data memory is conceptually illustrated in Figure 74

Pre-Trigger Data: The capture of the specified percentage of the data prior to the triggering event cannot be guaranteed and may in some cases be 0. This can occur in cases where the triggering event occurs before the required number pre-trigger event data can be stored. In these cases the data display will show fewer than the specified data points prior to the triggering event.

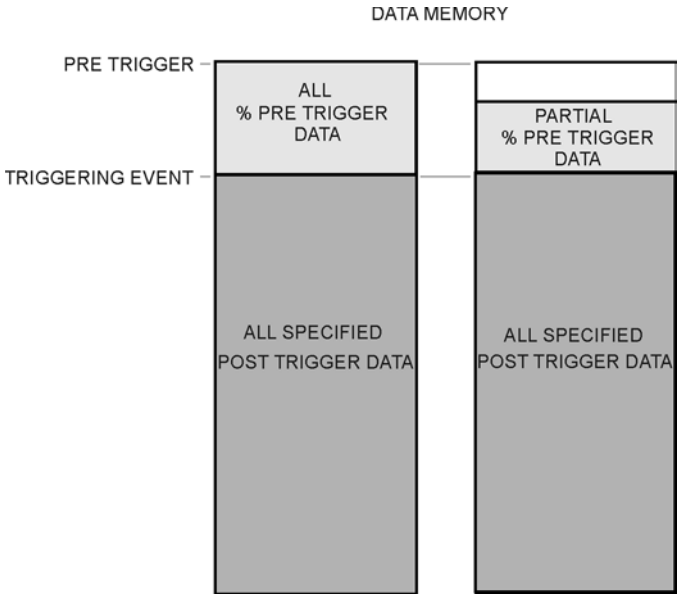


Figure 74 Pre-Trigger Example, 20% Pre-Trigger

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Exercise and Capture Data Project

With the TA700/800 operating in the **Advanced Mode** as shown on the Main Menu bar below, make sure that the Working Mode is **PCI Analyzer/Exerciser** or **PCI-X Analyzer/Exerciser**.





Click the **Black** button on the Main Menu bar to open the Exercise and Capture dialog box shown in Figure 75.

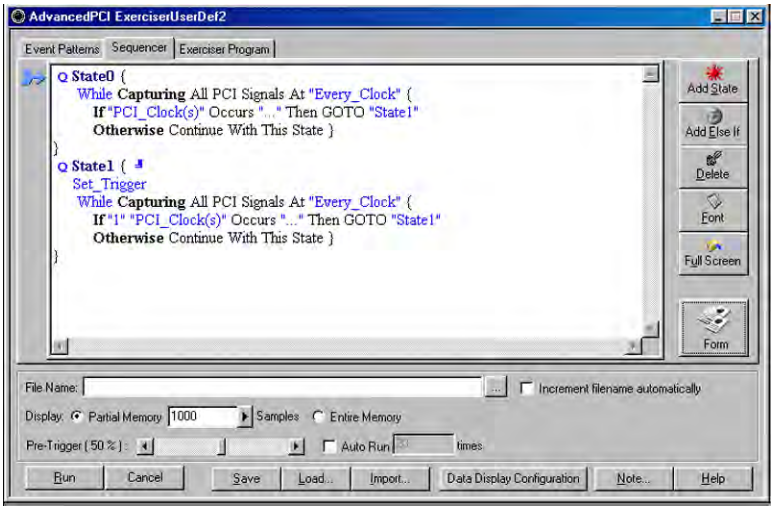


Figure 75 Exercise and Capture Data Project Dialog Box

For an exercise and capture data project you must program/define:

- An exerciser program
- A set of Events (See “Defining Event Patterns” on page 67)
- A sequencer program (See “Programming the Sequencer” on page 75)

The exerciser will run whenever a the sequencer enters a state for which it is set to start the exerciser.

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Programming the Exerciser

Make sure that the **Exerciser Program** Tab is selected on the Custom Project Dialog box as shown in Figure 76.

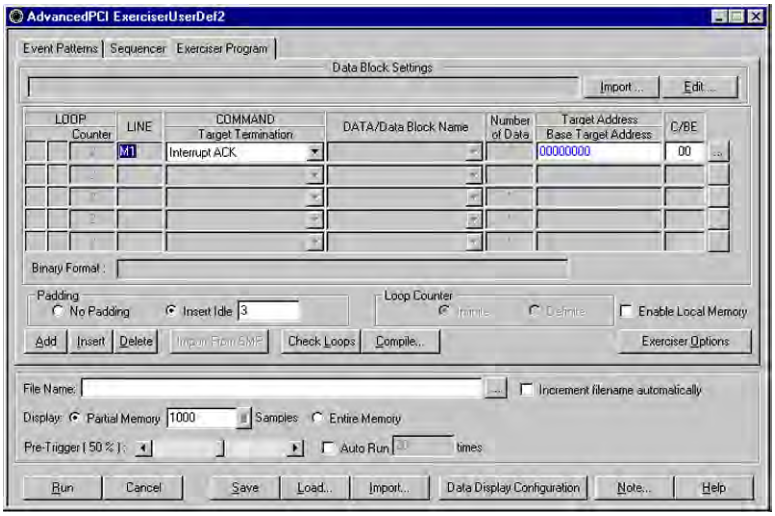


Figure 76 PCI Exerciser Program Dialog Box

To program the Exerciser:

1. The Exerciser Program dialog box opens as default with one active program line. You may add additional active program lines by clicking **Add**.

PCI-X Exerciser

The PCI-X Exerciser operates similarly to that for PCI, but with some notable differences.

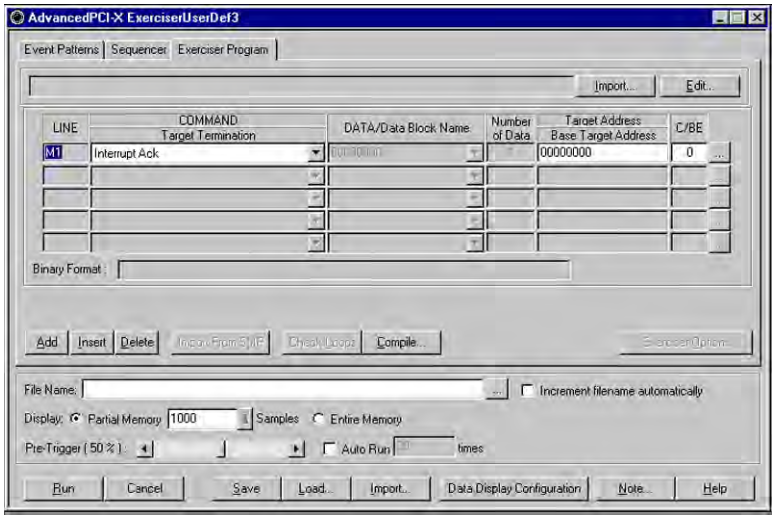


Figure 77 PCI-X Exerciser Program Dialog Box

See page 85 for PCI-X differences.

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2. Choose the number of lines to be added and the Line Type, Master or Target, in the number of lines dialog.

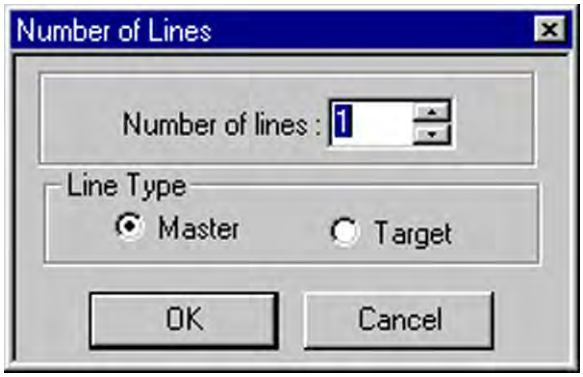


Figure 78 Number of Lines Dialog Box

Insert Program Line To insert a new program line between previously added active program lines, position the cursor below the line where you want to insert the new line and click the Insert button.

3. Select a command such as MEM Write from the command dropdown list for each active program line. Commands differ PCI vs. PCI-X.

Available PCI Exerciser Commands:

Interrupt ACK
Special Cycle
I/O Read
I/O Write
MEM Read
MEM Write
CONFIG Read
CONFIG Write
MEM Read Multiple
MEM Read Line
MW & Invalidate
Data Transfer
DAC : I/O Read
DAC : I/O Write
DAC : MEM Read
DAC : MEM Write
DAC : MEM Read Multi
DAC : MEM Read Line
DAC : MW & Invalidate

Data Transfer — TA700/800 to Transfer data as Target without termination and complete as expected.

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Disconnect with data	TA700/800 to Generate Disconnect as Target at the last data phase.
Retry	Generates Retry as Target.
Disconnect without data	Generate disconnect after the last data phase.
Target Abort with data	Generate Target Abort at the last data phase.
Target Abort without data	Generate Target Abort after the last data phase.

Available PCI-X Exerciser Commands:

Interrupt ACK
Special Cycle
I/O Read
I/O Write
MEM Read DWORD
MEM Write
Memory Read Block (Alias)
Memory Write Block (Alias)
Configuration Read
Configuration Write
Split Completion
Memory Read Block
Memory Write Block
Dual Address I/O Read
Dual address I/O Write
Dual Address Mem Read DWORD
Dual Address Mem Write
Dual Address Mem Read Block (Alias)
Dual Address Mem Write Block (Alias)
Dual Address Mem Read Block
Dual Address Mem Write Block
Target
Target Single Data Phase
Target Disconnect at Next ADB
Target Retry
Target Abort
Target Split Response
NOP

4. Enter a TARGET ADDRESS that you would like to write to and enter the DATA or select a Data Block to be written to that address.

32/64 bit Addressing To set 32 or 64 bit addressing mode click the enabled ellipses button at the end of the active program line Base Address Setting dialog box shown in Figure 80. Addressing selection applies on a line to line basis.

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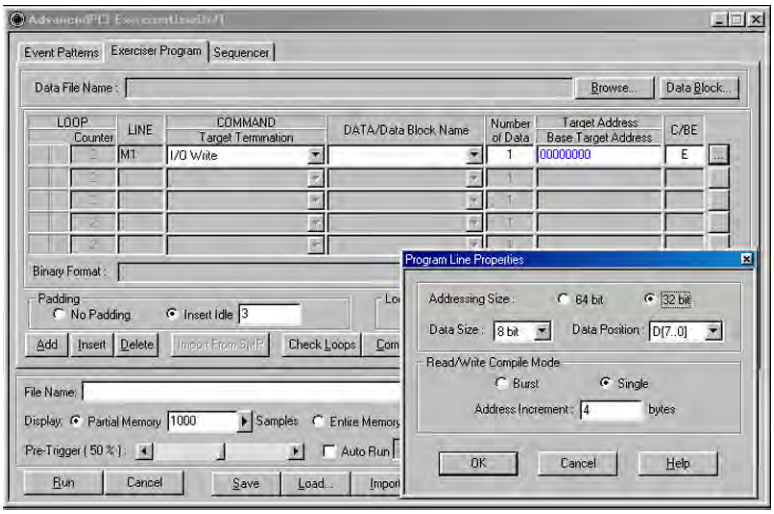


Figure 79 Setting 32/64 bit Addressing Mode

TA700/800 Address as Target When a Target command is chosen from the available COMMAND list, clicking the ellipses button opens the Base Address Setting Dialog Box.

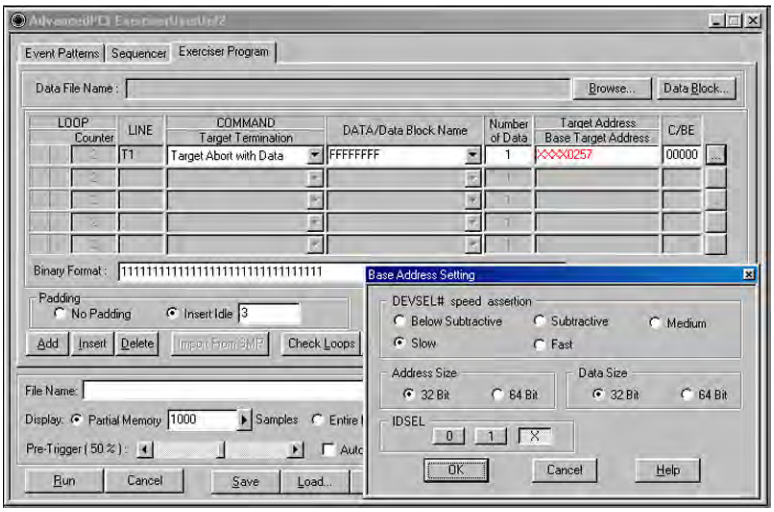


Figure 80 Target Base Address Setting

DEVSEL# Speed Assertion Specifies DEVSEL# response speed when operating as a target.

Fast (Not supported at this time) target responds within 1 clock period.

Medium target responds within 2 clock periods. (Supported @ 33MHz only)

Slow target responds within 3 clock periods.

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Subtractive target responds between the 5th and 6th clock period.

Below subtractive target responds between the 6th and 7th clock period.

In cases where a target response to a specific command is required the C/BE entry must be set to that command. C/BE commands are chosen from the C/BE dialog.



Figure 81 C/BE Set to Respond to Any Memory Command

Burst Data Writes For burst data write operations requiring multiple data you may select a previously created data file from a list of Data Files by clicking **Browse** and selecting a pre-defined data file, or create a new data file by clicking Data Block. See Creating a Data Block File on page 44.

Padding/Bus Utilization Checking Insert Idle and entering the number of idles desired will insert Idle states at the end of each compiled command. See Figure 82. Adding idles at the end of commands allows the TA700/800 to be precisely controlled on how long it will utilize the bus.

5. Set Exerciser options as described in Setting Exerciser Options on page 90.
6. When done, click **Compile . . .** to generate and view the executable exercise code as displayed in Figure 82.

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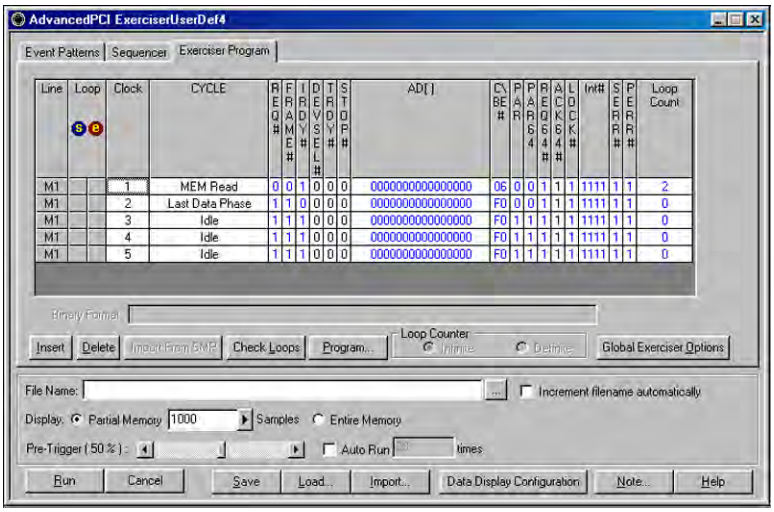


Figure 82 Compiled Output File With Padding

Forcing Errors

All signals displayed in blue may be changed to force errors and anomalies.

Parity Error

Parity error is checked by the recipient of data. If PAR is not in compliance with data, PERR is asserted two clocks later. The TA700 behaves the same way, meaning that it can only assert PERR when it is the intended recipient of data. Although it seems as if PERR is programmable during all transactions it is only altered per the users program during the data phase of Read transactions generated by the TA700.

Wait States

Wait states may be inserted by pointing the cursor on the line where a Wait State is desired and then clicking **Insert**.

Looping

You may define a loop by clicking in the Loop Start column next to the program line where you wish for the loop to start and in the Loop End column next to the program line where you wish for the loop to end. Loop end may be placed in Idle lines.

Enable Loop

For the loop to execute, check the **Autorun** check box and enter a value of up to 65535 in the **Number of times** edit box.

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Forcing an Interrupt You may force interrupts for a specific number of clocks during the program execution by double clicking in the INT# field for that line and then setting the interrupts in the INT# dialog box. See Figure 83.

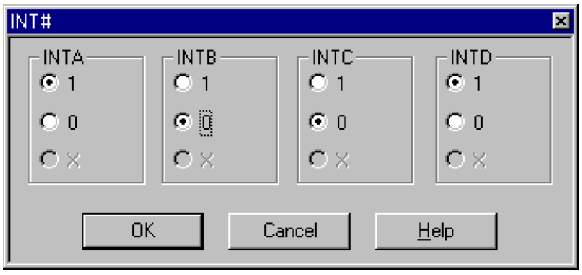


Figure 83 Setting Interrupts

Set Interrupts

Setting interrupts may be done in two ways:

1. From a compiled program for a specified number of clocks.
2. Outside of a compiled program, indefinitely until reset by the user again.



To set one or more interrupts indefinitely, click **Exerciser** on the menu bar and then select **Set Interrupts** from the dropdown list to open the Set Interrupt dialog box



Figure 84 Set Interrupts Dialog Box

Select the interrupts that you wish to set and click **OK.**

Continuous Setting, Outside Program Setting the interrupts in this manner sets them continuously until you uncheck them.

Limited Duration, Inside Program You may set one or more interrupts for one or more program steps when running compiled Program files. See Forcing an Interrupt on page 89.

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Setting Exerciser Options

You may set the exerciser options globally for all input program types or locally on the Exerciser Programming window.



To set the exerciser options, click **Exerciser** on the menu bar and select **Options** from the dropdown list to open the exerciser dialog box as shown in Figure 85.

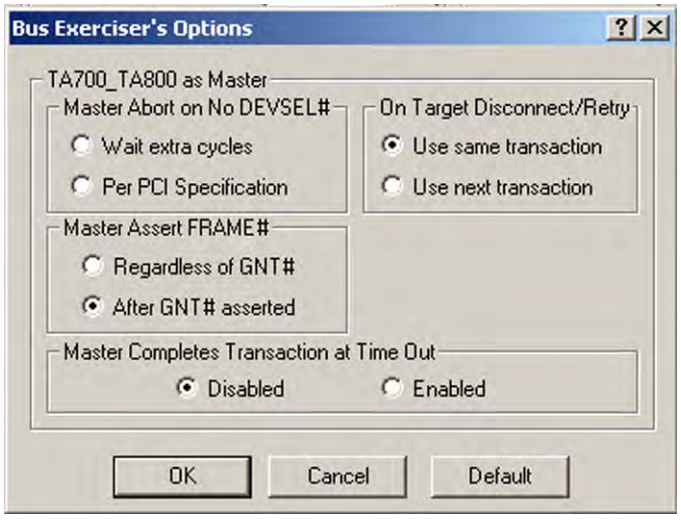


Figure 85 Exerciser Options Dialog Box

On Target Disconnect/Retry

Use Same Transaction Completes from the disconnect point on, regardless of the number of times the target issues a disconnect. The TA700/800 will take it from where the target disconnect was issued and try to complete the transaction from that point on.

Use Next Transaction The TA700/800 will bypass all of the transactions in the current command and will jump to the transaction for the next command.

Master Abort on No DEVSEL#

Wait Extra Cycles TA700/800 waits for 10 extra cycles.

Per PCI Specification

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Master Assert FRAME#

Regardless of GNT#	Once the TA700/800 is set to become a master, it asserts the frame and starts the transaction regardless of the status of the GNT#.
After GNT# Asserted	The TA700/800 will request the bus and start the transaction only after the GNT# is asserted.

Master Completes Transaction at Time Out

Disabled	The TA700/800 continues to complete the transaction for however many clocks it takes regardless of GNT# being deasserted.
Enabled	The TA700/800 completes the current transaction as soon as possible after GNT# is deasserted.

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Easy Mode Trigger and Capture

The Advanced Mode menu bar allows you to open an enhanced Easy Mode dialog that permits you to trigger and capture data using predefined PCI and PCI-X trigger points and data capture settings while allowing you to create a custom exerciser program.

To perform a quick data capture with a minimum of programming:

1. Click the **Yellow** button on the Advanced Mode menu bar to open the enhanced Easy mode dialog.



Figure 86 Capture and Trigger Dialog

2. Set the trigger and capture options as described in "Instant Data Capture & Trigger" on page 26
3. Click the **Exerciser Program** tab to open exerciser program dialog.

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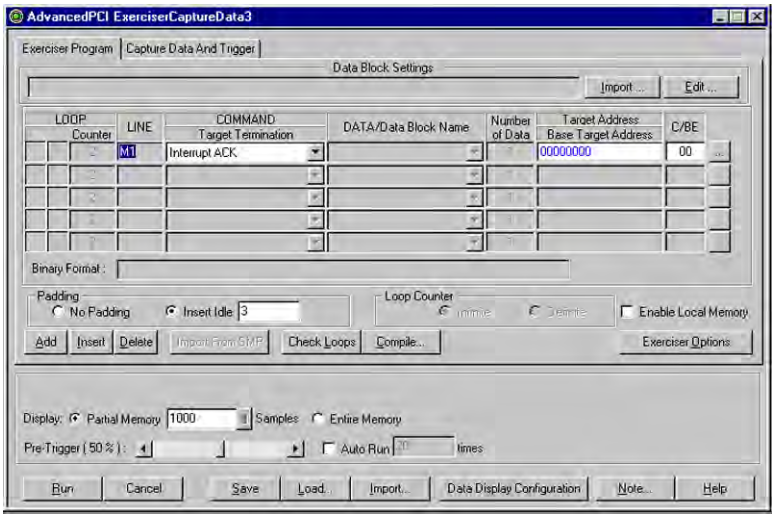


Figure 87 Exerciser Program Dialog

4. Program the exerciser as described in "Programming the Exerciser" on page 83
5. Click **Run** and wait to capture data and display the result.

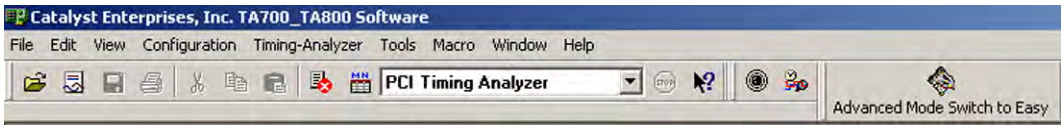
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Timing Analysis - Synchronous

This mode of operation is not supported by the TA700PDC, TA800 or PCI-X.

Make sure that the TA700/800 is in the **Timing Analyzer** working mode and is operating in the **Advanced Mode** as shown on the Main Menu bar below.



Click the Black button on the main menu bar to open the Timing Measurement setup dialog box below.

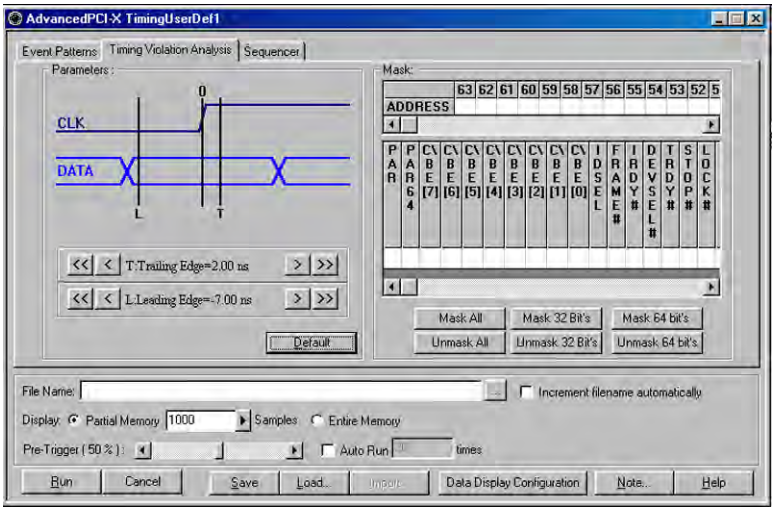


Figure 88 Timing Measurement Setup Dialog Box

1. Choose the signals intended for timing violation analysis in the **Mask** area of the dialog box and mask each signal that is to be excluded from the analysis. Alternately you may click the **32 bit** or **64 bit** button and then uncheck or check the signals that you want included in the analysis.
2. Set the desired Leading and Trailing edge values in the **Parameters** area of the dialog box by either **dragging** the vertical L and T bars to the desired position or by using the > >> or < << buttons to position the timing definition bars incrementally. The >> and << buttons move the bars in 2 ns increments and the > and < buttons in 0.10 ns increments.

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3. Click the Event Patterns and Sequencer Tabs and create Event Patterns and a Sequencer Program as described in Defining Event Patterns on page 62 and Programming the Sequencer on page 64 and click **Run**.

After the occurrence of a timing violation the timing violation display will open as shown in Figure 89. The red signals represent timing violation. Bus signals are shown as a code. As an example 00000080 indicates that the timing problem is for AD7, and 1000000C indicates the problem is for AD28, AD3 & AD2 signals.

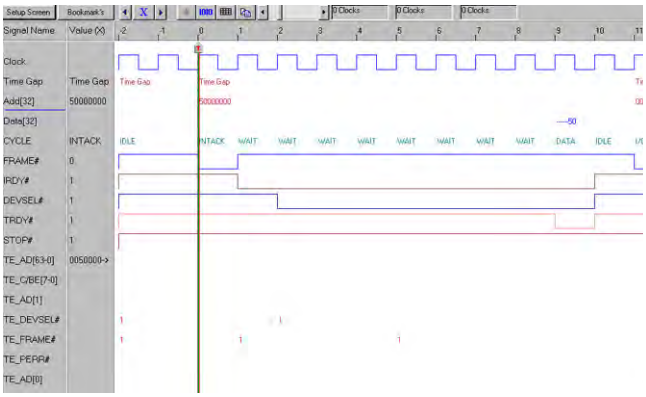


Figure 89 Timing Violation Results Display



To view the result as a list file output display, click the List button.

Display Setup

Use the setup screen to configure your display.

1. Click the **Setup Screen** button in the results display window to open the Timing Error Signal selection dialog box as shown in Figure 68.

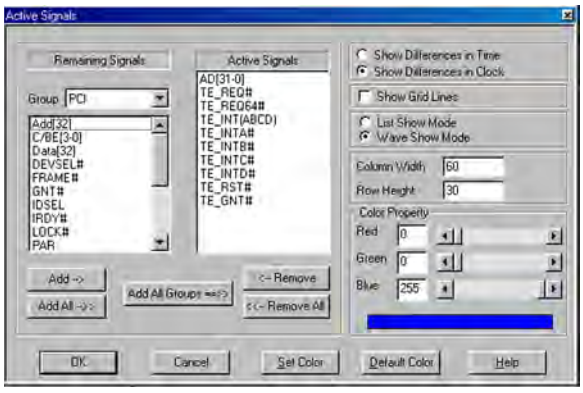


Figure 90 Timing Error Signal Selection

2. Select the signals for display from the Remaining Signals list and click Add.
3. Select other display options such as display of time in units of time or clocks, show gridlines etc. and click OK.

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For a detailed description of display manipulation, see “Display Manipulation” on page 129

Search for Setup & Hold Limits



To search for setup and hold limits click the Setup/Hold Limits search Icon to open the Setup and Hold Limits Mask definition dialog box.

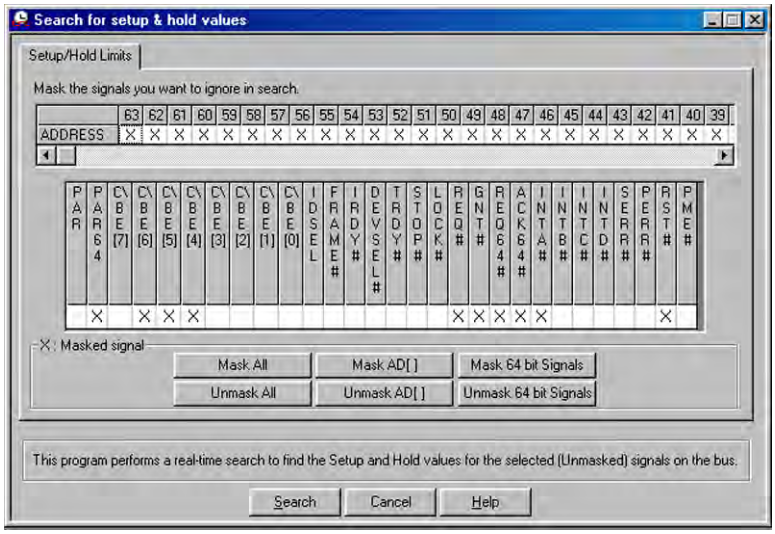


Figure 91 Setup and Hold Limits Mask Definition Dialog Box

Select the signals that you wish to ignore in the search and then click **Search**. At the completion of the search the result is displayed as shown “Setup and Hold Limits Search Result” on page 97

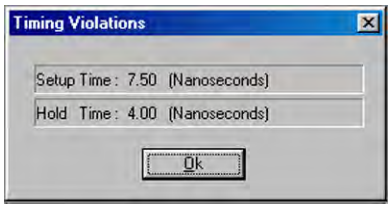


Figure 92 Setup and Hold Limits Search Result

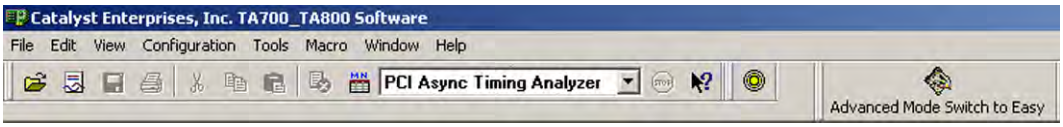
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Timing Analysis - Asynchronous

This mode of operation is not supported by the TA700PDC, TA800 or PCI-X

Caution: The TA700/800 may draw as much as 4.0 A during an asynchronous timing test, the TA700/800 board must be configured to operate from the + 3.3V bus power. JP2 shunted between pins 2 - 3.

Make sure that the TA700/800 is in the **Async Timing Analyzer** working mode and is operating in the **Advanced Mode** as shown on the Main Menu bar below.



Note: The Async Timing Analyzer in the Advanced Mode operates identically to that in the Easy Mode. See “Timing Analysis - Asynchronous” on page 62

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TA700/TA800 as Target

TA700/TA800 Enumeration

Once the TA700 is used in the System, it is enumerated. During the Enumeration the Operating System assigns a memory and I/O address to your TA700 which is used as TA700 Target Address. This will only happen if the S2 jumper is not installed and the S1 switch is down. If the TA700 is used in a passive environment you may assign any target address. To view the TA700 Configuration Space "Scan Configuration Registers" on page 55.

Once you start the software, the TA700 will not respond to any transactions, including configuration unless programmed on the Exerciser or Local Memory page.

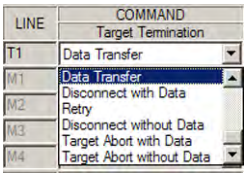
Setting Target Operation

There are two ways to operate the TA700/TA800 as a Target.

1. By defining specific Target responses in the exerciser program.
2. By enabling Local Memory.

Defining Target Responses in Exerciser Program

On an exerciser program page, click the down arrow in the T1 LINE COMMAND to choose a Target Termination.



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Enter a **Base Target Address** and set up target data with **Data** or a pre-defined **Data Block**. Note, however, that this data will not be stored.

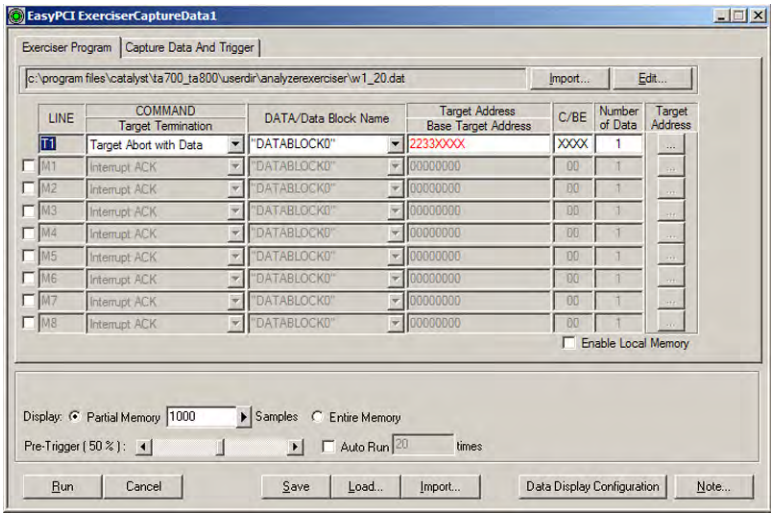


Figure 93 Setting Exerciser as Target

Note: When set up this way the TA700/TA800 will only respond with specifically programmed responses and not as a random target.

Enable Local Memory

Check the **Enable Local Memory** check box on the Exerciser Program tab. Note, however that this enables the TA700/800 to behave as a real target, but does not offer the flexibility to modify target response behaviour for specialized testing.

The PCI exerciser allows the TA700/800 to be programmed to act as a 1 MB random access memory behaving like a real target while still operating as an Analyzer. The local memory becomes active when the **Enable Local Memory** box is checked on the Exerciser program page and the Run button is pushed. The local memory will stop responding after the exerciser is manually stopped.

Setting the Base Address The TA700/800 base address is assigned by the system BIOS at boot up time. The first 20 bits (5 bytes) are assigned to the local memory and initially set to don't care. The user may change these bits to use the local memory for some specific memory access. You may assign any target address if the TA700/TA800 is being used in a passive environment.

Note: If you wish for local memory to correspond to a range of addresses you need to specify that range with X's. e.g. 0xA0000XXX which corresponds to 4K address range starting from 0xA0000000.

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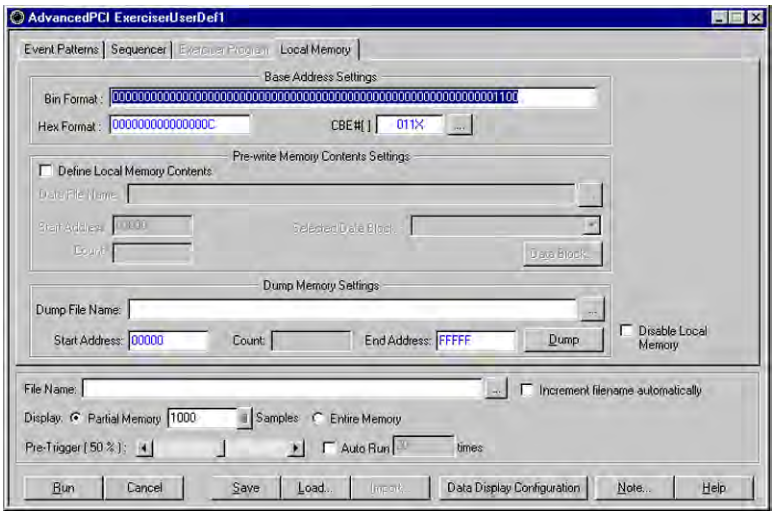


Figure 94 PCI Local Memory Programming Dialog

Memory Organization The 1 MB local memory is organized in 8 byte by 128KB locations as illustrated in Figure 95.

Address	Byte 7	Byte 6	Byte 5	Byte 4	Byte 3	Byte 2	Byte 1	Byte 0
00007:00000	+7	+6	+5	+4	+3	+2	+1	+0
00007:00000	+15	+14	+13	+12	+11	+10	+9	+8

Figure 95 PCI Local Memory Organization

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Predefining Data

To load the memory with user predefined data, check the **Define Local Memory Contents** check box and then the **Data Block** button.

Define the desired data blocks as described in "Creating a Data Block File" on page 44**.** When defining data please note that data is to be entered such that the MSD is in the highest address byte complying with the local memory organization format shown in **Figure 95**.

Dump Memory

You may view the local memory contents after a local memory operation. To view the local memory content, specify the start address and the end address that you wish to view and click the **Dump** button.

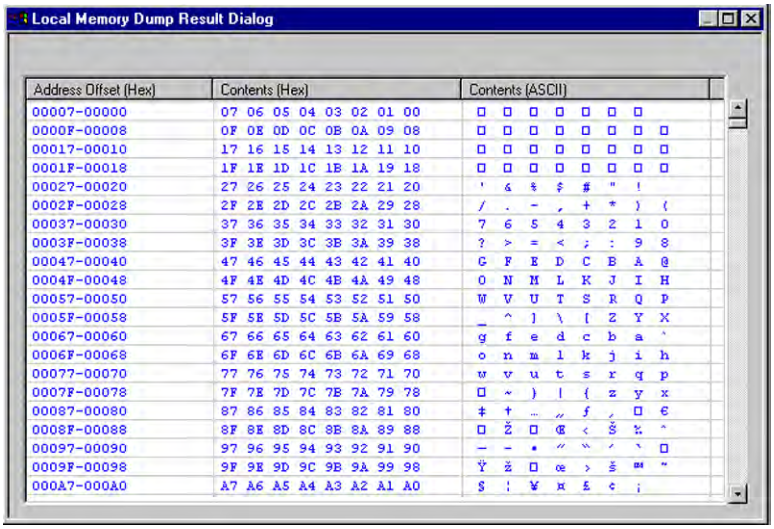


Figure 96 Local Memory Content

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Performance Analysis

Your TA700/800 offers you two ways to do Performance Analysis, Real-time and statistical. Performance Analysis that may be performed in any of the TA700/800 working modes except the Timing and Timing Asynchronous.

Exerciser Program When operating in the State Analyzer & Exerciser working mode, an exerciser program is required to generate bus traffic.

Real-time analysis uses hardware counters and dual ported FIFOs. The counters count the events at all times and interface with CPU via the FIFO to pass the results. This method results in the most accurate performance measurement since the counters are never stopped to be read.

ADVANTAGE:	Continuous Real-time measurement.
DISADVANTAGE:	Measurement results are based on an average. Minimum and maximum can not be measured and reported in this mode.

Statistical analysis is done by capturing the data into memory and post processing it by software. In this mode TA700/800 allows the capture to occur after an occurrence(s) of events so the captured data would include mostly the desired transactions and not unrelated bus activities.

ADVANTAGE:	Many more measurements are possible than in the Real-time method. It is possible to measure Min, Max and Average counts.
DISADVANTAGE:	Non Real-time, Software post processing the data.

Real-time Analysis

Continuous, Real-Time Analysis measures bus performance of up to 796MB/Sec, 64-bit 100 MHz. The analysis measurements are taken in accordance with predefined analysis projects **(*.pap)**. Some predefined analysis projects are included with your software for immediate use or, you may create your own custom analysis projects by setting analysis options, creating analysis equations, event patterns and exerciser programs.

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Performing a Pre-defined Analysis



Click the Performance Analysis Icon on the menu bar to open the Performance Analysis dialog box and select the Performance Analysis Tab.

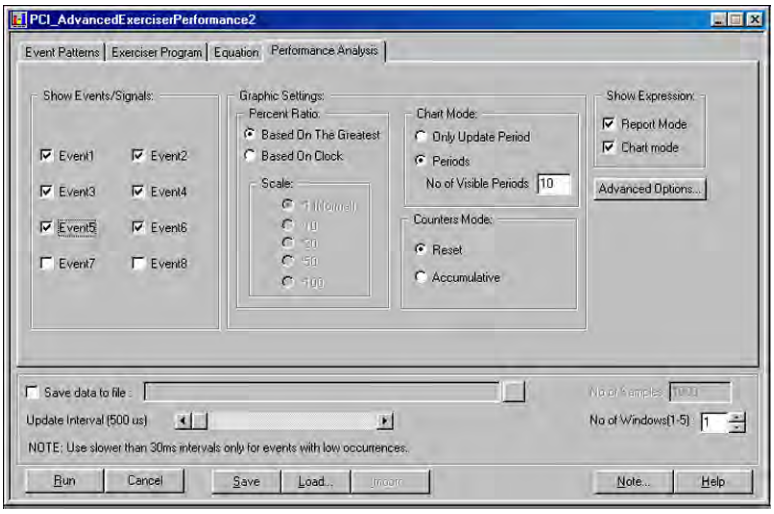
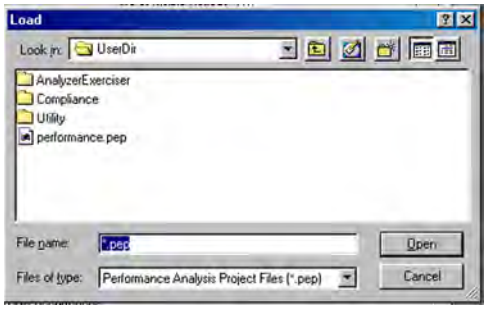


Figure 97 Performance Analysis Dialog Box

1. Click **Load** to open the Load dialog box.



2. Select a pre-defined analysis file and click Open to load the file.
3. Click **Run** to perform an analysis.

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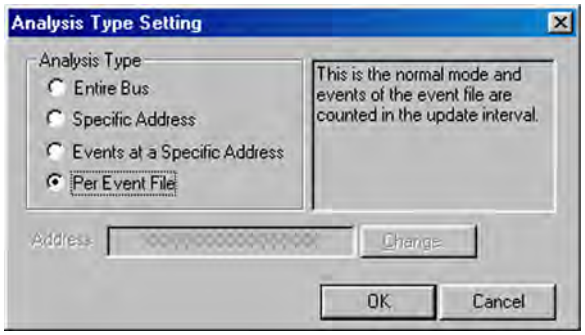
Creating a New Analysis Project

To create a new analysis program you must define/program:

- Performance Analysis Options
- Event Patterns
- Analysis Equations
- An Exerciser Program

Setting Analysis Options:

To set analysis options make sure that the Performance Analysis Tab has been selected and click on the Advanced Options button in the Performance Analysis Dialog Box to open the Analysis Type Setting dialog box shown below.



ANALYSIS TYPE

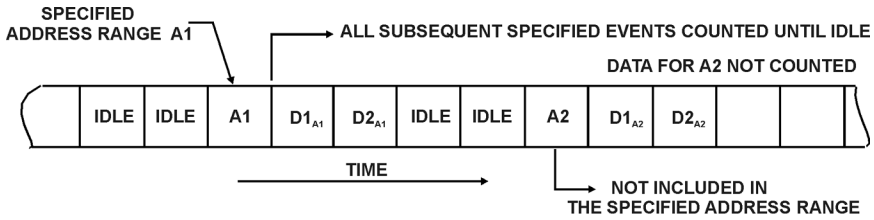
Entire Bus To count the events defined in the event file at all addresses.

Address Override

Specific Address and Events at a Specific Address selections override the addresses set in the event file.

Specific Address To count only all of the address events defined in the event tab.

Events at a Specific Address To count all of the events defined in the event tab after the occurrence of the specific address selected. This mode may be used to measure a data burst rate of a specific transfer.



Specific Address Selecting the Specific Address or the Events at a Specific Address enables address entry on the Performance Analysis dialog box.

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Per Event Tab	To count bus cycles such as memory and I/O operations at two or more addresses that are specified in the event tab, e.g. I/O operation of two different agents.

UPDATE INTERVAL

Set the update rate between 500 us and 10 minutes by positioning the Update Interval slider with the mouse cursor.

ANALYSIS WINDOW SETTINGS

Percent Ratio	Select **Based on The Greatest** to display results relative to the largest value or **Based on Clock**, to display an absolute measurement of all values. Select *1, *10, *20, *50 or *100 to zoom the display scale from 100% full scale to 1% full scale.
Reset/Accumulate	With **Reset** selected, the measurement counters are reset at the beginning of each interval. With **Accumulative** selected, the measurement counters will continue to add up.
Chart Mode	Choose **Only Update Period** to display the default number of period only and choose **Periods** and specify number updated periods desired to see on the display.
Show Expression	Chose **Report Mode** and or **Chart Mode** to see the result of the equation in both report format as well as graphical.

Defining Event Patterns

1. Click the Event Patterns Tab.
2. Define the Event Patterns as described in Creating an Event Pattern on page 68.

Writing And Editing Analysis Equations

Analysis equations are needed for generating the results of the measurement on the Reports window. They are entered in simple algebraic format observing standard algebraic conventions for operations using EV1 to EV8 (or their corresponding name) as the variables, **Clock** is the number of system clock cycles specified in the update interval of the project, e.g. in a 66MHz system and an update interval of 10ms clock would equal to 660000. **Freq** is the system frequency expressed in millions, e.g in a 66MHz system **Freq** would be 66. The “Description” line is used to enter the report title.

1. Click the Equation Tab to open the Equation Editor dialog box as shown in Figure 98

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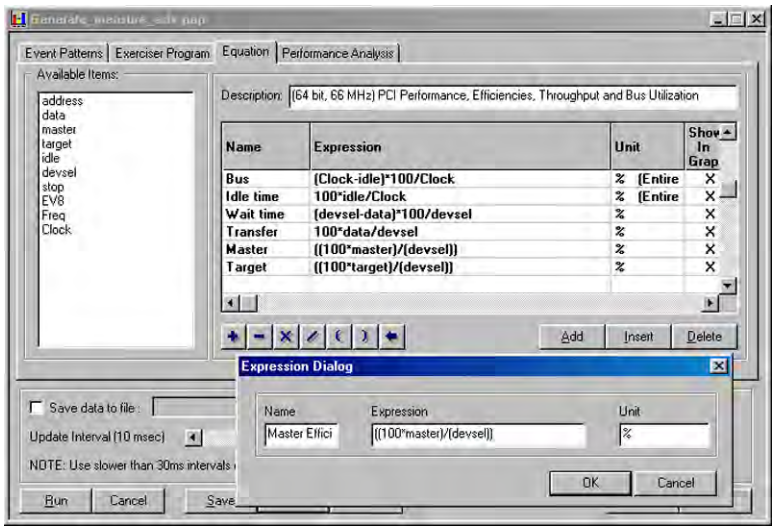


Figure 98 Equation Editor Dialog Box

Add a New Line To add a new equation line at the bottom of the list, click the **Add** button.

Insert a Line To insert a new equation above an existing equation line click the cursor in the line above which you wish to insert the new line and then click the **Insert** button.

New Equation Double click in a blank Expression line to open the Expression Dialog.

2. Type an equation name in the **Name** edit box.
3. Enter the equation in the **Expression** edit box using the Available Items and operators from the Equation tab.
4. Enter the units to be displayed in the **Unit** edit box.

Edit Equation Double click in the line of the equation that you wish to edit to open the Expression Dialog and perform the necessary editing.

Programming the Exerciser

1. Click the Exerciser Program tab.
2. Program the Exerciser as described in “Programming the Exerciser” on page 83

Save Results If you would like to save the analysis results, click **Save data into the File** enter the number of samples you wish to save and the name of the output file.

Save Settings To save the measurement setup, first select Save to open the Save As Dialog Box, enter a new file name to save as a *.pep file and click **Save**.

3. To perform the analysis Click OK.

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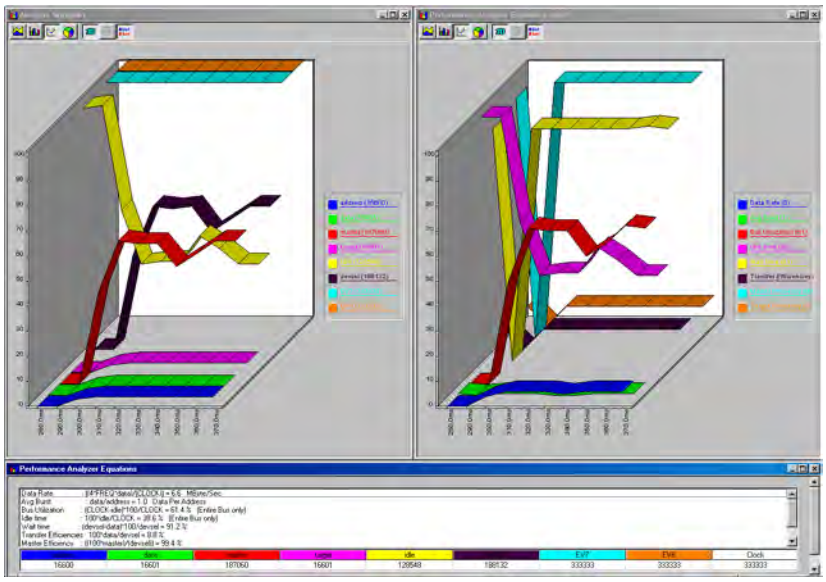


Figure 99 Analysis Real Time Display

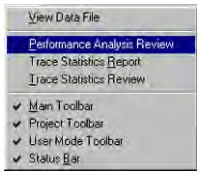
4. In the Display area, select any combination from the available display options, 2D, 3D, Stacked, etc... . From the “Graphic Settings” in the Performance analysis menu you may select scale for vertical and horizontal display.



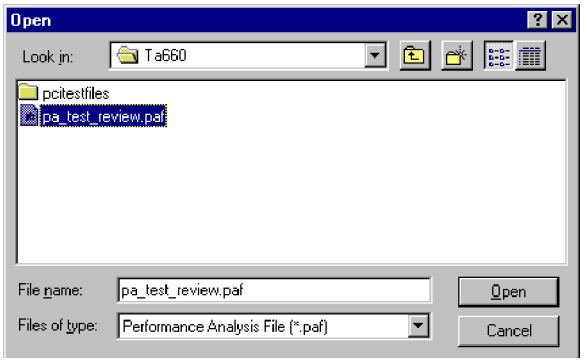
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Saved Performance Analysis Review

Your TA700/800 offers you the ability to review the results of previously performed and saved performance analyses.



Click **View** on the menu bar and then select **Performance Analysis Review** to open the **Open** dialog box.



Select a previously generated performance analysis file *.paf and click **OK** to open the performance analysis windows and a Statistics Review Window for that analysis file as shown in Figure 100.

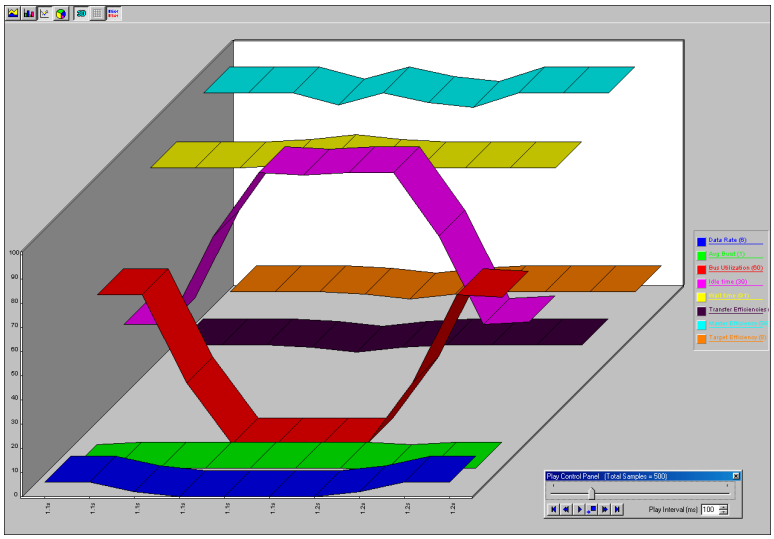


Figure 100 Review of Saved Performance Analysis

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To review the previously saved performance analysis you may drag the scroll bar on the Play Control Panel to the desired location or command it to step through automatically.

Trace Statistics

PCI-X Trace Statistics not supported in current version.

Trace Statistics analysis is implemented by capturing data in memory and then post processing it with software. The analysis software is capable of measuring important parameters such as Minimum and Maximum latency occurrences for any target or user defined specific target, command utilization such as how many times an I/O write versus I/O read occurs or, how many times memory commands occur. “Trace Analysis Options” on page 39 lists the parameters that you may select for a report.



Click the **Trace Statistics Icon** on the menu bar to open the Trace Statistics dialog box.

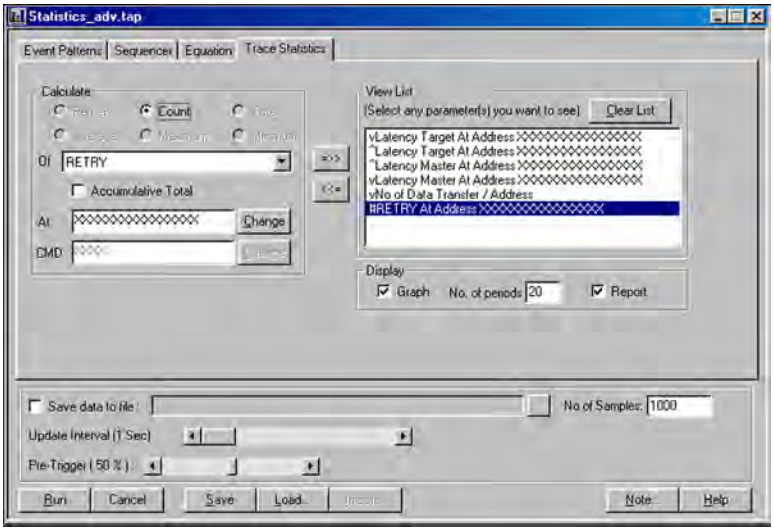


Figure 101 Trace Statistics Dialog Box

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Creating a New Trace Project

To create a new trace project you must define/program:

- Trace Statistics Options.
- Event Patterns
- A sequencer program
- Analysis Equations
- An Exerciser Program

Setting Trace Options

Selecting Parameters Select the parameters to be measured from the Analyze List Of shown in “Trace Statistics Dialog Box” on page 110 Move the selected parameter to the right window for software to perform interrogation on that parameter during post processing by clicking the =>> button next to the Of edit box. Parameters may be defined as minimum, average, maximum or count and or percent depending on which unit applies. Parameters may also be defined, if applicable, by address type.

Optimum Number of Samples Set the amount of data to be captured in the memory for post processing for each interval. The larger the number of samples the more time is required for downloading and processing, Therefore you should select an optimum number of samples to be captured to memory such as 1000. This takes about one second to process. If your application requires more data then a larger number should be entered.

Update Interval If a small number of data samples is expected to be captured, say 1000, and the application does not require repeated measurement, you may want to sample data once every 5 or 10 seconds by changing the Update Interval to 5 or 10 seconds as required. The larger of the two number of data samples or faster update rate will be the dominating setup for data capture time.

View List Select the items you want to view on the display by highlighting and clicking the items in the View List.

Display as Text The report in text as well as graphics may be displayed on the screen during run time by checking the Report box.

Save Measurements All measurements may also be saved and reviewed later, select SAVE and specify the output file name. The results may be viewed under view.

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Defining Event Patterns

1. Click the Event Patterns Tab
2. Define the Event Patterns as described in “Timing Analysis - Synchronous” on page 95.

Programming the Exerciser

1. Click the Exerciser Program tab.
2. Program the Exerciser as described in “Programming the Exerciser” on page 83

Defining Equations

1. Click the Equations Tab
2. Define Equations as described in “Writing And Editing Analysis Equations” on page 106

Running the Trace Project

After all of the configuration and programming steps have been completed, click the Trace Statistics Tab and verify that the items that you wish to collect statistics on are highlighted.

1. Click **Run** to collect trace statistics.

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Example Files

A number of pre-defined projects with defined event patterns and sequencer programs are include with your analyzer. You may **Load** a complete project to perform an immediate data capture and trigger, or you may **Import** event patterns and sequencer programs to assemble a project without much programming.

Create a Project

Click the **Black** button on the menu bar to open a Project Definition dialog box.

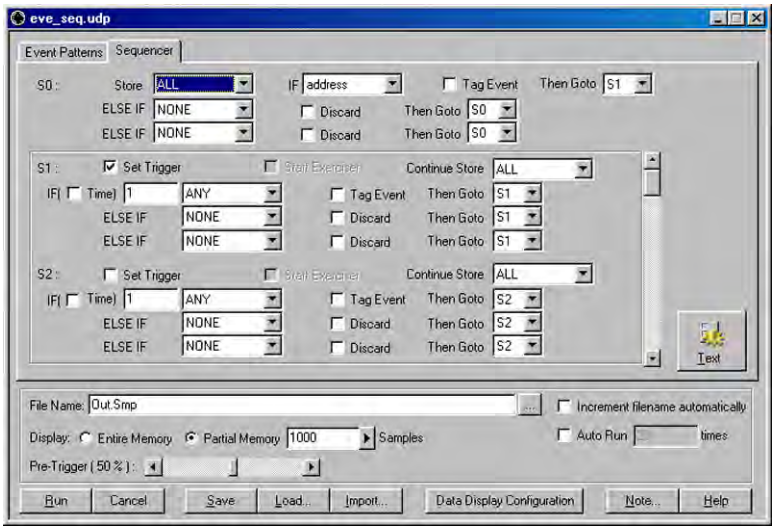
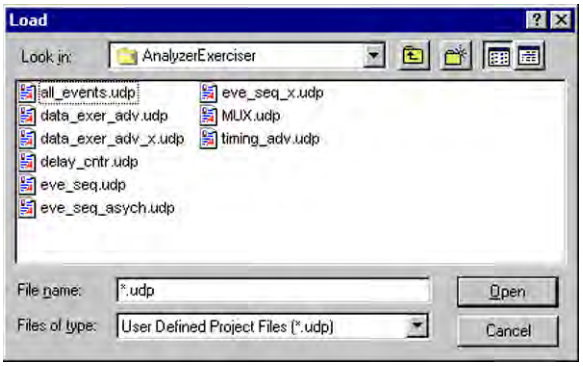


Figure 102 Project Definition Dialog Box

Load a Project

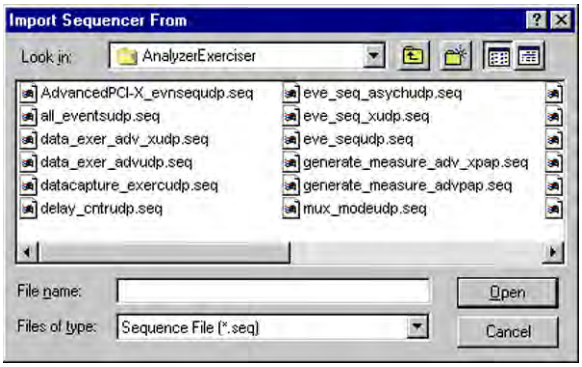
To load a pre-defined project click the **Load** button on the bottom of the Project Definition Dialog Box.



Select a pre-defined project from the examples folder and click OK.

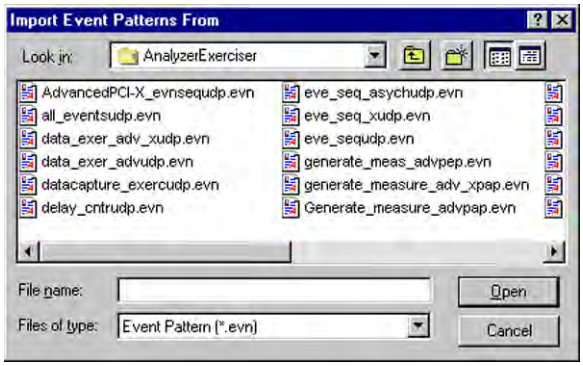
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Import a Sequencer Program To import a pre-defined sequencer program, open a new project, select the sequencer tab and click the **Import** button on the bottom of the Project Definition Dialog Box.



Select a pre-defined sequencer from the examples folder and click **OK**.

Import an Event Pattern To import a pre-defined event pattern, select the event tab and click the **Import** button on the bottom of the Project Definition Dialog Box.



Select a pre-defined event from the examples folder and click **OK**.

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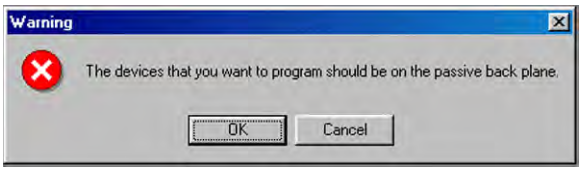
Program Device

The Program Device function initializes the configuration registers for use in a passive motherboard.



To program a device, click “Program Device” from the Compliance dropdown list.

A reminder message appears requiring a passive backplane.



Click **OK.** After a brief period a list of programmable devices appears as shown in Figure 103.

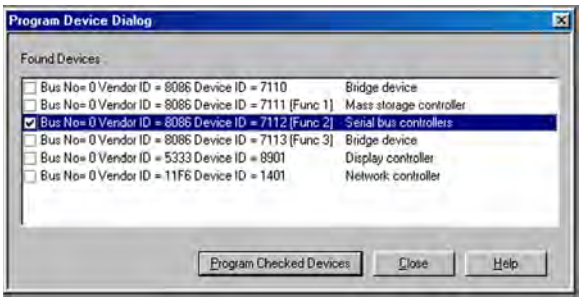


Figure 103 Select Device for Programming Dialog

Check the box next to the device you wish to program and then click the **Program Checked Devices** button.

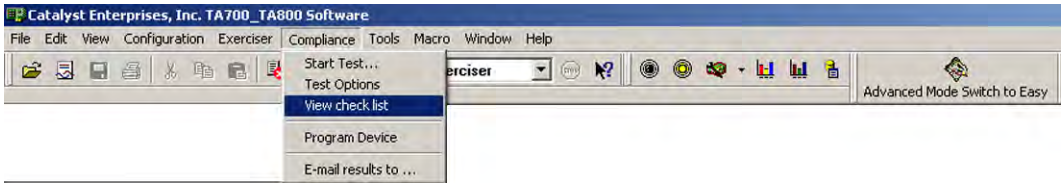


Figure 104 Programming Device Complete Message

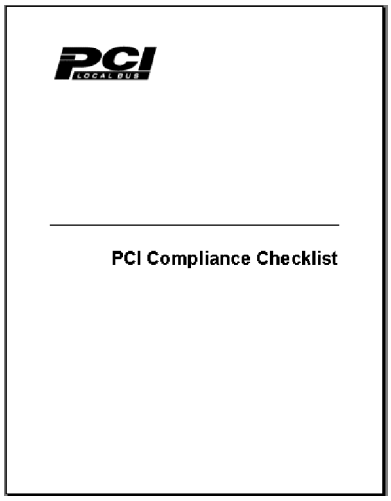
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Compliance Device Test

The TA700/800 incorporates a built in “Compliance Device Test” that performs the **PCI compliance checklist.** The Compliance Device Test is available only while operating in the **Analyzer & Exerciser** configuration.



To view a comprehensive description of the PCI Compliance Checklist, click **Compliance** on the menu bar and then select **View check list** which opens the checklist as a Microsoft Word for 2.1 spec and Acrobat format for 2.2 spec that you may review on line or print.



NOTE 1: To view the Compliance checklist version 2.1 specifications requires Microsoft Word 97 or higher to be installed on your system.

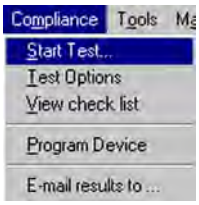
NOTE 2: To view the Compliance checklist version 2.2 requires Acrobat 4.0 or higher reader to be installed on your system.

NOTE 3: You can run the tests at an offset that is specified in the compliance.inf file. For more information refer to Manual\Compliance-Readme.txt.

Disable Device Drivers When performing a device compliance test on your device that has resident device drivers, you must disable them for the duration of the test to avoid hanging the system. This is due to the compliance test rewriting of the DUT registers for the purposes of the test.

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Executing a Compliance Device Test



Click “Start Test” from the Compliance drop down list on the menu bar to open the Compliance Tests Configuration dialog box.

Note: Be sure that your board is not involved in running any application program during the Compliance Test.

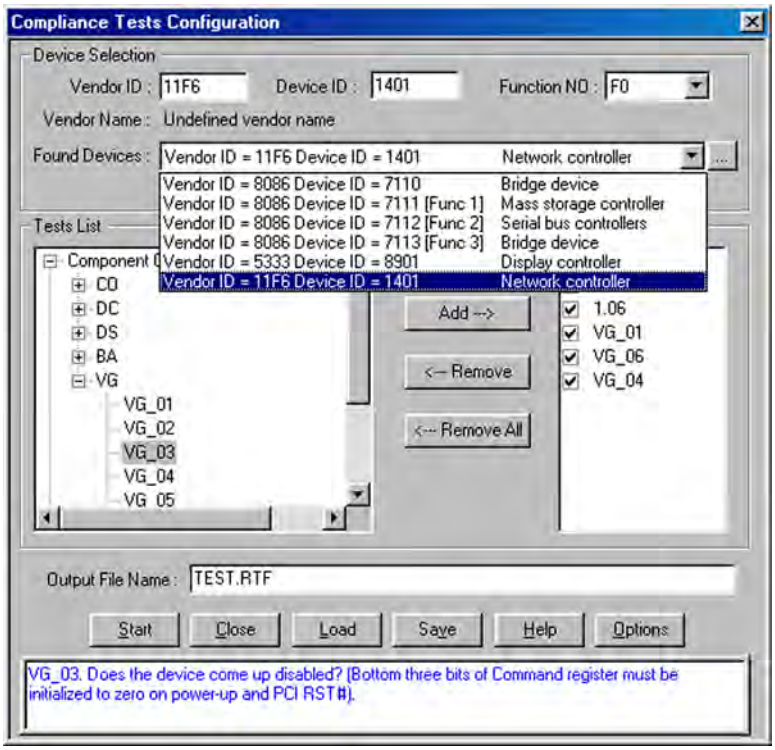


Figure 105 Compliance Tests Configuration Dialog Box

Click the browse button to the right of the **“Found Devices”** field to have the TA700/800 search for all PCI devices on the bus. The software will then display a list of found devices with the ID code and the vendor code for each of the devices found on the bus.

1. Select the device you like to perform the test on.
2. Choose the desired tests from the “Tests List” and click Add ->.

Test Description For a description of each test, click on a test and view the test description on the bottom of the Compliance Tests Configuration dialog box.

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Setting the Compliance Test Options

Select the desired device for compliance test and open the Compliance Tests Options by clicking the **Options** button.

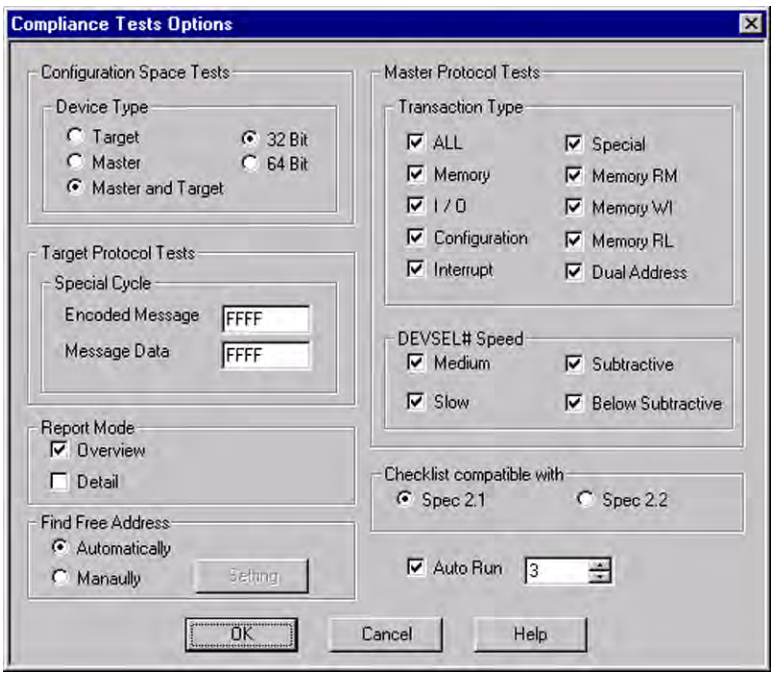


Figure 106 Compliance Tests Options Selection Dialog Box

Configuration Space Tests Check the device to be tested as Master, Target or both.

Master Protocol Tests Select protocol test options such as I/O, Memory. For Master test the user is expected to interact and cause his master card to perform a series of expected transactions. For the list of these transactions and the order they appear refer to the “Compliance Test_IUT User Guide.doc”.

Target Protocol Tests Performs Target tests, in this mode the TA700/800 is a master and requires little interaction from the user to perform target related tests on UUT.

DEVSEL# Speed Select the target DEVSEL# decode speed.

Auto Run In cases where you would like the test to be performed repetitively, check the Auto Run box and set the number of times for the test to be repeated. Click OK to complete setting the options.

Checklist Compatible with Select the PCI specification that you wish the test to follow, PCI 2.1 or PCI 2.2.

Save Configuration You may save the test configuration for use later by clicking **Save**. Assign a **test** file name to the configuration and click **Save**.

Report Mode When Overview is checked, only test results are displayed, however, when Detail is checked all details are listed and explained.

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Running Compliance at an Offset

To run compliance at an offset you must specify the offset in the compliance.inf file (in decimal) located in TA700_TA800 directory. Keep in mind that the least 2 significant bits are masked. For more information refer to the compliance_readme.txt file in TA700_TA800\manual directory

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Executing a Saved Configuration

Run Previous Configuration To run a Compliance test with a previously saved configuration, click **Load** and select a configuration file.

Specify the output file name where the test results are to be saved and click **Start**.

After clicking **Start** several messages may display, depending on the selected test, to guide the user through the test.

Example Test

The following test (1.09) finds the addresses that are free for the TA700/800 as target.

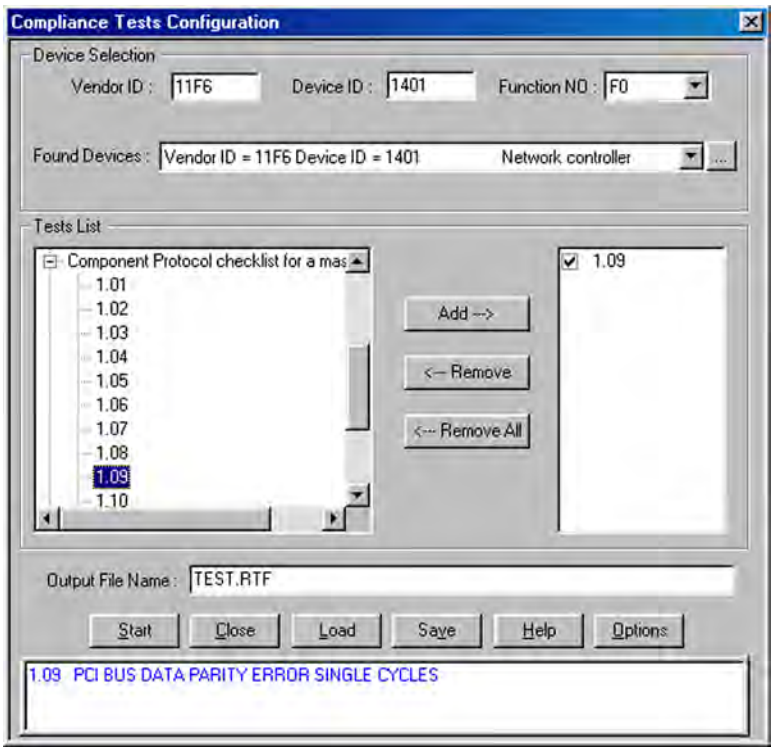


Figure 107 Compliance Test Setup

Choose test (1.09) and click **Add ->** and then **Start**.

After a short time the device found dialog as shown in Figure 108 will open, requesting you to perform an action.

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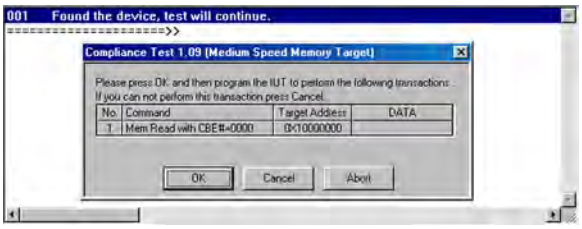
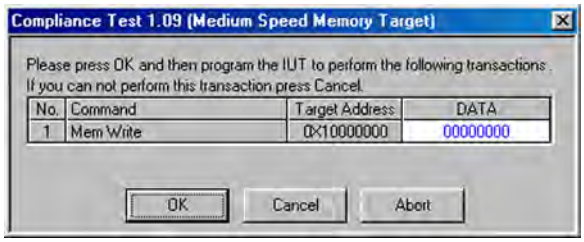
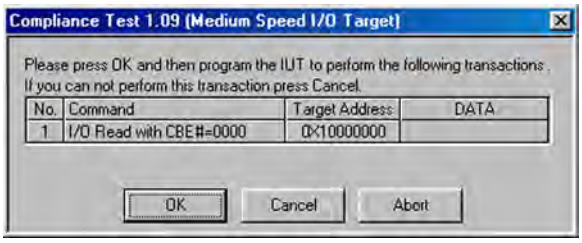


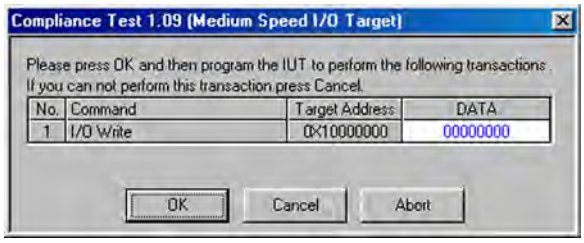
Figure 108 Device Found Dialog

Perform the requested action and click **OK**.

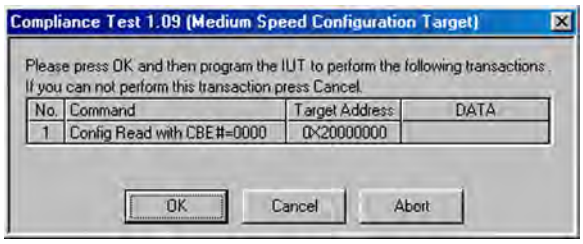


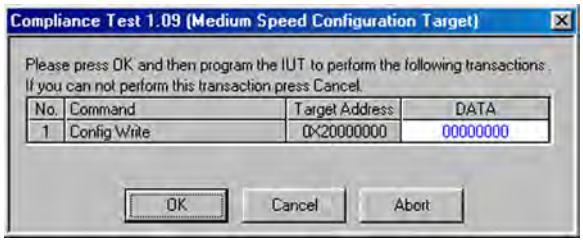
Repeat Process for all displayed windows.



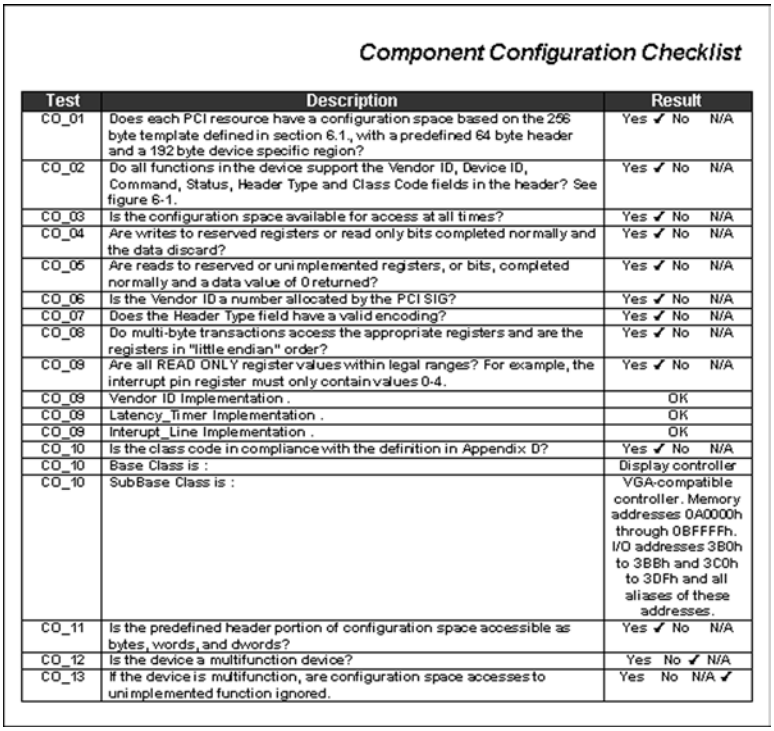


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After the final action is performed, a Compliance Result report is displayed.



Component Configuration Checklist

Test	Description	Result
CO_01	Does each PCI resource have a configuration space based on the 256 byte template defined in section 6.1., with a predefined 64 byte header and a 192 byte device specific region?	Yes ✓ No N/A
CO_02	Do all functions in the device support the Vendor ID, Device ID, Command, Status, Header Type and Class Code fields in the header? See figure 6-1.	Yes ✓ No N/A
CO_03	Is the configuration space available for access at all times?	Yes ✓ No N/A
CO_04	Are writes to reserved registers or read only bits completed normally and the data discard?	Yes ✓ No N/A
CO_05	Are reads to reserved or unimplemented registers, or bits, completed normally and a data value of 0 returned?	Yes ✓ No N/A
CO_06	Is the Vendor ID a number allocated by the PCI SIG?	Yes ✓ No N/A
CO_07	Does the Header Type field have a valid encoding?	Yes ✓ No N/A
CO_08	Do multi-byte transactions access the appropriate registers and are the registers in "little endian" order?	Yes ✓ No N/A
CO_09	Are all READ ONLY register values within legal ranges? For example, the interrupt pin register must only contain values 0-4.	Yes ✓ No N/A
CO_09	Vendor ID Implementation .	OK
CO_09	Latency_Timer Implementation .	OK
CO_09	Interupt_Line Implementation .	OK
CO_10	Is the class code in compliance with the definition in Appendix D?	Yes ✓ No N/A
CO_10	Base Class is :	Display controller
CO_10	SubBase Class is :	VGA-compatible controller. Memory addresses 0A0000h through 0BFFFFh. I/O addresses 3B0h to 3BBh and 3C0h to 3DFh and all aliases of these addresses.
CO_11	Is the predefined header portion of configuration space accessible as bytes, words, and dwords?	Yes ✓ No N/A
CO_12	Is the device a multifunction device?	Yes No ✓ N/A
CO_13	If the device is multifunction, are configuration space accesses to unimplemented function ignored.	Yes No N/A ✓

Figure 109 Compliance Result Report

This report may be printed for future reference.

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An additional report is generated on the display during this test. This report may be used to access the details on the performed test for the data generated and captured on the bus during the test. To access this data double click on the message line for the desired test to open a display with the data, written and read, from the IUT board. For NO responses the cursor is usually located at the non compliant event as shown in Figure 110.

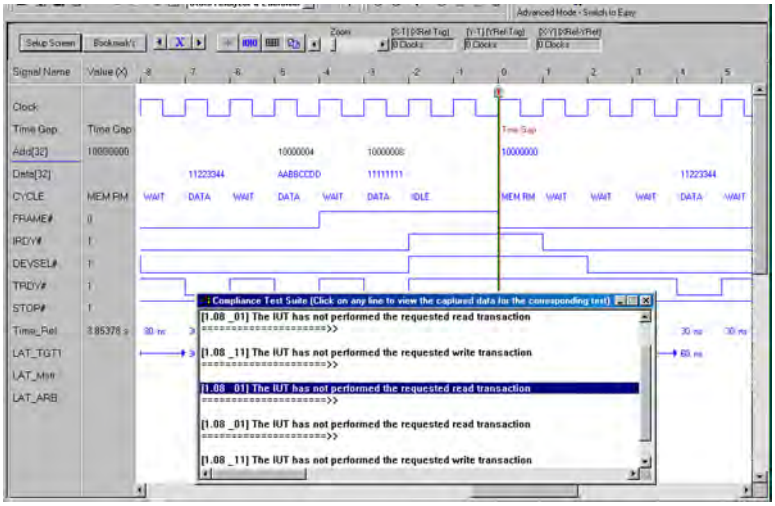


Figure 110 Display With Non Compliant Trigger

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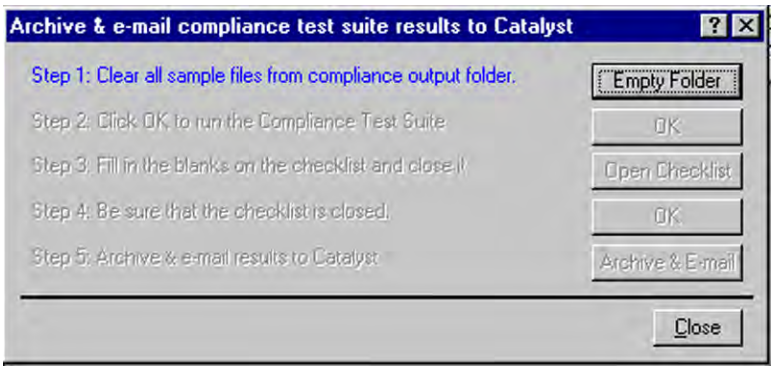
E-Mail Device Compliance Results

When encountering difficulty with running a device compliance test, you may perform the troublesome test and e-mail the result to Catalyst customer support.

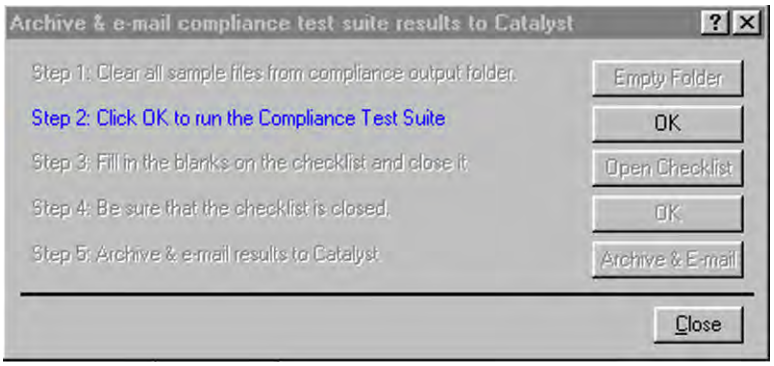


Click “E-mail results to . .” from the Compliance drop down list on the menu bar.

Perform step 1 by clicking the **Empty Folder** button.



Then perform step 2 by clicking OK



Set up a compliance test configuration in the Compliance Tests Configuration dialog box as shown in Figure 111.

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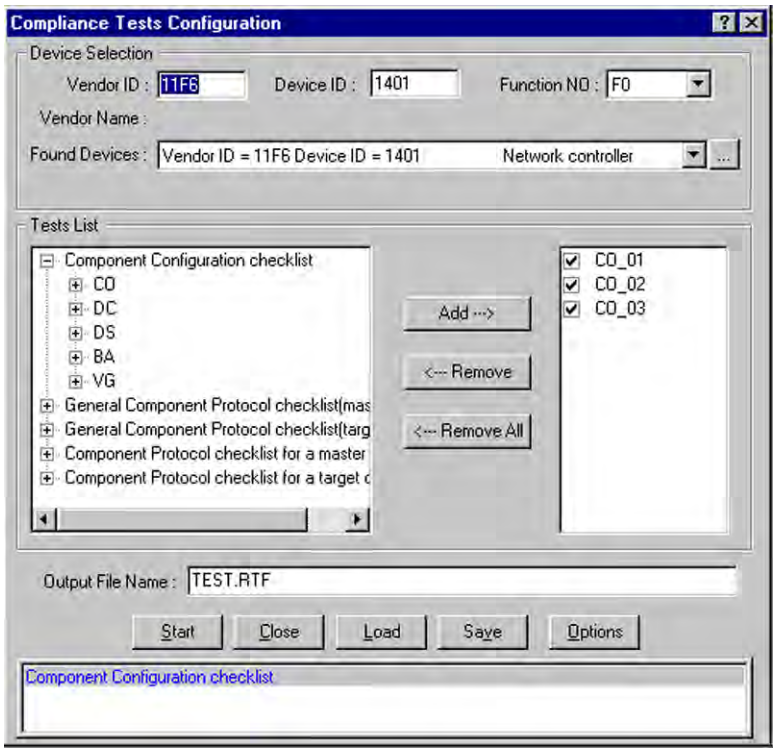


Figure 111 Compliance Tests Configuration Dialog Box

Click **Start** to start the test. After a brief period of time the test completes and displays the PCI compliance checklist

Close Compliance Configuration Dialog

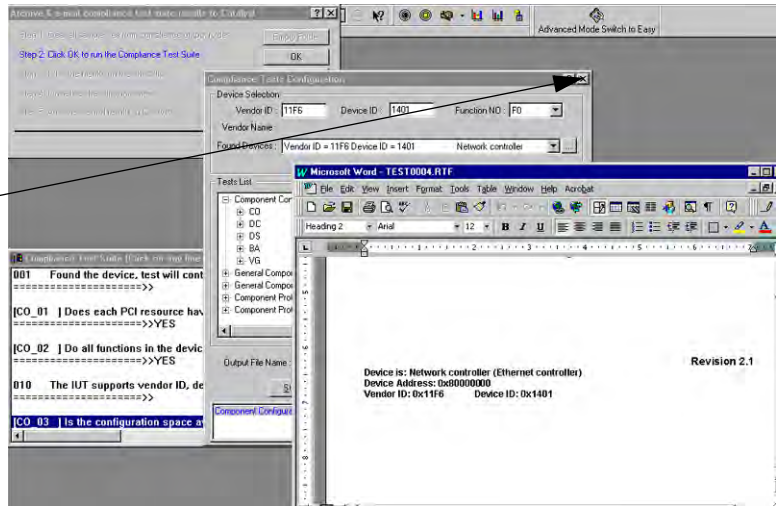
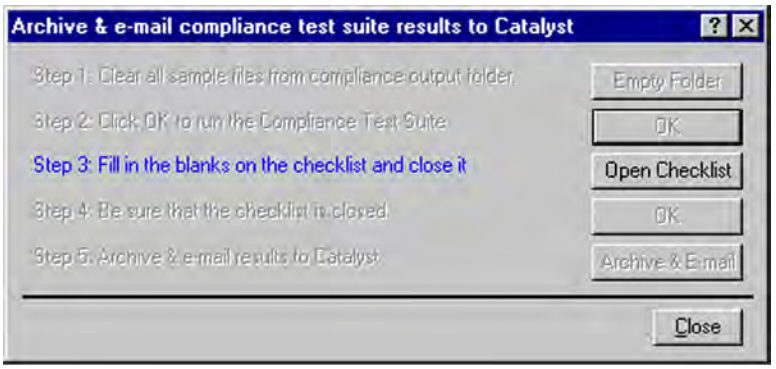


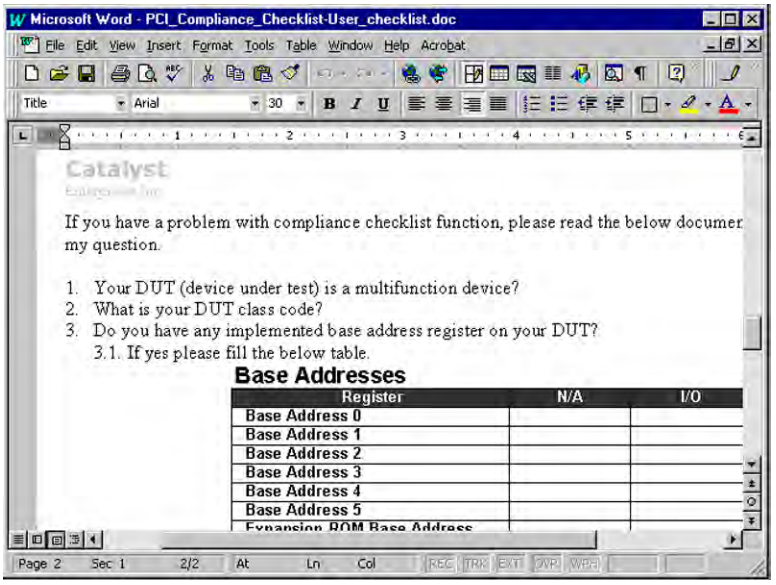
Figure 112 PCI Compliance Checklist

Close the Compliance Configuration Dialog by clicking the **Close** button or the Windows **Close** button to enable step 3.

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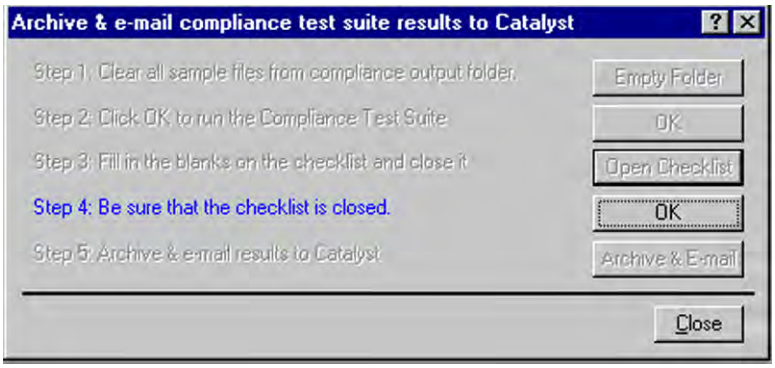


Click Open Checklist for step 3 to display the Checklist

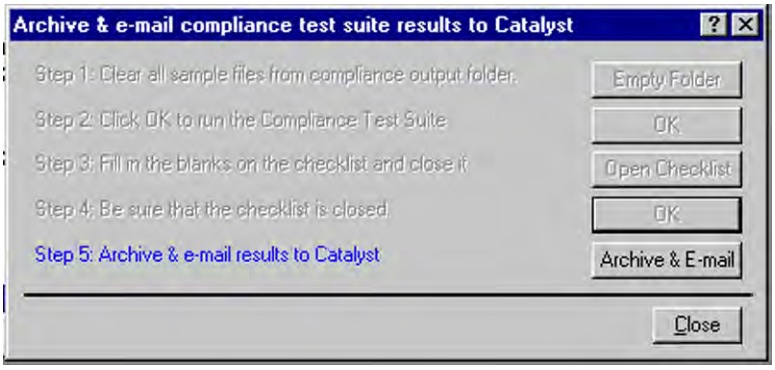


Fill in the required blanks on the checklist, close it and click OK for Step 3 to enable step 4.

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Click OK for step 4 to enable step 5.



Click **Archive & E-mail** to open the E-mail client dialog.

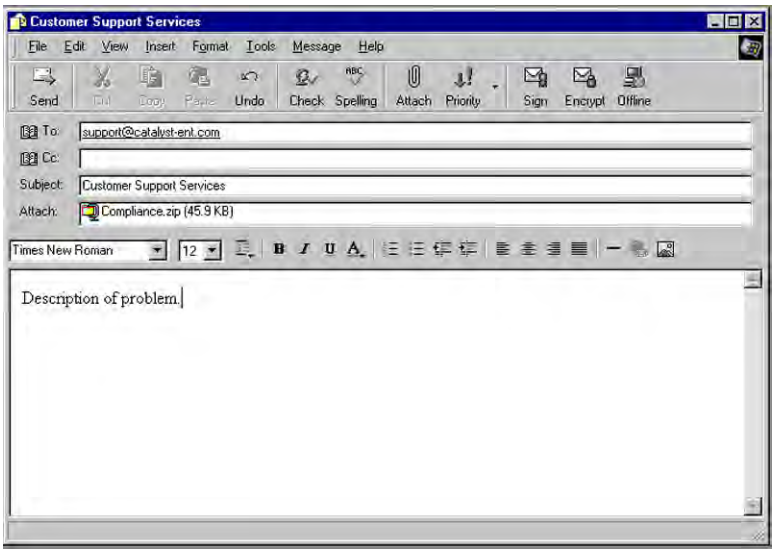


Figure 113 E-mail Client Dialog Box

Default E-mail Client The E-mail dialog box reflects the default E-mail client installed on your system.

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Default Recipient The default recipient of your E-mail is Catalyst Enterprises customer support, but you may change that to any valid E-mail address

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Display Manipulation

Captured data may be displayed in either a waveform Figure 114, a list window as shown in Figure 115 or both simultaneously as shown in Figure 116. To enhance viewing the data you may add or delete signals for viewing, use cursors to measure timing differences and zoom in and out around the X and Y cursors to analyze the captured events.

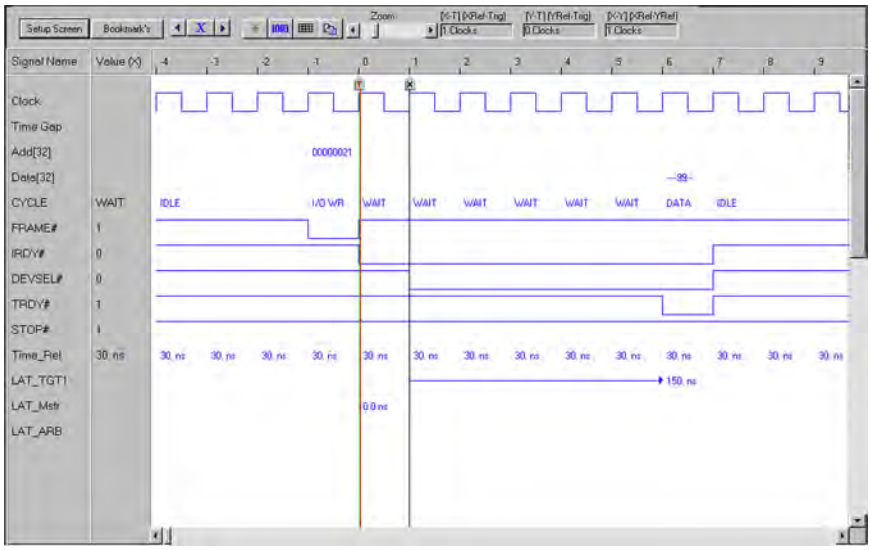


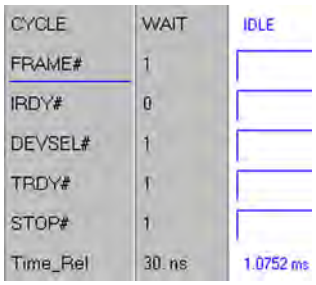
Figure 114 Waveform Data Display

You may rearrange the displayed signal order by selecting the signal name in the display with the left mouse button and then dragging it to a new location.

Signal Level Display

A convenient numeric signal level readout appears next to each signal name. The level indicated is at the active cursor position. Clicking on the cursor select button on the Data Display menu bar toggles the numeric readout to match the cursor selected. Clicking the + button enables this feature.





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To view the list file output display, click the List button.

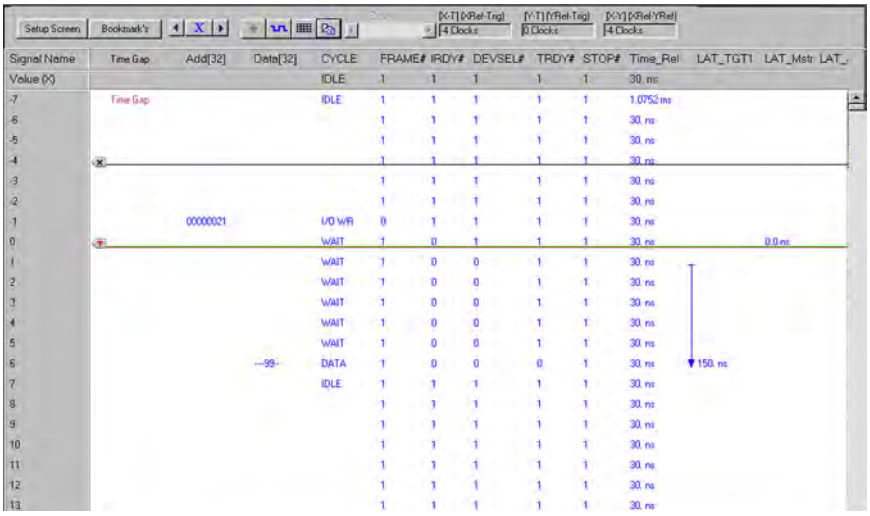
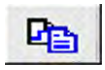


Figure 115 List Data Display



To view the waveform and the list file outputs display simultaneously, click the split screen button on either, an open waveform or list display.

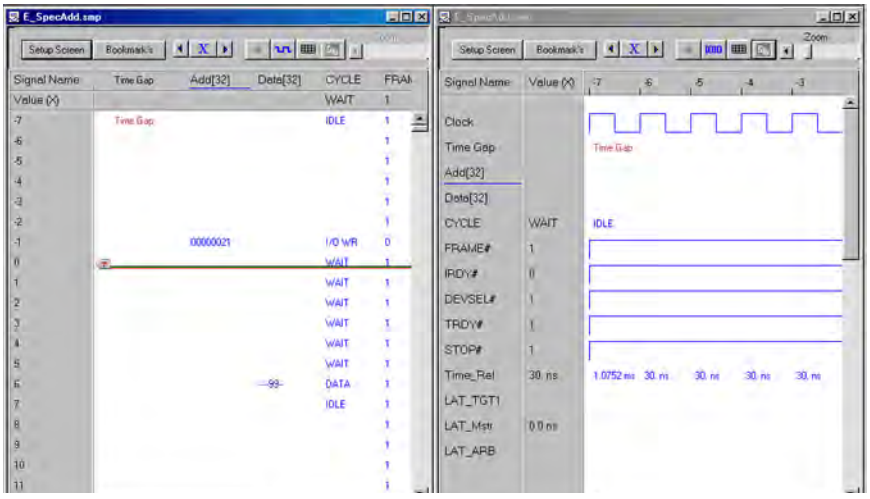


Figure 116 Simultaneous Waveform and List Display

Linked Cursors

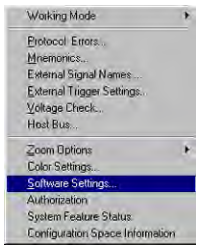
The cursors in the waveform and list windows are linked such that when you reposition a cursor in one window, the corresponding cursor in the other window moves to the same location.

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Multiple Results Windows

In cases where you would like to view several open windows simultaneously:

Click **Configuration** on the main menu bar.



Choose **Software Settings** from the drop-down list to open the TA 700 Global Settings Dialog box.

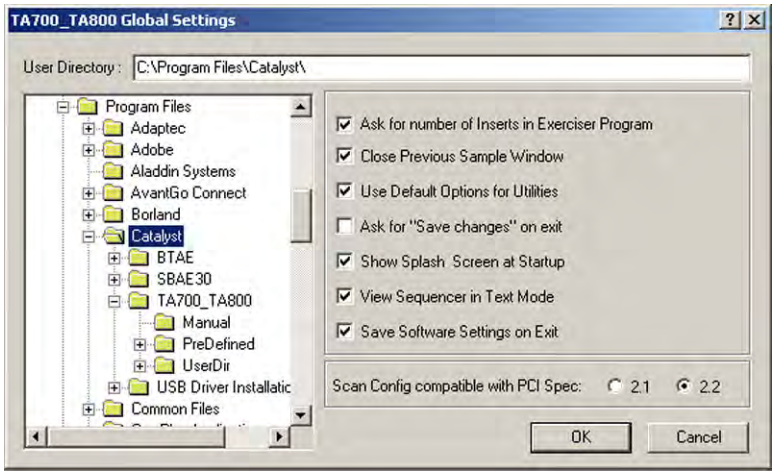


Figure 117 TA700/800 Global Settings Dialog

Uncheck the **Close Previous Sample Window** check box and click **OK**

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Adding and Removing Signals for Display

All PCI bus signals are always captured and stored on disc, but may not necessarily be displayed as default unless selected. For a signal to be viewed you must make sure that it is included for display. The capability to add or remove signals from the display offers you the ability to make the display less cluttered by including only the signals of current interest.

All signals stored

Adding and removing signals is a display function only. All captured data are saved in the output file on the hard disc and is available for display by including the signal name on the setup screen.

To add a signal to an open display:

Click the **Setup Screen** button to open the Active Signals dialog box.

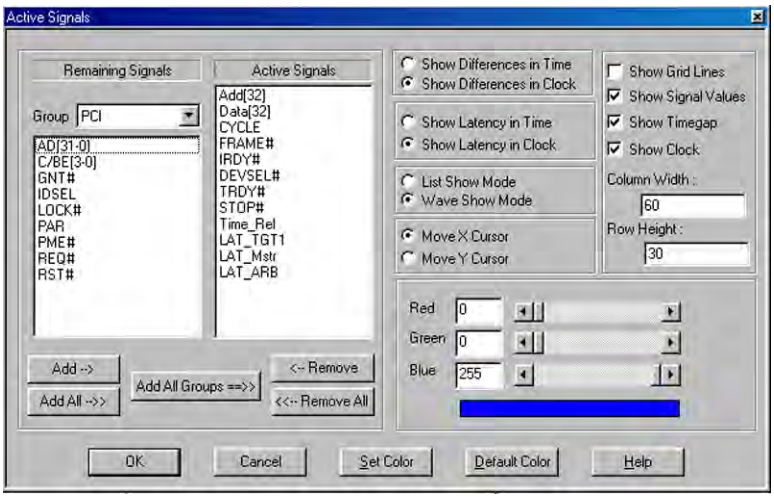


Figure 118 Active Signals Dialog Box

Find the signal to be added in the Remaining Signals area and click **Add**. To find signals quicker the signals are grouped in several classifications. When you select a group, all of the signals of that group display in the Remaining Signals window. Conversely you may remove signals from the Active Signals window by highlighting them and clicking **Remove**. When done click **OK**. The signals are always added to the end of the display but they may be dragged by the mouse to the desired location in the display for viewing.

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Termination Display In addition to the software determined termination, displayed in the sample viewer **CYCLE** column, you may add a column to display a hardware determined termination.

Note: This feature is not available for the expansion memory in the TA700.

To display the hardware determined termination: Click the **Setup Screen** button in an open sample window to open the Active Signals dialog box.

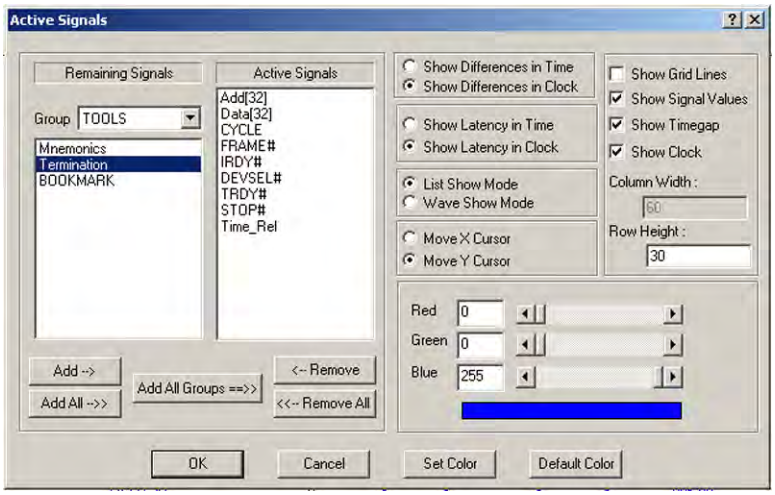


Figure 119 Active Signals Dialog Box

Click the down arrow next to the Group drop down list box, choose **Tools**, select **Termination,** click **Add->** and then **OK** to include it in the Active Signals list.

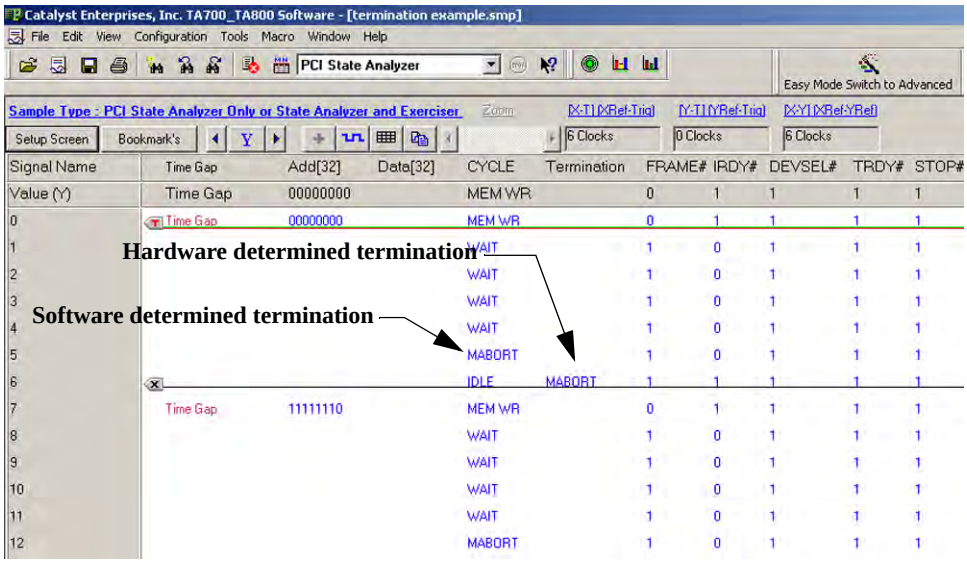


Figure 120 Hardware Determined Termination Included in Display

This feature is useful to display a hardware determined termination for cases where, for some sequencer qualified captures, the software has insufficient data to decode a termination.

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PCI-X Attribute Display To display PCI-X attributes you must include them in the Active Signals list. Click the **Setup Screen** button in a PCI-X sample window to open the Active Signals dialog box.

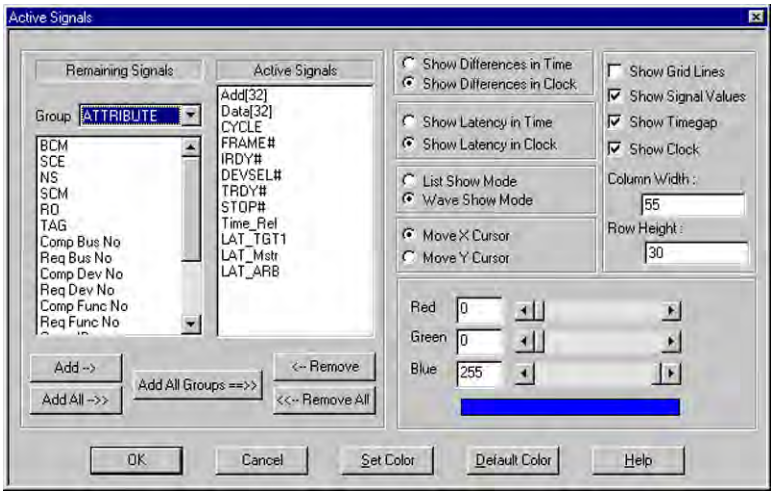


Figure 121 Select PCI-X Attributes for Display

Click the down arrow in the **Group** drop down box and choose **Attribute**. Select individual attributes and click the **Add->>** button or click the **Add All->>** button to move the signals to the Active Signal list. Click **OK** when done.

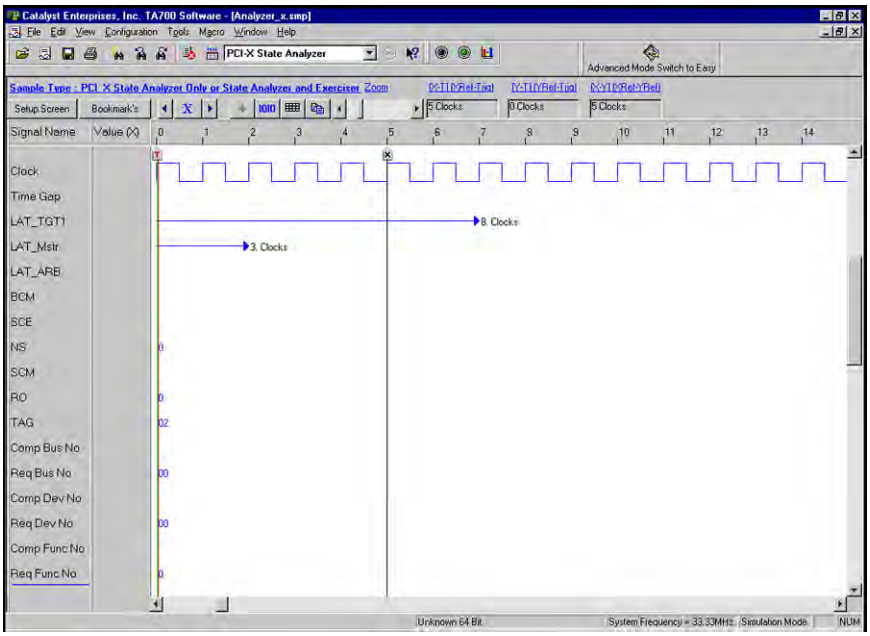


Figure 122 PCI-X Attribute Display

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Attribute Abbreviations

BCM	Byte Count Modified
SCE	Split Completion Error
NS	No Snoop (NS)
SCM	Split Completion Message
RO	Relaxed Ordering (RO)
Comp Bus No	Completer Bus No.
Req Bus No	Requester Bus No.
Comp Dev No	Completer Device No.
Comp Func No	Completer Function No.
Req Func No	Requester Function No.
Comp ID	Completer ID
Req ID	Requester ID
Seq ID	Sequence ID
SEC Bus ID	Secondary Bus No
Byte En [3-0]	Byte Enable

Quick Signal Edit To quickly add or remove signals from the display, right click the mouse in the signal name area.

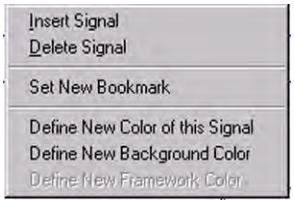


Figure 123 Quick Signal Edit List

Clicking **Insert Signal** will open the Insert Signal dialog shown in Figure 124.

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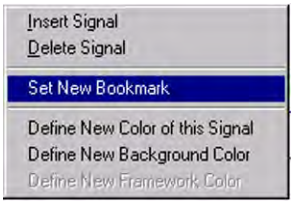
Figure 124 Insert Signal Dialog

Choose the signal to be added and click **OK.**

Using a Bookmark

Bookmarks are a convenient way to mark a point in the results display by name such that you can rapidly return to that point by name. To create a bookmark:

Right click the mouse in the signal display area where you wish to place a bookmark to open the Quick Signal Edit list.



Choose **Set New Bookmark** to open the Bookmark dialog box shown in Figure 125.

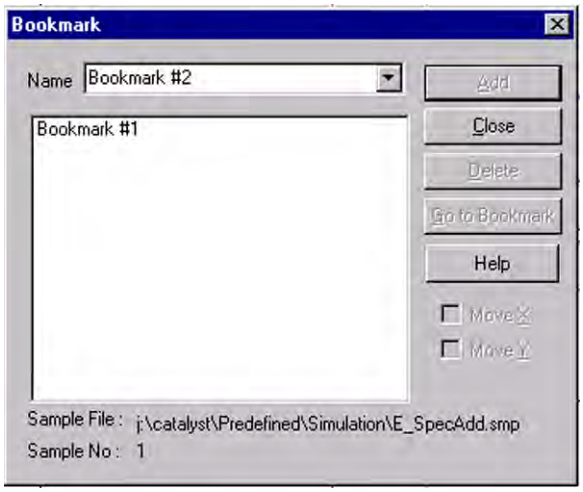


Figure 125 Bookmark Dialog

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Enter a name for the bookmark and click **Add** and then **Close**. For additional bookmarks, search the display for another point of interest and repeat the process.

Using a Bookmark

You can jump X or Y cursors, to the bookmarked point from anywhere in the display by clicking the **Bookmark's** button on the Waveform or List data display to open the Bookmark Search Dialog shown in Figure 126.

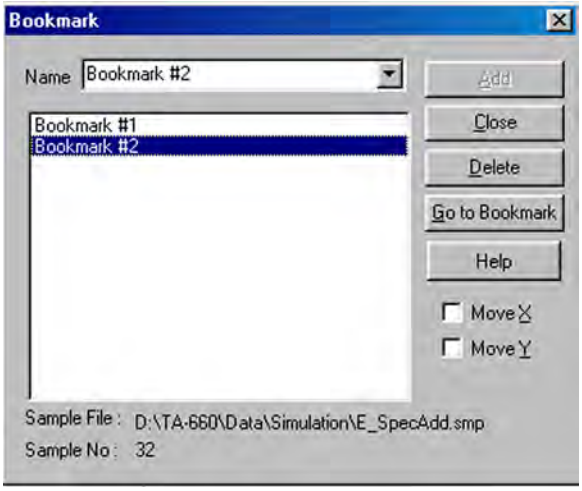


Figure 126 Bookmark Search Dialog

Select the bookmark location you desire and then **Go to bookmark.**

Remove Display Signal

To remove a signal from display right click the mouse on the signal name or on the signal line and choose **Delete Signal** in the Quick Signal Edit List.

Signal Trace Color

You may tag special signals of interest to be displayed in a different color to differentiate them from the rest. To assign a color to a signal trace:

Right click the mouse under the signal which you wish to change the color to open the Quick Signal Edit List and choose **Define Signal Color** to open the Signal Color Selection Dialog box as shown in Figure 127, select a color and click **OK**.

Background Color

To choose a different background color, right click the mouse in the signal display area to open the Quick Signal Edit List and choose **Define Background Color** to open the Signal Color Selection Dialog box as shown in Figure 127, select a color and click **OK**.

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Figure 127 Signal Color Selection Dialog

Latency Report

To view Master/Target Latencies add the signals LAT_XX to the display See Figure 118.

Latency Clock vs Time You may display latencies in clock or time units by making the choice in the Setup Screen as shown in Figure 118.

Using the Cursors

Each of the data displays incorporates three cursors that are labeled X, Y and T. All of them are initially overlaid and positioned at location 0, which is the trigger position of the display. The Trigger or T cursor is always locked at location 0 of the display. It cannot be repositioned. and serves as the measurement reference.

Moving the X Cursor The X cursor may be dragged by selecting the left mouse button and positioning the mouse cursor over the display cursors and then dragging to the desired location or by clicking the left mouse button with the mouse cursor positioned anywhere in the display. This will cause a display in the [X-T](XRef-Trig) box to show the difference in clocks, or, if selected, time, between the trigger and the X cursor.

Moving the Y Cursor Similarly the Y cursor may be dragged by positioning the mouse cursor over the cursors with the right mouse button selected or by clicking the right mouse button with the mouse cursor anywhere in the display. This

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will cause a display in the [Y-T](YRef-Trig) box to show the difference in clocks, or if selected, time, between the trigger and the Y cursor. The difference between the X cursor and the Y cursor is shown in the [X-Y](XRef-YRef) box as well.

Time vs. Clocks Display To display differences in clocks or time select Show Differences in Time or Show Differences in Clock from the Active Signals Dialog box as desired. See Figure 118.

Jump Within Data Display

You may quickly jump within a data display relative to the start position, trigger position or cursor positions, using the Jump option.



To jump within the display click **Tools** on the menu bar and then select Jump to open the Jump Dialog box.

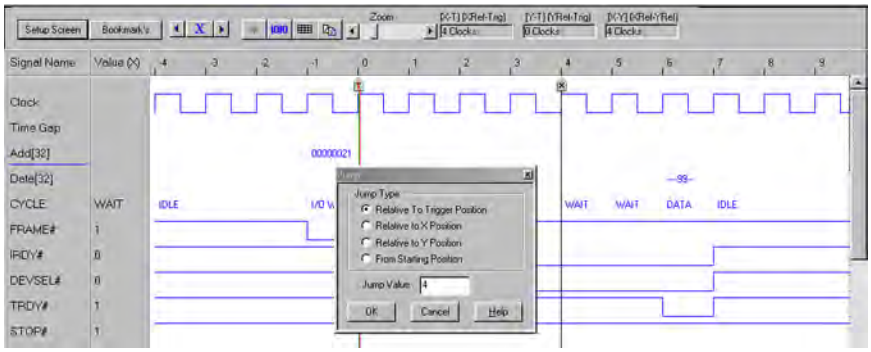


Figure 128 Selecting a Jump Option

Select the desired jump option, enter the desired distance for the jump and click **OK**.

Using Zoom in the Wave Window

Zoom is available only in the wave window and permits you to scale the display by a factor of 0.1 to 10. To zoom the display you may click on and drag the zoom slider to a zoom position or simply click to the right of the slider button to zoom in and to the left of the slider button to zoom out.

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Zoom Options

To zoom about the X, Y or between the X & Y cursors click Configuration on the main menu bar and select the **Zoom Options** as shown in Figure 129.

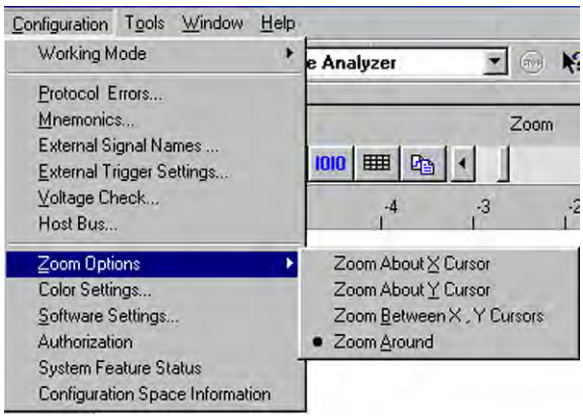


Figure 129 Setting Zoom Options

Zoom Around Choosing this option zooms the current display window independently of the cursors.

User Defined Display Configuration

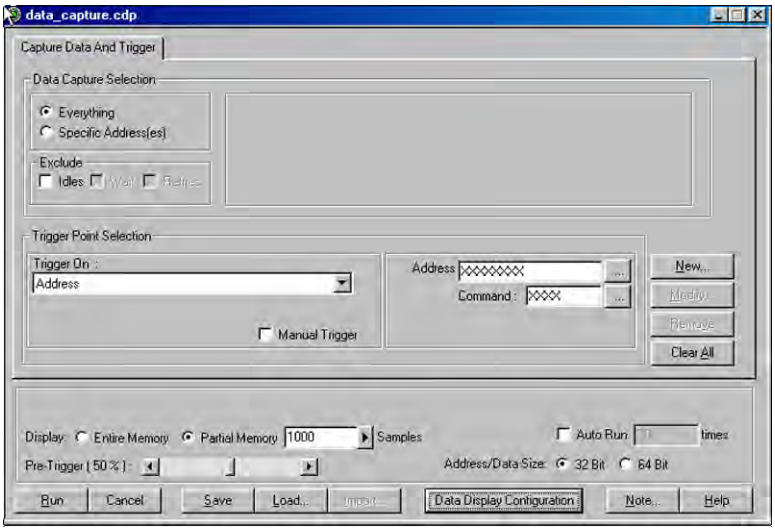
Users may modify the display by adding, removing, and rearranging the position and color of the signals as it fits best for their application. This format may be saved and recalled for different data capture and trigger projects.

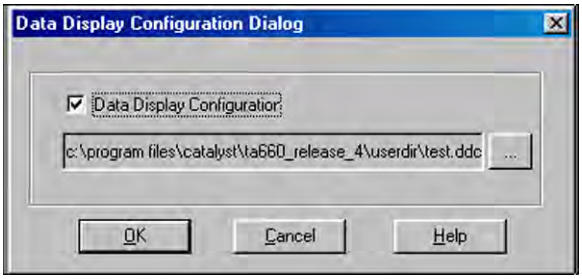
Display Configuration To save and recall this configuration file, simply make all the desired changes to the display and do a “Save As”, select a file name with extension.ddc (Data Display configuration).

To recall this configuration format click on “Data Display Configuration” Button on the bottom of the project menu before executing the project, browse and select the file name desired for this project and enable it in the drop down menu.

Note: Saving the Data display configuration does not work on the pre-captured data provided with the software in the simulation mode, it has to be done on user captured data.

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Search

The search option permits you to examine any output file and to quickly locate PCI bus data patterns including search patterns defined in Mnemonics.

The search option is enabled whenever an output file is displayed on the screen. Whenever an output file is displayed the Menu Bar is expanded to include the additional **Find, Find Next** and **Find Previous** icons.





Click the Search button to open the Search Pattern definition dialog box.

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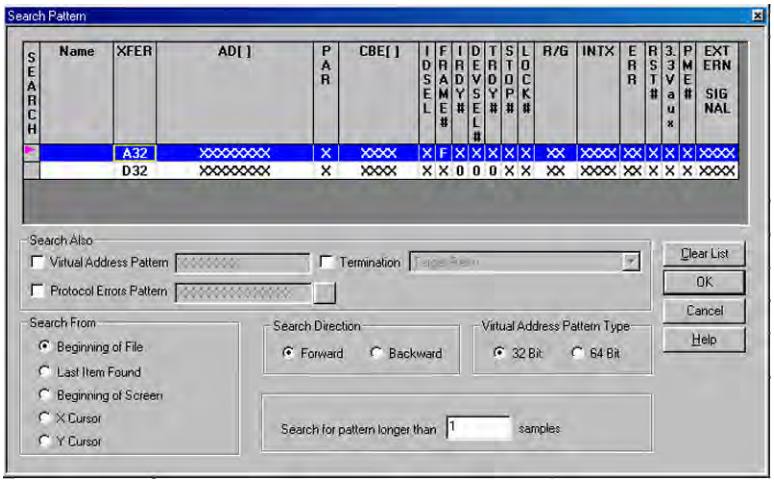


Figure 130 Search Pattern Definition Dialog Box (D32 XFER)

1. Set the search parameters and address or parameter pattern that you wish to locate and click OK.

Search Settings Retained

The search settings for each search are retained for future use, unless cleared by clicking the **Clear List** button. To search with previously defined settings, highlight the appropriate line and click **OK**.

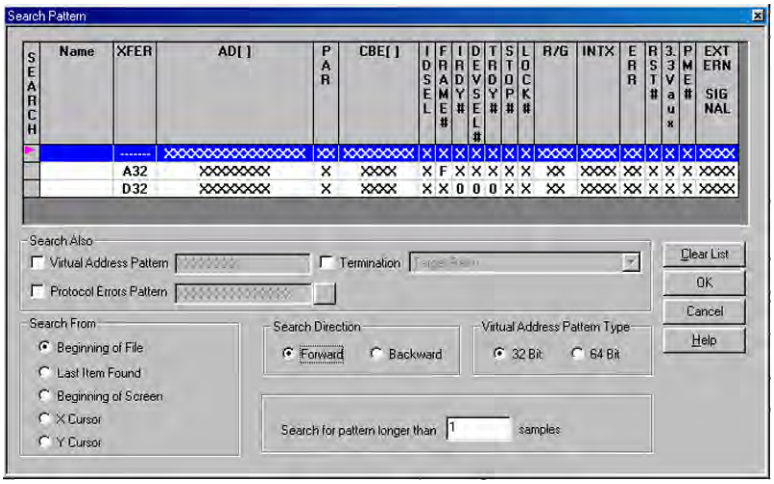


Figure 131 Search Settings Retained

Each time you initiate a new search, an unconfigured search line is added to the list. You may use it to set up new search parameters or use one of the previously defined ones.

Search Also

You may expand your search to include Virtual Address Pattern, Protocol Errors Pattern and/or External Signals Pattern or termination type by checking the appropriate check box in the Search Also area.

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Search may also be made for names. These names are defined and assigned to patterns in the mnemonics menu.

External Signals Pattern

To search external signals, double click in the **Extern Signal** field and select the external signal pattern required in the data entry dialog.

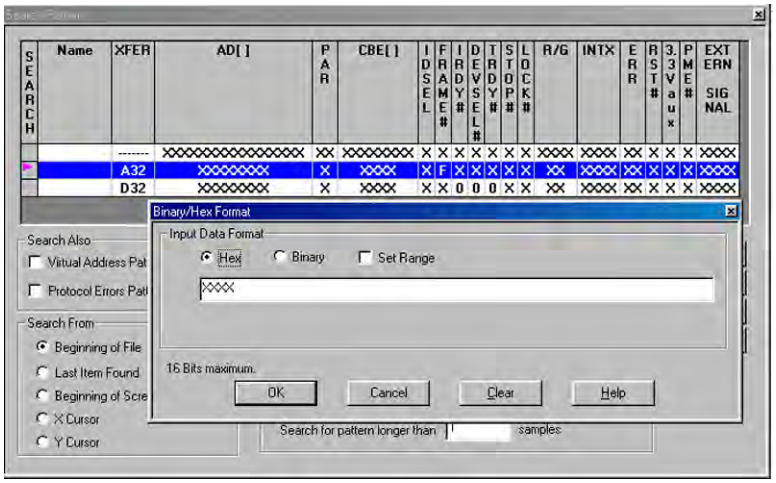


Figure 132 Defining External Signals Patterns

Protocol Errors Pattern

To search with protocol error patterns, click the ellipses button next to the Protocol Errors Patterns edit box and define the Protocol error pattern by clicking the don't care X repeatedly to set it to a 1 or 0 as desired.

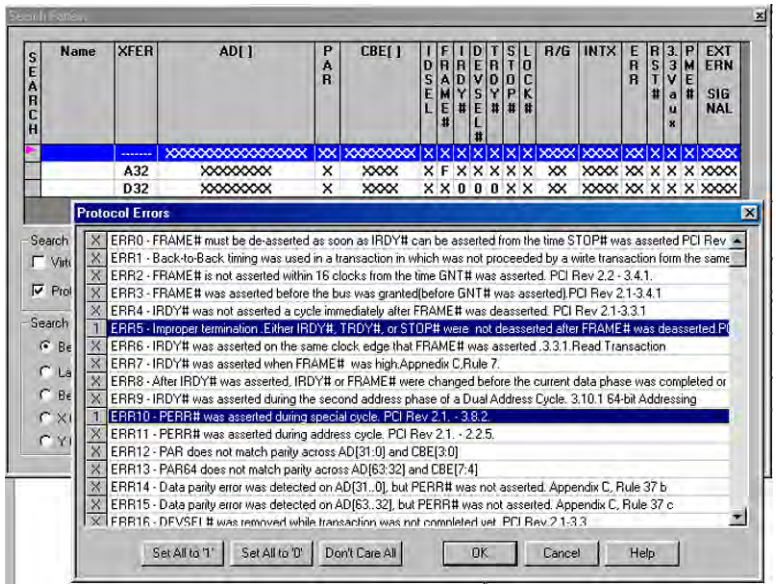


Figure 133 Search Also Protocol Errors

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Search Using Mnemonic

To search for a match pattern defined as a Mnemonic click in the Name Field of the search pattern dialog and choose the mnemonic name that you wish to use in the search.

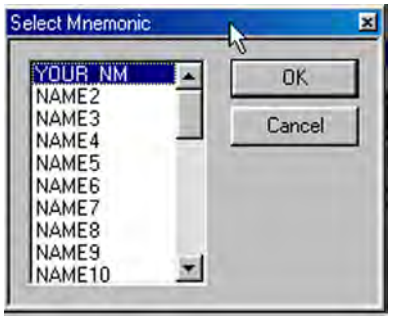


Figure 134 Choosing a Mnemonic

Defining Mnemonics

For instructions on how to define Mnemonics see “Mnemonics” on page 164.

Virtual Address Pattern

To search for a Virtual Address pattern, click the Virtual Address check box in the Search Also area and enter the address relative to the start address of a Burst or DMA transfer (Which is transferred on the bus) to locate the corresponding data point. Virtual addresses are displayed in black in the results display.

Termination

To search for a termination, click the down arrow next to the Termination drop-down list box and choose the desired termination type to search for.

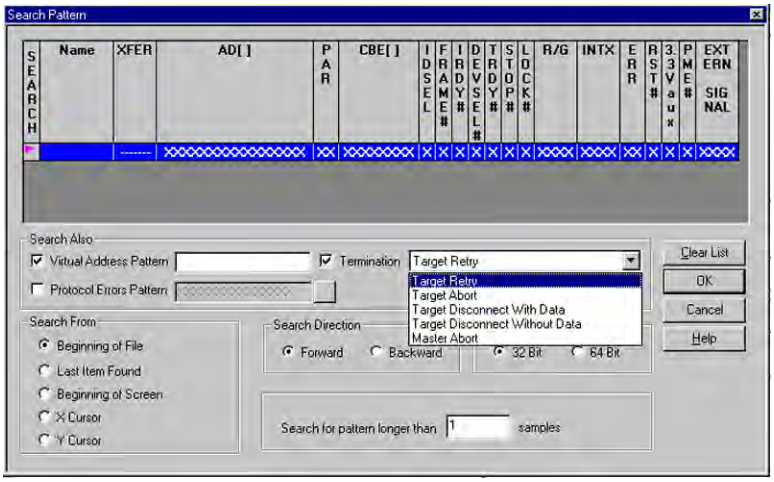
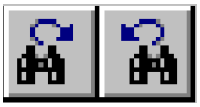


Figure 135 Search for Virtual Address and Termination Selection



After the initial search, you may perform forward or backward searches for the same item by clicking on the **Find Next** or **Find Previous** buttons on the menu bar.

Required Data

The search forward or search backward functions require collected data in the selected search direction in order to operate. A search is performed in relation to the X cursor. When a match is found a new Search S cursor appears at that location.

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Converting Captured Data

The captured data may be converted to several standard formats such as text, Excel and PCX graphics.

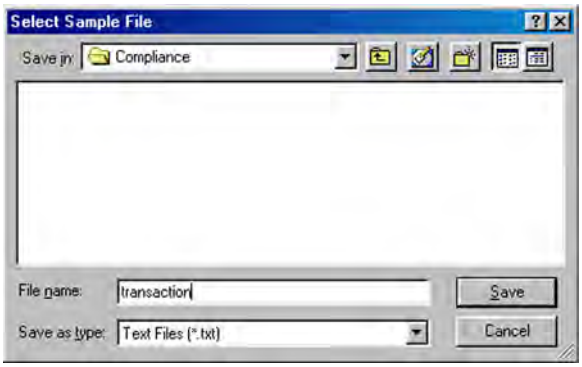
Convert To Text

You may convert an output (*.smp) file to ASCII text for later use in off-line data analysis programs. A text file may be created from the currently displayed (*.smp) file immediately after data capture or from a previously saved output file.



To create a text file from a displayed data file. Click **File** on the menu bar and then select **Save As**

Select a folder where you wish to save the text file, enter a File Name and choose Save as type **Text Files (*.txt)** and click **Save**.



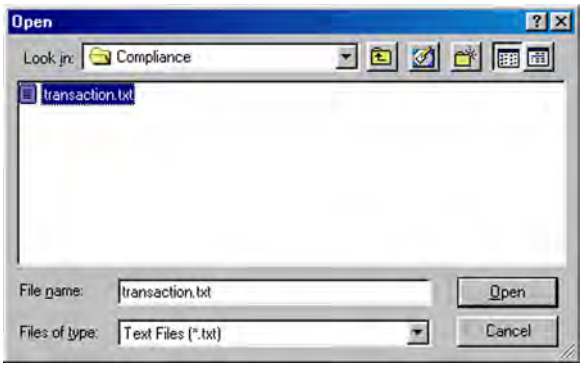
After a short time the Text File created window will open, displaying the name and the path to the converted text file.



Make a note of the path to the file and click **OK** to close the window.

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To view the newly created text file click **File** on the menu bar and then select **Open**.



Select the file and click **Open** to view the text file as shown in Figure 136.

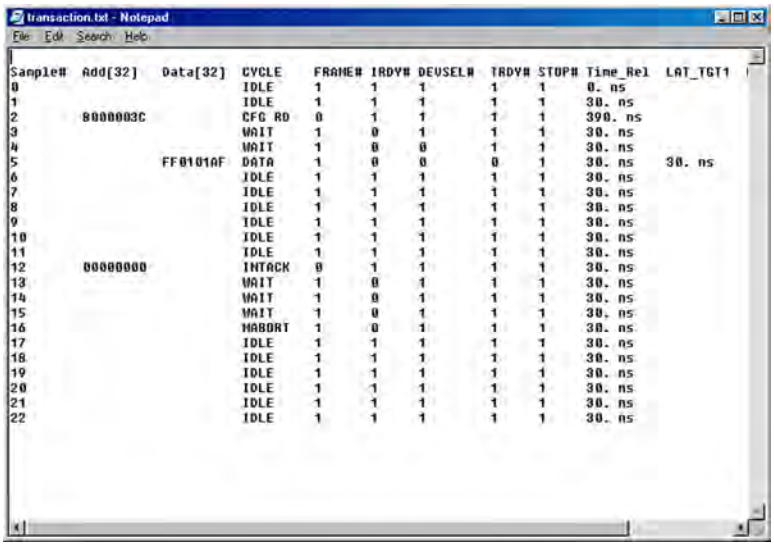


Figure 136 Text File Display

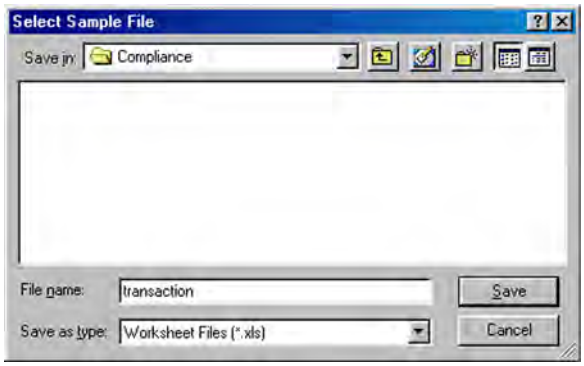
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Convert to Excel™

You may convert an output (*.smp) file to an Excel (*.xls) spreadsheet for later off-line analysis.



To create an Excel™ for a displayed data file. Click **File** on the menu bar and then select **Save As**.



Select a folder where you wish to save the Excel™ file, enter a File Name and choose Save as type **Worksheet Files (*.xls)** and click **Save** which will begin the conversion process.

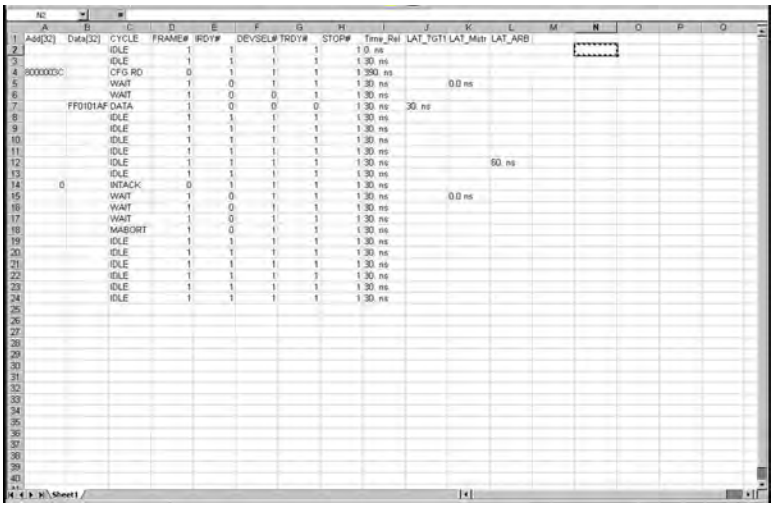


After a short time the Conversion Completed Successfully message will display.



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You may now open the file using Excel™ as shown in Figure 137 and perform any required data manipulations.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	A##[32]	Data[32]	CYCLE	FRAME#	IRDY#	DEVSEL#	TRDY#	STOP#	Time_Rel	LAT_TGT1	LAT_Mstr	LAT_ARB					
2			IDLE	1	1	1	1		1 0 ns								
3			IDLE	1	1	1	1		1 30 ns								
4	80000050		CFG RD	0	1	1	1		1 390 ns								
5			WAIT	1	0	1	1		1 30 ns		0.0 ns						
6			WAIT	1	0	0	1		1 30 ns								
7		FF0101AF	DATA	1	0	0	0		1 30 ns	30 ns							
8			IDLE	1	1	1	1		1 30 ns								
9			IDLE	1	1	1	1		1 30 ns								
10			IDLE	1	1	1	1		1 30 ns								
11			IDLE	1	1	1	1		1 30 ns								
12			IDLE	1	1	1	1		1 30 ns			60. ns					
13			IDLE	1	1	1	1		1 30 ns								
14		0	INTACK	0	1	1	1		1 30 ns								
15			WAIT	1	0	1	1		1 30 ns		0.0 ns						
16			WAIT	1	0	1	1		1 30 ns								
17			WAIT	1	0	1	1		1 30 ns								
18			MABORT	1	0	1	1		1 30 ns								
19			IDLE	1	1	1	1		1 30 ns								
20			IDLE	1	1	1	1		1 30 ns								
21			IDLE	1	1	1	1		1 30 ns								
22			IDLE	1	1	1	1		1 30 ns								
23			IDLE	1	1	1	1		1 30 ns								
24			IDLE	1	1	1	1		1 30 ns								

Figure 137 Excel™ File Display

Capture a Screen

You may perform a screen capture at any time and save it as a *.pcx graphics file for later review or inclusion in a report.

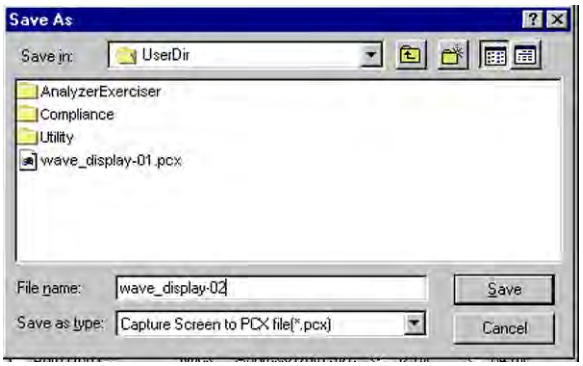


To perform a screen capture click **Tools** on the menu bar and choose Capture Screen . . .

Position the cursor where you would like to capture the screen and with the left mouse button depressed drag the cursor to define the screen capture area. Release the mouse button to open the Save As dialog.

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Assign a file name to the screen capture to be saved and click **OK**.



The capture progress bar will display, and when complete, you may open the *.pcx file for viewing using a graphics program or import it in a word processing program such as Word™ as an illustration.

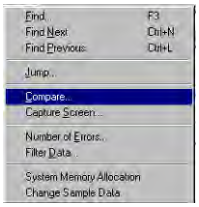


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Tools to Analyze Captured Data

Compare

Compare permits you to perform a comparison of two output files to generate a screen display of the differences found. This feature may be particularly useful to compare an output file of a known working product to that of a malfunctioning product.



To compare two files select **Compare** from the Tools menu to open the compare output files dialog box shown in Figure 138.



Figure 138 Compare Output Files Dialog Box

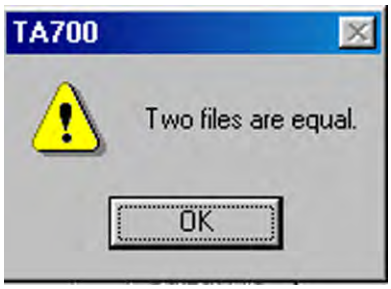
1. Select the comparison files by browsing the first and second file list boxes.
2. Choose the sample at which you would like the comparison to start by entering the start sample number in the **From** edit box, (the default value is 1).
3. Click either, the **Entire File** or **Partial File** radio buttons to select the entire file or a partial file to be compared. Checking **Partial File** requires you to specify the number of samples to be compared.
4. Click OK.

Compare Equal

If the contents of the two files match the **Two files are equal** dialog box will display

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.



Compare Different

If the two files are not identical then the **Compare Results** window as shown in Figure 139 will open displaying the differences between the two files.

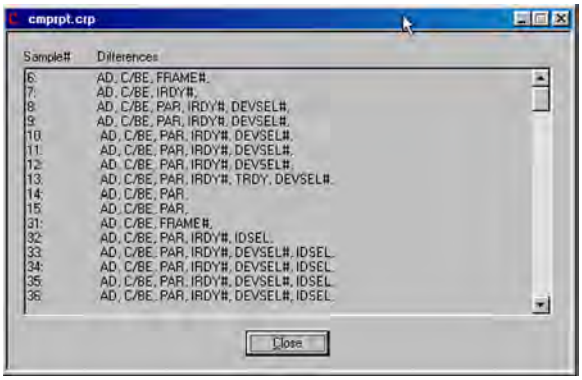


Figure 139 Compare Differences Display

Different File Sizes

If you are comparing two files with the **Entire File** option checked and the two files are of unequal length, you will get the following warning.



Click OK and repeat the action with the **Partial File** option checked.

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Filtering Captured Data

Filtering feature permits you to modify an existing *.smp data files to include or exclude a set of user defined patterns. This modification is saved into a new file.

To perform filtering you must first define the patterns that you wish to use for filtering. The patterns are defined as mnemonics.

For a complete discussion of other applications of Mnemonics, see “Mnemonics” on page 164.



To define a mnemonic for filtering, click on the **Mnemonics** icon on the menu bar or select **Mnemonics** from the **Configuration** dropdown list on the menu bar.

To define a mnemonic for filtering, double click a **NAME#** to open an Event name dialog box. Select and enter a unique name (e.g. YOUR_NAME) for the search pattern that you wish to define. Complete the filter parameter definition by clicking on the appropriate parameters for that name to open the corresponding dialog box and entering the desired settings.

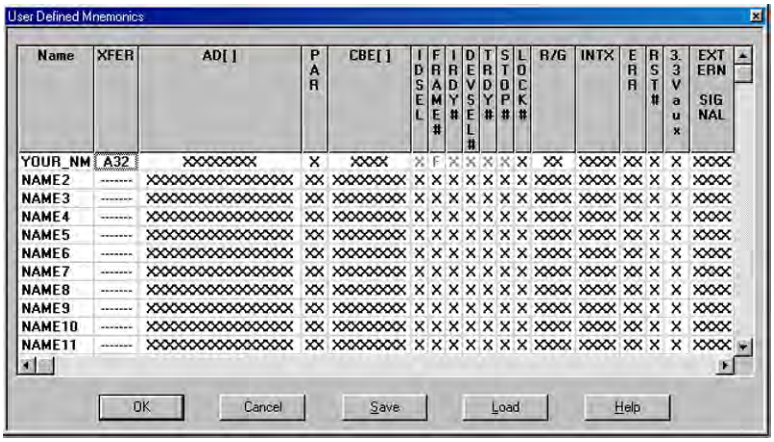


Figure 140 Mnemonics Setup for Filtering

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To filter a previously sampled data file click **Tools** on the menu bar and then select **Filter Data . . .** to open the Filter Data dialog box as shown in Figure 141.

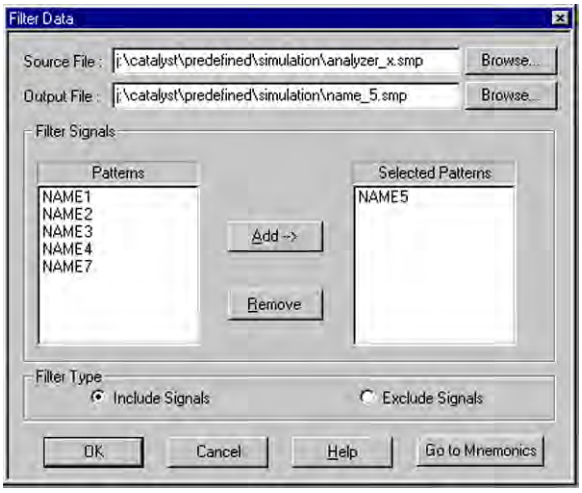


Figure 141 Filter Data Dialog Box

To configure the filter:

1. Select the Source file to be filtered and an Output File which is the destination file for the filtered results.
2. Select the desired Filter signal mnemonics one at a time from the Patterns list and click **Add->** to include them in the Selected Patterns List.
3. Determine the filter type by checking the Include or Exclude Signals button to define if the patterns are to be included or excluded from filtering.
4. Click Ok

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After a short time the Filter Data complete dialog box opens.

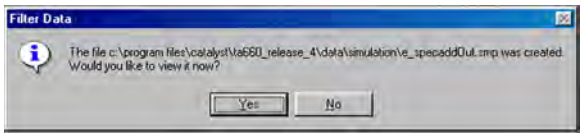


Figure 142 Filter Data Complete Dialog Box

Click **Yes** to view the filtered file or **No** to view it later. You may view and search the filtered file as any other data file.

Filtering Example

Figure 143 shows an example of results of filtering with a Mnemonic. The active window in the display shows filter results where only memory transactions were selected for inclusion.

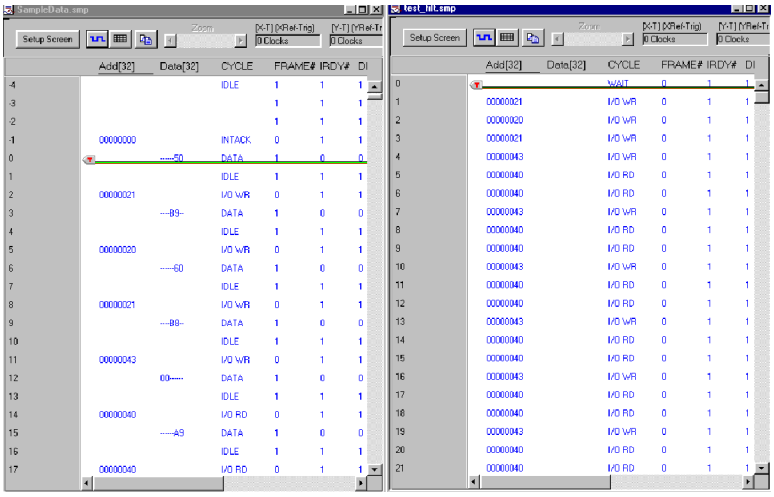


Figure 143 Filter Results Display

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Special Setups

Protocol Errors

The TA700/800 monitors over 50 different protocol errors and detects all of them automatically every time a data capture is made. The detected errors are displayed in red on the output display provided, that the ERROR signal has been selected for display using the Active Signals dialog box. To include the protocol errors on the display click the **Setup Screen** button and then make sure that **ERROR** has been included in the Active Signal list.

Protocol Error

A predefined trigger selection for Protocol Error is included as one of the trigger choices in the **Data Capture & Trigger On** menu in the **Easy Mode**. For **Advanced mode** the Protocol Error is also listed as an input of each sequencer state to cause the conditional jump or triggering selection as well. You may use the Protocol Error selection in the easy mode to trigger on protocol errors without any special setup required.

To limit the number of errors that can cause a trigger you may mask out the unwanted protocol errors.



To mask undesired protocol errors click the **Protocol Errors** icon on the menu bar to open the Set Protocol Errors dialog box.

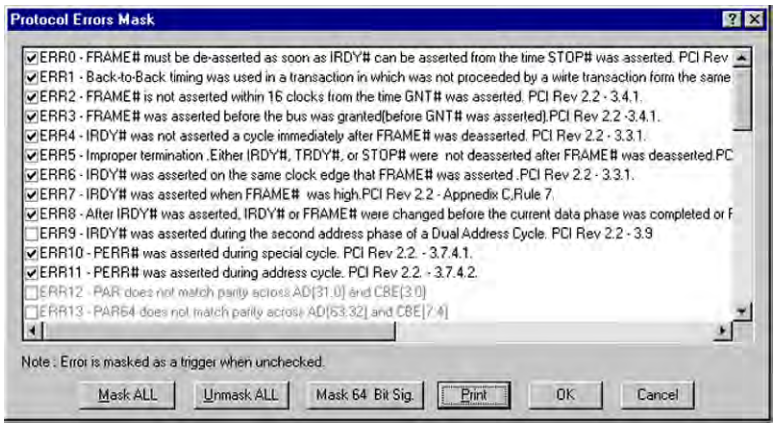


Figure 144 Protocol Errors Mask Enable

Uncheck the protocol Errors that you wish to exclude from causing a trigger and click **OK**. See Table 3. for a description of protocol errors.

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Table 3. PCI Protocol Errors (0-51)

Err.#	*Description*
ERR0	FRAME# must be de-asserted as soon as IRDY# can be asserted from the time STOP# was asserted PCI Rev 2.2-3.3.3.2.1.Rule 5
ERR1	Back-to-Back timing was used in a transaction in which was not proceeded by a write transaction form the same master. PCI Rev 2.2 -3.4.2
ERR2	FRAME# is not asserted within 16 clocks from the time GNT# was asserted. PCI Rev 2.2 - 3.4.1
ERR3	FRAME# was asserted before the bus was granted(before GNT# was asserted).PCI Rev 2.2 -3.4.1
ERR4	IRDY# was not asserted a cycle immediately after FRAME# was deasserted. PCI Rev 2.2 - 3.3.1
ERR5	Improper termination .Either IRDY#, TRDY#, or STOP# were not deasserted after FRAME# was deasserted.PCI Rev 2.2 - 3.3.1
ERR6	IRDY# was asserted on the same clock edge that FRAME# was asserted .PCI Rev 2.2 - 3.3.1
ERR7	IRDY# was asserted when FRAME# was high.PCI Rev 2.2 - Appendix C,Rule 7
ERR8	After IRDY# was asserted, IRDY# or FRAME# were changed before the current data phase was completed or FRAME# reasserted during the same transaction. PCI Rev 2.2 - Appendix C, Rules 8 b and 8 d
ERR9	(*Not implemented*)"IRDY# was asserted during the second address phase of a Dual Address Cycle. PCI Rev 2.2 - 3.9"
ERR10	PERR# was asserted during special cycle. PCI Rev 2.2. - 3.7.4.1
ERR11	PERR# was asserted during address cycle. PCI Rev 2.2. - 3.7.4.2
ERR12	(*Not implemented*) PAR does not match parity across AD[31:0] and CBE[3:0] PCI Rev 2.2 - 3.7.1
ERR13	(*Not implemented*) PAR64 does not match parity across AD[63:32] and CBE[7:4] Rev 2.2 - 3.8
ERR14	(*Not implemented*) Data parity error was detected on AD[31..0], but PERR# was not asserted. PCI Rev 2.2 - Appendix C. Rule 32.b
ERR15	(*Not implemented*) Data parity error was detected on AD[63..32], but PERR# was not asserted. PCI Rev 2.2 - Appendix C, Rule 37 c
ERR16	"DEVSEL# was removed while transaction was not completed yet. PCI Rev 2.2 - 3.3
ERR17	Target has responded to a reserved command by asserting DEVSEL#. PCI Rev 2.2 - 3.1.1
ERR18	DEVSEL# was asserted during special cycle. PCI Rev 2.2. - 3.6.2
ERR19	DEVSEL# was asserted before FRAME# was asserted. PCI Rev 2.2. - 3.3.1 and 3.3.2
ERR20	Target does not allow for turnaround time. TRDY# must not go low at the first clock after assertion of FRAME# in a read transaction. PCI Rev 2.2 - 3.3.1. & 3.3.2.
ERR21	TRDY# was asserted before DEVSEL# was asserted. PCI Rev 2.2 - Appendix C, Rule 14
ERR22	DEVSEL#, TRDY# or STOP# were changed before the current data phase was completed, after TRDY# was asserted. PCI Rev 2.2 - Appendix C, Rule 12 d
ERR23	TRDY# asserted while target is requesting abort. PCI Rev 2.1. - 3.3.3.2.1.

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Table 3. PCI Protocol Errors (0-51)

Err.#	*Description*
ERR24	Improper termination by Target. STOP# was asserted and de-asserted while FRAME# was still asserted. PCI Rev 2.2. - 3.3.2.1. Rule 4
ERR25	STOP# was asserted before DEVSEL# was asserted. Appendix C, Rule 14
ERR26	DEVSEL#, TRDY# or STOP# were changed before the current data phase was completed, after STOP# was asserted. PCI Rev 2.2 - Appendix C, Rule 12 d
ERR27	Improper Back-to-Back transaction. Either DEVSEL#, TRDY#, or STOP# were not delayed and were asserted on the first cycle of the Back-to-Back transaction. PCI Rev 2.2. - 3.4.2.
ERR28	The first transaction on the LOCK# was not a read transaction. PCI Rev 2.2. - Appendix F, F.1, Rule 2
ERR29	LOCK# was not released when Retry was requested by the Target. PCI Rev 2.2. - Appendix F, F.1, Rule 4
ERR30	LOCK# was not released after target abort. PCI Rev 2.2 - Appendix F, F.1, Rule 5
ERR31	LOCK# was not asserted the clock following the address phase or was not kept asserted throughout the transaction. PCI Rev 2.2 - Appendix F, F.1, Rule 3
ERR32	REQ64# was not asserted during the same time as FRAME#. PCI Rev 2.2 - 3.8
ERR33	ACK64# was not asserted during the same time as DEVSEL#. PCI Rev 2.2 - 3.8
ERR34	REQ64# was asserted during a non-memory transaction. PCI Rev 2.2 - 3.8
ERR35	ACK64# was asserted before REQ64# was asserted. PCI Rev 2.2 - 3.8
ERR36	TRDY# is not asserted within 8 clocks on the data phase of the burst transfer. ERR36 applies only to second or subsequent transfers, first transfer which is 16 clocks is covered by ERR37. PCI Rev 2.2 - 3.5.4.1
ERR37	TRDY# or STOP# not asserted within 16 clocks on the first data phase of the burst transfer. PCI Rev 2.2 - 3.5.4.1
ERR38	IRDY# was not asserted within 8 clocks from the time FRAME# was asserted. PCI Rev 2.2 - 3.5.4.1
ERR39	Master did not abort within 6 clocks from the time FRAME# was asserted while DEVSEL# was never asserted. PCI Rev 2.2 - 3.5.4.1
ERR40	DEVSEL# asserted after 5 clocks from the time FRAME# was asserted. PCI Rev 2.2 - 3.5.4.1
ERR41	REQ# was not deasserted for a minimum of 2 clocks after a Retry and or a Disconnect by the Target. PCI Rev 2.2 - Appendix C, Rule 10
ERR42	Target has not recognized configuration cycle type 00 or 01 and has asserted DEVSEL#. PCI Rev 2.2 - 3.2.2.3
ERR43	The IO byte address (AD0, AD1) given at the start of cycle does not match the CBE, byte enable. PCI Rev 2.2. - 3.2.2.1
ERR44	Memory Write and Invalidate Command were not implemented in Linear Incrementing Burst Mode. PCI Rev 2.2. - 3.2.2.2
ERR45	Target did not disconnect after the first phase of Reserved Burst Ordering in memory commands. PCI Rev 2.2 - 3.2.2.2
ERR46	Master abort was done prior to 4 clocks from the address phase. PCI Rev 2.2 - 3.3.3.1 and 3.9
ERR47	Reserved command was performed. PCI Rev 2.2 - 3.1.1
ERR48	A second DAC was performed immediately following a DAC. PCI Rev 2.2 - 3.9

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Table 3. PCI Protocol Errors (0-51)

Err.#	*Description*
ERR49	Byte enables were changed before the data phase was completed, A master must keep the byte enables stable during the complete data phase. PCI Rev 2.2 - Appendix C, Rule 3b
ERR50	An INTx signal has been asserted and then deasserted before an Interrupt Acknowledge. PCI Rev 2.2 - 3.6.4
ERR51	Bus Command was not reflected on C/BE[7..4] during DAC transaction. PCI Rev 2.2 - 3.9

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PCI-X Protocol Errors

Table 4. PCI-X Protocol Errors (0-58)

Err. #	*Description*
ERR0	Burst transactions are only allowed for memory transactions or Split Completion. PCI-X Rev 1.0 -1.5
ERR1	The starting address of Configuration Read and Configuration Write transactions must be aligned to a DWORD boundary. PCI-X Rev 1.0 -1.10.1
ERR2	The C/BE bus is reserved and must be driven high the clock after the attribute phase. PCI-X Rev 1.0 -1.10.1
ERR3	The initiator must assert FRAME six clocks after GNT is asserted and the bus is idle on a configuration transaction. PCI-X Rev 1.0 -1.10.2
ERR4	IRDY must be asserted two clocks after attribute phase. PCI-X Rev 1.0 -1.10.2
ERR5	(*Not implemented*) For write and split completion initiator must toggle between first and last data in starting wait states
ERR6	Fast back-to-back transactions are not permitted. PCI-X Rev 1.0 -1.10.4
ERR7	(*Not implemented*) Initiator should driver address four clock before asserting frame in configuration transactions
ERR8	PERR can not be asserted during attribute phase. PCI-X Rev 1.0 -1.10.6
ERR9	For I/O and memory DWORD transactions, AD0 and AD1 must match the byte enable. PCI-X Rev 1.0 -2.3
ERR10	In attribute phase reserved bits must be zero. PCI-X Rev 1.0 -2.5
ERR11	Initiators must not generate reserved commands. PCI-X Rev 1.0 -2.6
ERR12	After the attribute phase and during the data phase(s) of a transaction, the C/BE bus is reserved and must be driven high by the initiator for all transactions except Memory Write. PCI-X Rev 1.0 -2.6
ERR13	DEVSEL can not be asserted 1, 5 or more than 6 clocks after address phase. PCI-X Rev 1.0 -2.8
ERR14	If the completer sets the Split Completion Error (SCE) bit in attribute phase, it must set also the Split Completion Message (SCM) bit to indicate the Split Completion has message. PCI-X Rev 1.0 -2.10.4
ERR15	(*Not implemented*) If the transaction is a Split Completion Messages, the Lower Address field in the Split Completion address must be set to zero, and the Byte Count field in the Completer Attributes must be set to four. PCI-X Rev 1.0 -2.10.6
ERR16	(*Not implemented*) Delayed transactions not allowed.
ERR17	Memory write and Split Completion can not be completed as Split Transaction. PCI-X Rev 1.0 -1.7
ERR18	Initiator can not signal Master Abort before 8 clocks after assertion of FRAME. PCI-X Rev 1.0 -1.10.2
ERR19	The initiator must terminate the transaction when the byte count is satisfied. PCI-X Rev 1.0 -1.10.2,
ERR20	The initiator is permitted to disconnect a burst transaction (before the byte count is satisfied) only on an ADB. PCI-X Rev 1.0 -1.10.2

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Table 4. PCI-X Protocol Errors (0-58)

Err. #	*Description*
ERR21	The target must deasserts TRDY, STOP and DEVSEL on the first clock after the last data phase. PCI-X Rev 1.0 - 1.10.3
ERR22	If the target signals Split Response, Target-Abort, or Retry, the target must do so within 8 clocks of the assertion of FRAME. PCI-X Rev 1.0 -1.10.3
ERR23	If the target signals Single Data Phase Disconnect, Data Transfer, or Disconnect at Next ADB, the target must do so within 16 clocks of the assertion of FRAME. PCI-X Rev 1.0 -1.10.3
ERR24	Once the target has signaled Disconnect at Next ADB, it must continue to do so until the end of the transaction or must signal Target Abort. PCI-X Rev 1.0 -1.10.3
ERR25	The requester must terminate a Split Completion with Data Transfer or Target-Abort (except PCI-X bridge that is forwarding a Split Completion from one PCI bus to another). PCI-X Rev 1.0 -1.10.8
ERR26	TRDY must be asserted more than one clock after the attribute phase. PCI-X Rev 1.0 -2.8
ERR27	If a transaction has four or more data phases, the initiator signals the end of the transaction by deasserting FRAME one clock before the last data phase. PCI-X Rev 1.0 -2.11.1.1
ERR28	The initiator must deassert FRAME at least two clocks after the target asserts TRDY. PCI-X Rev 1.0 -2.11.1.1
ERR29	The initiator must deassert IRDY one clock after the last data phase but never less than two clocks after the first data phase. PCI-X Rev 1.0 -2.11.1.1
ERR30	Not a valid termination with respect to IRDY, FRAME. PCI-X Rev 1.0 -2.11.1.1
ERR31	(*Not implemented*) If the target signals Disconnect at Next ADB less than four data phases from an ADB the transaction must cross that ADB and disconnects on the next one. PCI-X Rev 1.0 -2.11.2.2
ERR32	Single Data Phase Disconnect, Retry or Split Response must be signaled in the first data phase. PCI-X Rev 1.0 - 2.11.2
ERR33	Master can not insert wait states. PCI-X Rev 1.0 -1.6
ERR34	Target can not insert wait states after first data phase. PCI-X Rev 1.0 -1.6
ERR35	Target initial wait states for memory write and Split Completion transactions must come in pairs. PCI-X Rev 1.0 - 1.6
ERR36	REQ64 can be asserted only for memory transactions (except Memory Read DWORD) or Split Completion. PCI-X Rev 1.0 -1.10.1
ERR37	(*Not implemented*) Dual transactions should not be used for addresses less that 4GB
ERR38	(*Not implemented *) Dual address & split
ERR39	The first transaction on the LOCK# was not a read transaction. PCI-X Rev 1.0 - 8.5.1
ERR40	LOCK# was not released when Retry was requested by the Target. PCI-X Rev 1.0 - 8.5.1
ERR41	LOCK# was not released after target abort. PCI-X Rev 1.0 - 8.5.1
ERR42	LOCK# was not asserted the clock following the address phase or was not kept asserted throughout the transaction. PCI-X Rev 1.0 - 8.5.1
ERR43	Target has not recognized configuration cycle type 00 or 01 and has asserted DEVSEL#. PCI-X Rev 1.0 - 1.10.5

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Table 4. PCI-X Protocol Errors (0-58)

Err. #	*Description*
ERR44	Target has responded to a reserved command by asserting DEVSEL#. PCI-X Rev 1.0 - 2.4
ERR45	DEVSEL# was asserted during special cycle. PCI-X Rev 1.0 - 2.7.3
ERR46	FRAME# was asserted before the bus was granted (before GNT# was asserted). PCI-X Rev 1.0 - 1.10.2
ERR47	(*Overlapped Error*) IRDY# was asserted during the second address phase of a Dual Address Cycle. PCI-X Rev 1.0 - 2.12.1
ERR48	Reserved command was performed. PCI-X Rev 1.0 - 2.4
ERR49	PERR# was asserted during special cycle. PCI-X Rev 1.0 - 1.10.6
ERR50	PERR# was asserted during address cycle. PCI-X Rev 1.0 - 5
ERR51	PAR does not match parity across AD[31:0] and CBE[3:0] PCI-X Rev 1.0 - 5.3
ERR52	PAR64 does not match parity across AD[63:32] and CBE[7:4] PCI-X Rev 1.0 - 5.3
ERR53	Data parity error was detected on AD[31..0], but PERR# was not asserted. PCI-X Rev 1.0 - 1.10.6
ERR54	Data parity error was detected on AD[63..32], but PERR# was not asserted. PCI-X Rev 1.0 - 1.10.6
ERR55	REQ64# was not asserted during the same time as FRAME#. PCI-X Rev 1.0 - 2.12.3
ERR56	ACK64# was not asserted during the same time as DEVSEL#. PCI-X Rev 1.0 1.12.3
ERR57	ACK64# was asserted before REQ64# was asserted. PCI-X Rev 1.0 - 2.12.3
ERR58	Bus Command was not reflected on C/BE[7..4] during DAC transaction. PCI-X Rev 1.0 - 2.12.1

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Number of Errors

Detected errors are displayed as an ERROR signal name in red in the display window if the signal ERROR has been selected for display on the screen.



To determine the total number of errors encountered in the entire captured data file click **Tools** on the analyzer menu bar and then select **Number of Errors** to open the number of errors display box as shown in Figure 145.

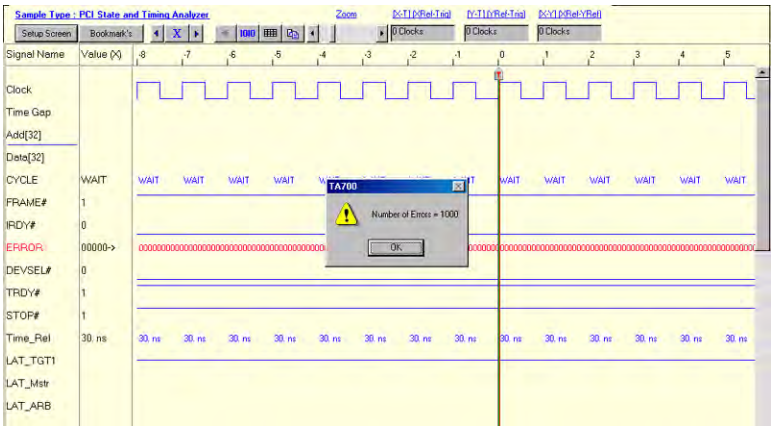


Figure 145 Number of Errors Display

Protocol Error Type

To view the type of the detected protocol error in either a list or wave display you must make sure that the ERROR signal has been added to the display. Figure 146 illustrates a typical protocol error wave display with the ERROR signal added. The error appears as a red number on the error signal line where it occurred in synch with the rest of the PCI bus signals. To determine the protocol error type triggered on, double click on the red NUMBER to open the detected protocol error message shown in Figure 147.

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The check mark(s) next to the error(s) indicate(s) the type of the error(s) and description of the error according to PCI specifications.

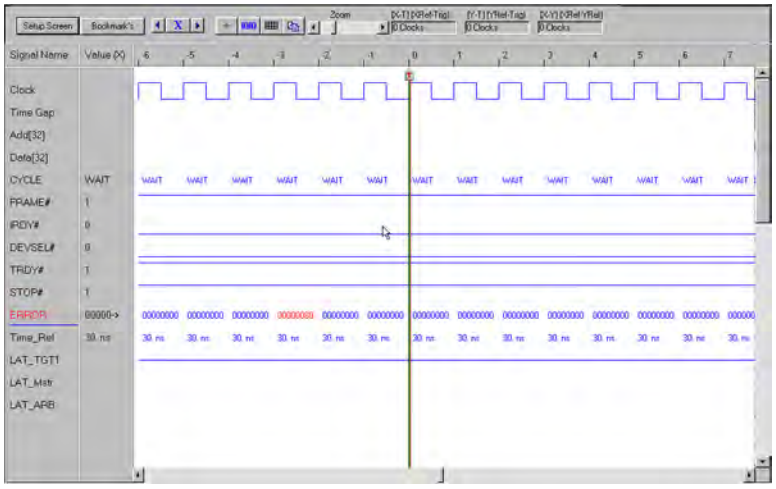


Figure 146 Protocol Error Wave Display

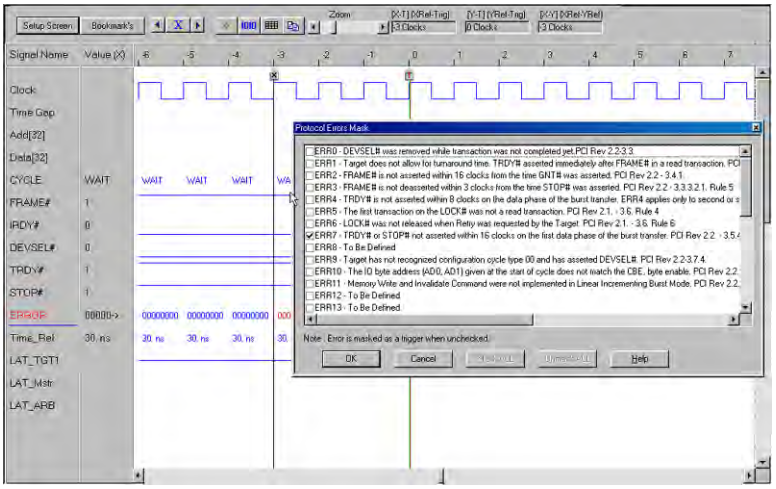


Figure 147 Detected Protocol Error Message

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Mnemonics

Mnemonics is a convenient debugging tool that assigns pre-defined names to matching patterns. The Pre-defined names may be:

1. Included in the captured data display screen next to the matching patterns for quick identification.
2. Used in the search menu to specify and find a desired pattern.
3. Used in Filter Data menu to include or exclude data from a previously generated data file.
4. Defined for complex patterns such as data that occurs only after a specific address.

You may define up to 100 individual patterns to use in the data output display, search menu and Filter Data menu.

You may create several files each intended for a specific application.



To define mnemonics, click on the **Mnemonics** icon on the menu bar.

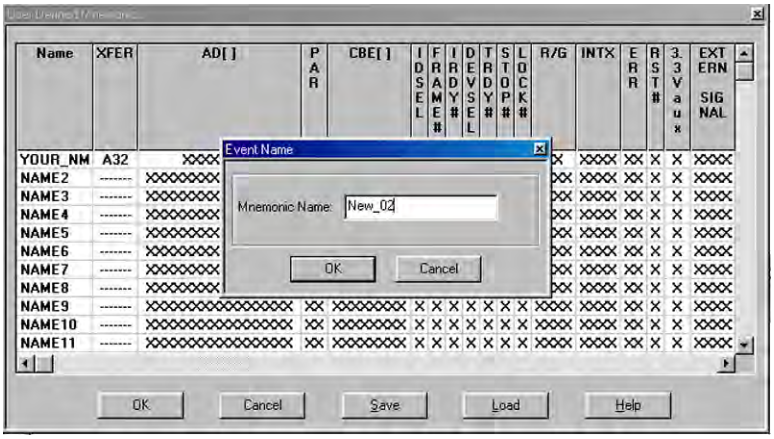


Figure 148 Mnemonics Definition Dialog Box

To define a mnemonic, double click a **NAME#** to open an Event name dialog box select and enter a unique name for the pattern. To define a complex address/data pattern click on the XFER field and select the MX32 or MX64 mode.

Not a Measurement

While similar in appearance and action to the Event file, the mnemonics definition is only an assignment of names to matching patterns used to search and highlight an already collected data and is not used to perform any measurements.

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Displaying Patterns Matching Mnemonics

Figure 148 illustrates a simple mnemonic file named YOUR_NM that is to be used to highlight a matching pattern in collected data.

To view a pattern with this mnemonic you must add it to the displayed signals list. To add the mnemonic:

Click the **Setup Screen** on either the wave or list data display to open the Active Signals Dialog Box.

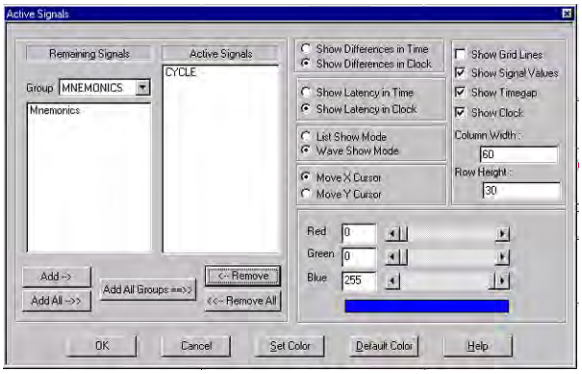


Figure 149 Add Mnemonic to Display

Select **MNEMONICS** from the Group drop down list, select the mnemonic to be added and click **Add->** and then **OK** to complete the operation.

Figure 150 illustrates the search result with a mnemonic.

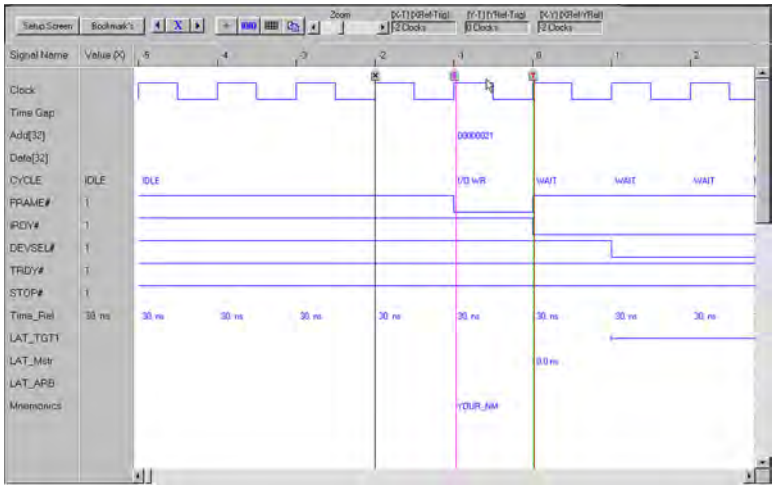


Figure 150 Searching a Display With a Mnemonic

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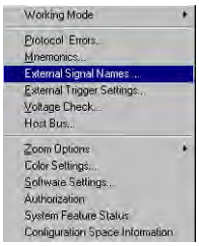
External Signals

External Input Signals

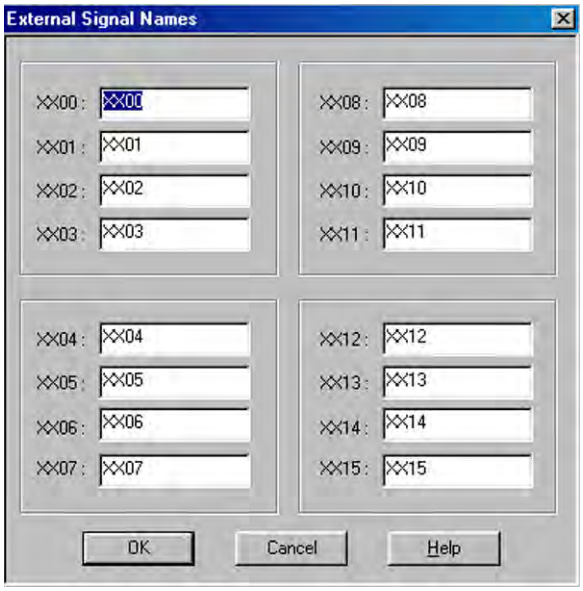
Your analyzer accepts 16 external signals that may be used in performing Performance analysis and event recognition. These signals are accessed via an External cable, provided with the analyzer and they are captured to memory in synch with PCI signals.The signals are named XX00 to XX15 by default. They may be renamed in the External Signals Dialog Box by the user.

Warning:External signal inputs level is 5V compliant, exceeding this level may damage the board. Additionally the signals must be valid for at least 2 clock cycles.

Fully enabled on TA700 and TA800A, only signal XX00 is enabled on TA800 Rev. B



Choose **External Signal Names** from the Configuration list on the main analyzer menu bar to open the External Signal Names dialog.



The wires in the cable carrying these signals follow the resistor color code convention as defined in the following tables.

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Table 5. External Signal Color Code Assignment TA700 (PCI, PCI-X, PDC*)

Signal	Name	Color
1	XX00	Brown
2	XX01	Red
3	XX02	Orange
4	XX03	Yellow
5	XX04	Green
6	XX05	Blue
7	XX06	Violet
8	XX07	Gray
9	XX08	White
10	XX09	Black
11	XX10	Brown
12	XX11	Red
13	XX12	Orange
14	XX13	Yellow
15	XX14	Green
16	XX15	Blue
17 *	GND	Violet
18 *	GND	Gray
19 *	GND	White
20 *	Key	Black
21 *	Ext_O0	Brown
22 *	Ext_O1	Red
23 *	Ext_O2	Orange
24 *	Ext_O3	Yellow

* For PDC pin assignments see “External Signals” on page 241.

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Table 6. External Signal Color Code Assignment TA800 (PCI, PCI-X)

Signal	Name	Color
1	XX00	Brown
2	GND	Red
3	-	Orange
4	-	Yellow
5	GND	Green
6	-	Blue
7	-	Magenta
8	GND	Gray
9	-	White
10	-	Black
11	GND	Brown
12	-	Red
13	-	Orange
14	GND	Yellow
15	-	Green
16	-	Blue
17	GND	Magenta
18	-	Gray
19	-	White
20	GND	Black
21	-	Brown
22	-	Red
23	KEY	Orange
24	-	Yellow

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Table 7. External Signal Color Code Assignment TA850 (PCI, PCI-X)

Signal	Name	Color
1	XX00	Brown
2	GND	Red
3	XX01	Orange
4	XX02	Yellow
5	GND	Green
6	XX05	Blue
7	XX07	Magenta
8	GND	Gray
9	XX05	White
10	XX06	Black
11	GND	Brown
12	XX07	Red
13	XX08	Orange
14	GND	Yellow
15	XX09	Green
16	XX10	Blue
17	GND	Magenta
18	XX11	Gray
19	XX12	White
20	GND	Black
21	XX13	Brown
22	XX14	Red
23	KEY	Orange
24	XX15	Yellow

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Table 8. External Signal Color Code Assignment (TA700 CPCI)

Signal	Name	Color
1	XX00	Brown
2	XX01	Red
3	XX02	Orange
4	XX03	Yellow
5	XX04	Green
6	XX05	Blue
7	XX06	Violet
8	XX07	Gray
9	XX08	White
10	XX09	Black
11	XX10	Brown
12	XX11	Red
13	XX12	Orange
14	XX13	Yellow
15	XX14	Green
16	XX15	Blue
17	GND	Violet
18	GND	Gray
19	GND	White
20	GND	Black

External Output Trigger

The external output trigger is a TTL level output with a duration of 1/2 system clock cycle. This signal is delayed by 17 clock periods from the actual trigger point. The trigger polarity is set from the Configuration menu selectable on the main menu bar.

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Macros

TA700/800 software allows users to define a series of routines, that open files and execute programs, as macros and assign them to a Function key.

To define a macro:

1. Click “Macro” on the main menu bar
2. Select **Macro Editor** to open the define new macro dialog box shown in Figure 152.

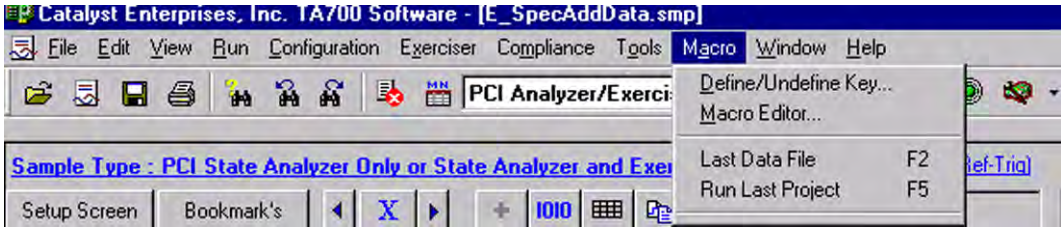


Figure 151 Defining a Macro

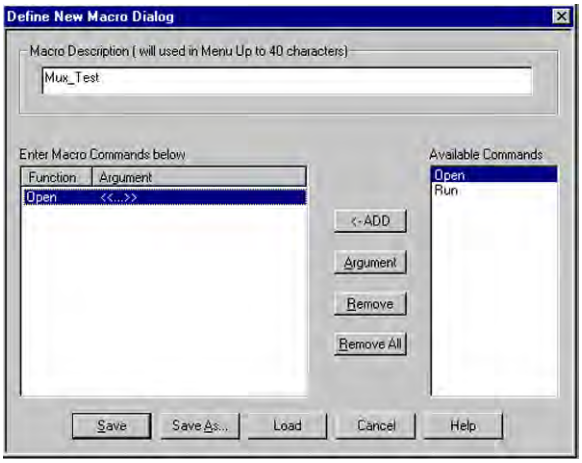
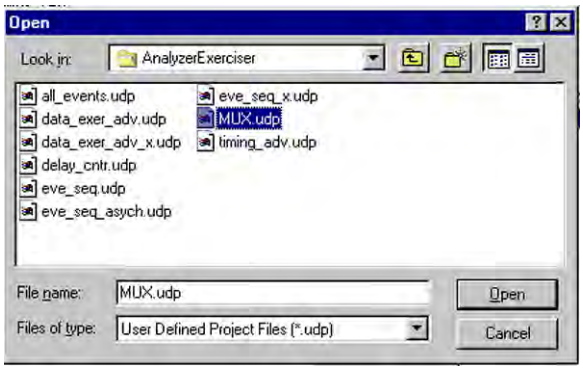


Figure 152 Defining the Macro

3. Enter a Macro description e.g. Mux_Test in the Macro Description text box.
4. Select the type of function to be performed, i.e. OPEN from the available commands and click ADD.
5. Click in the newly added command line to highlight it and then click Argument to locate an appropriate function *.udp file.

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In this example the function is to OPEN a frequently tested file called MUX.udp. Several functions such as OPEN and RUN may be intermixed and selected in a macro function.

6. Highlight the desired file and click **Open** to display the completed Macro definition.

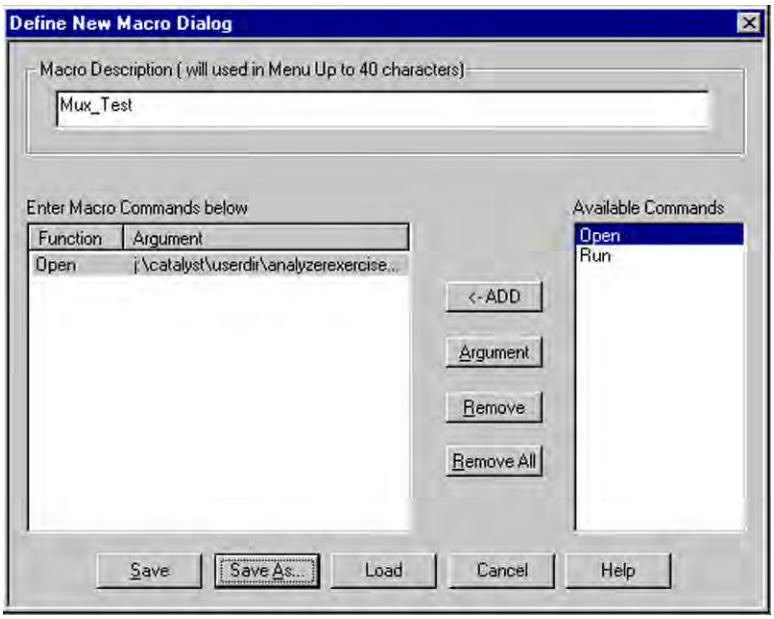


Figure 153 Completed Macro Definition

7. To save the newly created Macro click **Save As** to open the Save As dialog.

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8. Assign a File name and click **Save.**

Assigning a Macro to a Function Key:

1. Click "Macro" on the main menu bar and choose the **Define/Undefine Key** to open the Macro Assign Key dialog.

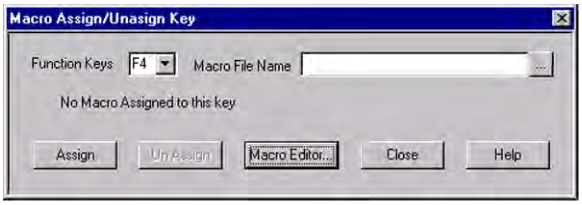


Figure 154 Macro Assign Key Dialog

2. Click the ellipses next to the Macro File Name edit box to display defined macros.

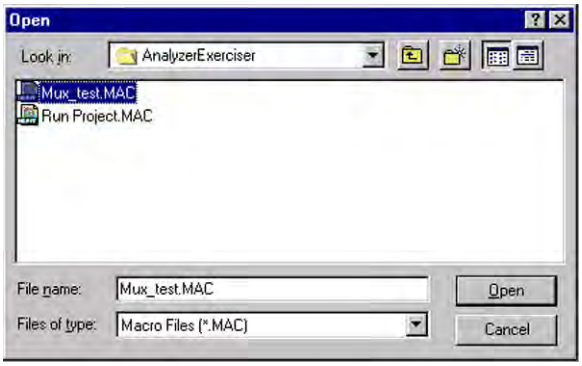


Figure 155 Defined Macros

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3. Choose the macro for assignment to the function key and click **Open**.

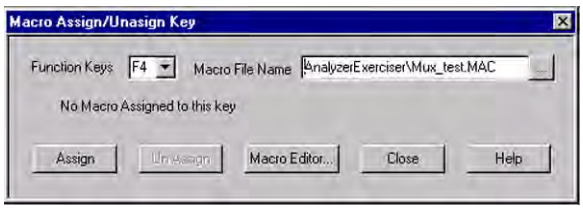


Figure 156 Assigning a Macro to a Function Key

4. Choose a function key from the Function Keys dropdown list and click **Assign.**

The assigned function key is now available to open the mux_mode.udp project.

NOTE: Please note that before a macro is assigned to a project, the project must be defined and saved. All project types including Performance Analysis, Statistical, Timing, etc may be defined as part of a macro utility.

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System Administration

Multiple Users

Your system software comes with a pre-defined folder (directory) structure for storing input and output files. All pre-defined Easy Mode input files are stored in the Data folder.

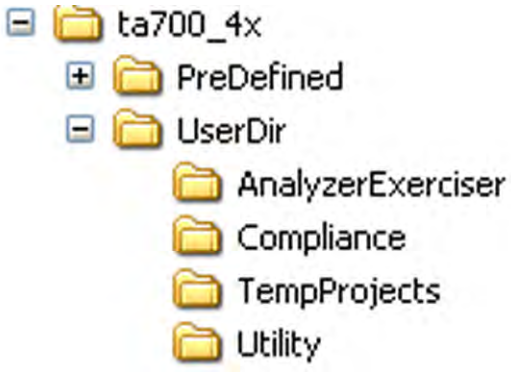


Figure 157 TA700/800 Directory Structure

You may configure your system using the Windows File Manager or Explorer for multiple users by creating a different User Directory (Folder) for each user to separate user specific projects.

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Troubleshooting

Hardware Not Found

When launching your TA700/800 Analyzer, a **Hardware Not Found** may be indicative of a problem with your parallel or USB port. Make sure to check your LPT Port settings as described in “LPT Port Setting” on page 15 or, if using USB, make sure that the USB cable is securely installed and that the USB driver has been installed as described in “Manual USB Driver Installation” on page 6

Device Not Found

When performing a configuration registers scan some devices on the bus are not found. Verify that the TA700/800 is not in downstream from a bridge. See page 56 for a description of scan direction limitations.

No LEDs Lit on Powerup

If no LEDs are lit on TA700 on powerup set +3.3V Power source jumper for on board regulator operation. See “Jumper Configuration” on page 226.

PCI-X 100 MHz Inoperative

Verify that there is no DUT in TA700 test connector. The TA700 will not operate at 100 MHz with a device in the test connector. See “Optional Auxiliary PCI connector” on page 2 Make sure that the extender switch is OFF.

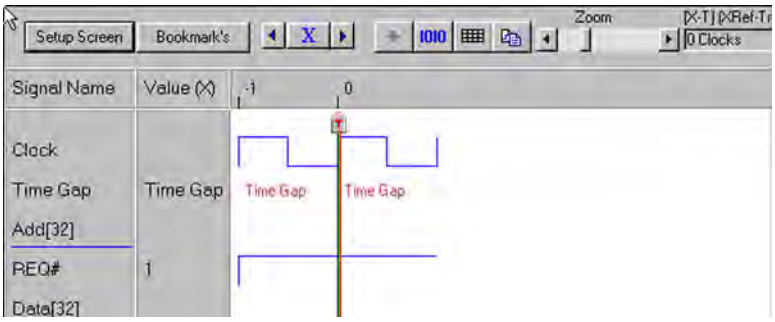
No Trigger

If after clicking Run the analyzer does not trigger for a long time.



Click the Stop button in the “Waiting for data. . . “ screen to open the data capture display window.

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A display with only two captured locations may be indicative of a BIOS that views your card as transparent to the slot used and shuts off the clock to that slot.

To correct this condition go to your CMOS setup and check the options for “PCI clock Enable/Disable” and disable the option.

Top Connector Live Power Rails

In cases where an external power supply is used for the TA700/800, but the power supply is off, the host bus +12V and -12V rails on the top connector will be live. This is a condition that happens for TA700 PCI Boards Revision C and above.

Recommendations:

1. Apply the external power prior to powering up the host bus.
2. Insert or remove your DUT from the top connector with no power applied to the bus.

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Active Session Conflict

Two active software sessions when attached to the same parallel port will cause the TA700/800 to operate improperly.

Recommendations:

1. Make sure that there is only one active session.
2. For applications that require two TA700/800 analyzers and two software sessions running in the same system, you may implement that by using two parallel ports with each session connected to its own port.

To implement this:

1. Run the first session with only one TA700/800 connected to a parallel port.
2. Disconnect the TA700/800 from the parallel port.
3. Connect the second TA700/800 to the second parallel port and start another software session.
4. Reconnect the first TA700/800.

System Clock Shutdown

Some host systems may shut down the system clock to the TA700/800 slot if the TA700/800 is set to be transparent to the BIOS.

Known Issues

For the most current known issues and problem resolutions visit

http://www.getcatalyst.com

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TA700/800 SPECIFICATIONS

ANALYZER

Bus Type

TA700/800	PCI / PCI-X
TA700C	CPCI
TA700PDC	PMC

Bus width 32 or 64 bit wide

Maximum Clock Rate Up to 100 MHz (Up to 66.66 MHz for PMC, up to 133.33 MHz for TA800) analyzer

Up to 66.66 MHz (Up to 133.33 MHz for TA800) exerciser

Min 25 MHz (PCI, PCI-X, CPCI)

100 kHz (PMC, TA800)

External Signals

16 Input Channels	Sampled in memory, may be used as trigger inputs or as input to performance analysis. (Not supported by TA800)
1 External Trigger Out	Positive or negative TTL Level synchronized to the sequencer first time trigger.

Memory Depth per Channel

Trace, 95 PCI signals	128K
Trace, optional	4 Meg (Not supported for TA700PDC or TA800)
External Signals	16 x 128K
Exerciser, 95 signals	128K
Protocol Errors	128K
Timing Errors	128K
Time Tag	128K

Word Recognizers 8 Event patterns.

Triggering Events Any of the 8 events, Boolean equation of the events, or trigger on timing or protocol errors.

30 - 20 bit Counters Used as 30 event or delay counters at each state. (14 - 20 bit counters in TA800 used as 14 event or delay counters at each state)

32 Level Sequencer Supported at each level by Store, Set Trigger, Set Tag, Discard, If, Else If, GoTo, Delay Time, Delay Count and Start Exerciser statements.(16 level sequencer for TA800)

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Counter Use	Count Accumulative count & reset as High Pass filter for triggering on system crashes. Count & reset as Low Pass filter.

TIMING MEASUREMENT

Synchronous

Not Supported by PMC and TA800

Strobe	Window strobe (2 edges)
Width	94 (64 bit PCI + control signals).
Resolution	100 Ps/edge
Operating Frequency	25 MHz to 67MHz
Spread	2-12 ns 33 MHz mode
	2-5 ns 66 MHz mode
Glitch Detection	1.5 ns
Signals	Any or all PCI bus signals may be included or masked individually.
Display	Red flag on the data display for each PCI signal, identified by the PCI signal name.

Asynchronous

Not Supported by PMC and TA800

Clock	664 MHz
Width	64 bit (selectable PCI control signals + addresses for AD [0 .. 31] or AD[32 .. 63])
Resolution	1.5 ns
Memory Depth	512K

TIME TAG

Counter	40 bits
Resolution	TA700 10 ns to 40 ns
	TA700PDC 15 ns to 1.0 ms
	TA800 7.5 ns to 1.0 ms
Recording Duration	Up to 5 Hours at 15 ns, up to 10 Hours at 30 ns.
Reported display	Absolute time from the start, Relative to trigger point, relative to each data sample, Latencies for Target and Master.

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PERFORMANCE ANALYSIS

Real-time, Continuous

Event Counters	8 counters, each 32 bit.	
Count qualifier	Every bus cycle, User defined address space or Sequencer (Based on user defined sequence of events)	
Count Modes	Reset or Accumulative	
Count Interval	500 us to 10 minutes	
Output Results Reports		
	Pre-defined	Bus utilization, Efficiencies, Throughput, Latencies, DMA transfers, Idle time; I/O vs. Memory utilization.
	Custom	Per user defined equations.
Measurement Reports	Normalized to largest per interval or Absolute measurement.	
Output Display (Real Time)	Text Report, Bar Graph, Pie Chart and histogram.	
Display Modes	Color; 2D or 3D	
Host CPU interface	Real-time FIFOs	

Statistical (Memory Capture)

Capture Depth	User defined up to 128 K
Capture Qualifier	User defined sequence of events.
Measurement types	Min, Max or Average. Number of occurrences. Percentage of occurrences.
Measurement Qualifiers	User-defined address, address range or cycle type.
Report Types	Graphical and Text
Measured Parameters	Latency Target
	Latency Master
	Latency Arbiter
	Efficiency
	Target Efficiency
	Master Efficiency
	Throughput Mb/Sec
	Bus Utilization
	IDLE
	No of Data Transfer/Address
	Wait

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Int Ack

I/O

I/O RD

I/O WR

Memory

Mem RD

Mem WR

Configuration

CFG RD

CFG WR

MEM RM

Dual ADD

MEM RL

MEM W&I

Total No Of Data

RETRY

TABORT

DIS+DATA

DIS-DATA

MABORT

Latency, REQ# to Data

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UTILITIES

Search	By name, forward, backward and for consecutively re-occurring patterns.
Post-capture filter	Include or exclude use-defined patterns.
Convert Captured Data	ASCII
	EXCEL
	PCX
Compare Captured Data	User defined start and end from each file
Jump	Jump in results display relative to X and Y trigger positions from starting position.
Capture Screen	Capture a mouse cursor selectable screen area for saving as a *.pcx file.
Zoom	Zoom display around X and Y cursors, between X and Y cursors or Zoom around independently of cursors.

MNEMONICS

100 User Defined per file	May be saved for recall in a different application. Unlimited files may be generated and saved.
PCI Bus	Inverse decode of all PCI initiator and target termination.

EXERCISER

Bus Width	Up to 64 Bit
Bus Speed	25 to 66.6 MHz
	1 KHz to 133.33 MHz PCI-X for TA800
	1 KHz to 66.6 MHz for TA700PDC
Output Voltage Swing	3.3 V
Link	To the Analyzer, Start after defined events, Start after external trigger

Data Block generation

Data block generation of W1, W0 or user patterns

8, 16, 32 or 64 bit wide

Up to 128K deep

Multiple blocks of data in to a single file

May be generated in the GUI and saved as ASCII format

May be generated in a text editor and imported to the exerciser program

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Master Mode

Read/Write to I/O, MEM or configuration registers.

DMA transfers of up to 128K, real-time.

Single execution, loop up to 65535 or indefinite.

Insert user defined Wait states, unlimited, any location.

Force Interrupts, Errors, Parity Errors.

Perform special bus cycles.

Test memory blocks.

Read Modify Write memory.

Execute programs with or without GNT# from arbiter.

Several programs may be cascaded for on-the-fly execution.

Respond to Retry, Abort and Disconnect.

Perform Dual address cycle programs.

Split completion for PCI-X exerciser.

Target Mode

Termination Type	Transfer data, Retry, Disconnect with or without data, Abort with or without data.
Decode Address	User defined I/O, Memory Read, Write single address or range, special cycle etc.
DEVSEL Speed	Fast (Not available in current version), Medium, Slow, Subtractive or Below Subtractive.
	Split response for PCI-X exerciser.

Local Memory

Read/Write memory	1 Meg Byte memory on board for random access read/write operation
Memory Depth	1MB organized as 8 x 128 Kbyte locations.
Transactions	32/64 bit
DEVSEL Speed Assertion	Slow
Initial Latency	7 wait states.

Not available for PCI-X and TA800, in current version of software.

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Voltage Check

N/A for TA700PDC

Voltages Monitored	+5V, +3.3V, +12V, +3.3V_{AUX}
	+5V, +3.3V for the DUT (Not available for CPCI)
	(+5V, +3.3V, +12V, +3.3$V_{AUX,}$ +3.3V_{IO} for TA800)
Drop Measured	-5%
Indicator	Red/Green LED (D8, D9 for TA700, D2, D3 for TA800)

Voltage Requirement

TA700	+5V @ 10 mA for Rev. C
	+3.3V @ 3 Amps and +/-12V @ 50 mA for Rev. B and earlier for extender operation.
TA700PDC	+3.3V @ 3 Amps and +5V @ 10 mA.
TA700C	+5V @ 10 mA +3.3V @ 3 Amps
TA800/TA850	+3.3V @ 1.79 Amps for typical 133.33 MHz Analyzer operation.

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Appendix A

TA700 COMAPI Library

The TA700EngineAPI is a COM Object library that enables programmers to use most of the TA700 software functionality in their programs. This library covers all the hardware functionality. The software has been developed for use with applications developed under COM Supported Platforms such as Microsoft Visual C++, Borland Delphi, and Microsoft Visual Basic. The library includes internal interfaces to detect, set device options and program TA700 hardware to execute a specified project with the desired event, sequence and program selections.

A sample file that demonstrates the use of several of the TA700 COM API features is included with this package.

Note: To use this library first you must register the following DLLs:

TA700EngineAPI.dll

Make sure to copy the most recent *.BIN files in to the working directory.

The easiest way to register these DLLs is to use the "Regsvr32.exe" program located in the Windows/System directory

Regsvr32 “<path>\TA700EngineAPI.dll”

Where <path> is the location of the TA700API DLL

Please note the following items before using the TA700 COM API Package:

- All samples are implemented at Microsoft Visual C++ 6.0
- TA700 COM API Package requires the file TA700EngineAPI_i.c.This file declares the GUID’s for all Interfaces, COM Class... in the C style.
- The TA700 COM API Package requires the file TA700APIcons.h.This file declares some of the useful constants for developing with TA700 COM API. This feature is only enabled on C based platforms such at Visual C++.

Examples using each function are provided in the sample section on

Limitations: At this time the Com API does not support Performance Analysis and Trace Statistics.

This release support TA850 boards in addition to TA700 and TA800 boards. In addition to EPP & USB ports Ethernet Interface has been added to the interfaces supporting by COM API with TA850 boards. For this purpose some settings files have been added to the API Suite in the **“.\System\Configuration\”** folder, so it is necessary to have this folder in **parent folder** of **“Ta700EngineApi.dll”**. Some interfaces have changed as follows:

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New Methods

IRunProjectServer Interface

SetDeviceID()

FormatResultMessage()

SaveAsText()

DumpLocalMemory()

IChangeProjectServer Interface

GetTimingMasks()

GetTimingMasksAddress()

GetTimingMasksControl()

SetSampleNo()

GetSampleNo()

SetWorkingMode()

GetWorkingMode()

SetOutputFileName()

GetOutputFileName()

GetMasterAbortOption()

GetAssertFrameOption()

GetCompleteTransactionOption()

GetTargetDisconnectOption()

IRunProjectServer Interface

SetInterfaceMode()

SetPortNumber()

IUtilityserver Interface

SetFpgaFilesPath()

SetInterfaceMode()

SetPortNumber()

AutoDetectSystemFrequency()

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Removed/Moved Methods

IUtilityserver Interface

GetPortNumber()

ShowFeaturesStatus()

SetAuthorizationCode()

IRunProjectServer Interface

SetSampleNo() :	Moved to IChangeProjectServer Interface
SetWorkingMode() :	Moved to IChangeProjectServer Interface
SetProjectName() :	Merged with RunTa700Project() method
SetOutputFileName() :	Moved to IChangeProjectServer Interface
AutoDetectSystemFrequency():	Moved to IUtilityServer Interface
SetMasterAbortOption():	Moved to IChangeProjectServer Interface
SetAssertFrameOption():	Moved to IChangeProjectServer Interface
SetCompleteTransactionOption():	Moved to IChangeProjectServer Interface
SetTargetDisconnectOption():	Moved to IChangeProjectServer Interface

Note: Make sure to create the interfaces only by Pure COM instantiation method or Smart Pointer method since some method IDs have changed. Automation Instantiation method is not supported.

TA-700 Modes Supported

- PCI Analyzer only Mode
- PCI Analyzer/Exerciser Mode
- PCI Timing Mode (100psec)
- PCI Asynchronous Timing Mode
- PCI-X Analyzer only Mode
- PCI-X Analyzer/Exerciser Mode

This release supports all PCI, CPCI, PMC, and PMC-DC protocols. In the EPP mode we support only the speed up mode. It means that at this release all programming & Capturing data is speed up. Also it must be mentioned that this release has some changes from last release 1.0, it is so important for all developers, please read below before using this release.

Support of Multithreading

The TA700 Engine API has been changed to be used as a multi threading mechanism while maintaining the supported API functions the same as they were before. TA700 API permits developers to use it at desired multi threading applications, meaning that the TA700 API Engine can be used to attach to multi boards, and run multi projects in the body of several threading processes simultaneously. See the following example that is used at UserApp application:

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Assume that it is desired to run a master exerciser program on one TA700 board, and one Target Exerciser program on another TA700 board. These programs are named master.mtm and target.mtm. The following sequence illustrates this process:

Two instantiated objects are created by the IRunProjectServer Interface, first TempRun, and then TempRun2

```
if(!SUCCEEDED(CoCreateInstance(CLSID_RunProjectServer, NULL, CLSCTX_ALL,
IID_IDispatch, (void**)&pDispatch)))
Return;
if(!SUCCEEDED(pDispatch-
>QueryInterface(IID_IRunProjectServer,(void**)&TempRun)))
return ;
pDispatch->Release();
if(!SUCCEEDED(CoCreateInstance(CLSID_RunProjectServer, NULL, CLSCTX_ALL,
IID_IDispatch, (void**)&pDispatch2)))
return;
if(!SUCCEEDED(pDispatch2-
>QueryInterface(IID_IRunProjectServer,(void**)&TempRun2
return;
pDispatch2->Release();
```

Set all needed data for each. For example the interface type (EPP or USB), port No, FPGA path, project name (Master.mtm related project for one of them and Target.mtm related project for another)

```
TempRun->SetInterfaceMode(m_nProject1PortType);
TempRun->SetPortNumber(m_nProject1PortNo);
TempRun->SetFpgaFilesPath(strFPGAFolderPath);
```

Call the runTA700Project method of TempRun while the new thread is started which uses the TempRun2 as the connecting interface to RUNProjectServer COM server.

```
AfxBeginThread(ProgramControlThread,&pData,0,THREAD_PRIORITY_NORMAL);
TempRun->RunTA700Project (strProjectName);
```

Note: "ProgramControlThread" is the function pointer for a similar process for embedded thread function.

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Library Exported Interfaces

IRunProjectServer

This interface allows the developer to run a predefined TA700 project. The developer must define the following data fields:

- Path of FPGA Files,
- Voltage Mask
- Trigger Option polarity

Methods to set the required data Fields are included. The following are methods available for this interface:

- SetTriggerOption()
- RunTA700Project()
- SetFpgaFilesPath()
- SetProtocolErrorMasks()
- SetVoltageMasks()
- SetInterfaceMode()
- SetPortNumber()
- EnableCompilerOfExerciser()
- SetForceStopTimerValue()
- GetTerminationType()
- SetDeviceID()
- FormatResultMessage()
- SaveAsText()
- DumpLocalMemory()

SetTriggerOption (nOutTrigPolarity)

Parameters

NOutTrigPolarity	Specifies the new Polarity of External Signal Trigger. It can take 0-1 values no more. 1: Triggers on positive polarity 0: Triggers om negative polarity

RunTA700Project (BSTR ProjectName)

Parameters

BSTR Projectname.	The RunTA700Project method runs TA700 board with specified data and saves the result with a specified output file name.

SetFPGAFilesPath (bstrOutputFileName)

Parameters

bstrOutputFileName	Specifies the new path of the FPGA file that is needed for TA700 Run Engine.

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SetProtocolErrorMask (nProtocolErrorMask)

Parameters

nProtocolErrorMask — Specifies the new Protocol Error mask.

For example if you want to unmask Protocol error No 11, you must set the 11th bit to 1 before passing the nProtocolErrorMask to this method:

```
Mask = (__int64)1 <<10;
If (Unmask)
nProtocolErrorMask  |=   mask;
else
nProtocolErrorMask &= ~ mask;
```

SetVoltageMasks (nVoltageMasks)

Parameters

nVoltageMask — Specifies Voltage Mask. The TA700 monitors the critical voltages on the PCI bus. A 5% drop in voltage for selected voltages and turns the SYS status LED from green to red. If the bit set for a voltage in the Voltage Mask this capability will be disabled for that voltage

bit 0: Board +5 Volt

bit 1: Bus +5 Volt

bit 2: Bus +3.3 Volt

bit 3: Bus +12 Volt

bit 4: Bus +12 vaux Volt‡

bit 5: Top Connector +5 Volt‡

bit 6: Top Connector +5 Volt‡

SetInterfaceMode (nInterfaceMode)

Parameters

nInterfaceMode — Specifies the new Interface Mode for Next run.

Pass 0 for EPP Port.

Pass ≥ 1 for USB Port

SetPortNumber (nPortNumber)

Parameters

nPortNumber — Sets the new Iport Number for the Next run. For example, you can have more than one EPP or USB port, so nPortNumber specifies the number of each port, this number is one base.

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EnableCompilerOfExerciser (bEnabledCompiler)

Parameters

bEnabledCompiler — Enables or disables Compiler of Exerciser for next run.

Parameter value =TRUE the TA700 API will compile the .prg file and use it.

Parameter value =FALSE the TA700 APIwill use precompiled exerciser file that is archived as. MTM.

SetForceStopTimerValue (nTimerValue)

Parameters

nTimerValue — Sets the value for timer which TA700 Analyzer / Exerciser which when expired will cause a stop.

GetTerminationType (nTerminationType)

Parameters

nTerminationType — The Termination type of the last run will be saved at this parameter.

Remarks — The GetTerminationType method returns the last termination type of Analyzer / Exerciser of the TA700. The type of this parameter is a predefined enumeration type at CAPI dll. The following is a declaration that can be used in your software:

```
enum {
eSuccessTermination, // If Analyzer / Exerciser has finished
                        normally
eUserStopTermination, // If User has stopped the Analyzer/
                        Exerciser at GUI
eCancelRetrievingDataTermination, // If User has stopped the
                        retrieving data at GUI
eCancelProgrammingTermination, // If user has stopped the Hardware
                        while it is configuring by software
eErrorTermination,// If software has any problem by Hardware
eForcedStopTermination // If analyzer/Exerciser was stopped
                        manually by Software by the internal
                        force stop timer
}
```


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SetDeviceID(nDeviceType,lBoardSerialId)

Parameters

nDeviceType	Type of board interface connection, 0 for TA700,TA800 and 1 for TA850
lBoardSerialId	The board serial id specified by Catalyst

FormatResultMessage(nMessageID, pbstrMessage)

Parameters

nMessageID	The returned error code
pbstrMessage	The message depends on message id, this parameter is by reference return value

SaveAsText(bstrSampleFileName)

Parameters

bstrSampleFileName	Name of sample file (User does not have to include the txt extension)
Remarks	The SaveAsText method saves the specified sample file in text format with same name as the sample file with a .txt extension added automatically.

DumpLocalMemory(bstrProjectName)

Parameters

bstrProjectName	Name of project file
Remarks	The DumpLocalMemory reads the local memory defined in project file and saves it as a .lmf file specified in project.

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IChangeProjectServer

This interface allows the developer to change a predefined TA700 project.By this interface developers can do any modifications on Event,Sequencer, But not Exerciser of the specified project.All methods which are available at this Interface are below :

SetEventField()	GetTimingMasks()
GetEventField()	GetTimingMasksAddress()
SetPreTrigger()	GetTimingMasksControl()
GetPreTrigger()	SetSampleNo()
SetSeqFieldInt()	GetSampleNo()
GetSeqFieldInt()	SetWorkingMode()
SetSeqFieldStr()	GetWorkingMode()
GetSeqFieldStr()	SetOutputFileName()
SetElseStatementInt()	GetOutputFileName()
GetElseStatementInt()	SetMasterAbortOption()
SetElseStatementStr()	Open()
GetElseStatementStr()	Close()
SetTimingEnableValue()	SetAssertFrameOption()
SetTimingTClockValue()	SetCompleteTransactionOption()
GetTimingEnableValue()	SetTargetDisconnectOption()
GetTimingTClockValue()	GetMasterAbortOption()
SetTimingMasks()	GetAssertFrameOption()
SetTimingMaskAll()	GetCompleteTransactionOption()
SetTimingMasksAddress()	GetTargetDisconnectOption()
SetTimingMasksControl()	

Open (lpszProjectName)

Parameters

lpszProjectName Sets new Project Name

Close ()

Parameters

None.

Remarks The Close method closes the last opened project.

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SetSampleNo (nSampleNo)

Parameters

nSampleNo	Sets the number of samples to be taken.

GetSampleNo (pnSampleNo)

Parameters

pnSampleNo	Number of samples taken.
Remarks	The GetSampleNo method returns the Number of samples that have been saved.

SetWorkingMode (nWorkingMode)

Parameters

nWorkingMode	Specifies TA Working Mode. The following values define the working mode:

PCIBusAnalyzer	0
PCITimingAnalyzer	1
PCIBusExerciser	2
PCIAsyncTimingAnalyzer	3
PCIXBusAnalyzer	4
PCIXTimingAnalyzer	5
PCIXBusExerciser	6
PCIXAsyncTimingAnalyzer	7
None	8

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GetWorkingMode (pnWorkingMode)

Parameters

pnWorkingMode — Value of saved project working mode.

PCIBusAnalyzer	0
PCITimingAnalyzer	1
PCIBusExerciser	2
PCIAsyncTimingAnalyzer	3
PCIXBusAnalyzer	4
PCIXTimingAnalyzer	5
PCIXBusExerciser	6
PCIXAsyncTimingAnalyzer	7
None	8

Remarks — The GetWorkingMode method returns the working mode value of saved project.

SetOutputFileName (bstrOutputFileName)

Parameters

bstrOutputFileName — Output File Name such as FileName.Smp

Remarks — The SetOutputFileName method Sets output file name.

GetOutputFileName (pbstrOutputFileName)

Parameters

pbstrOutputFileName — Returned File Name such as MyFile.Smp

Remarks — The GetOutputFileName method returns the last output file name.

SetTargetDisconnectOption (bTargetDisconnect)

Parameters

bTargetDisconnect — Sets the Target Disconnect status for next run of TA Board.

If set TRUE: The TA will bypass all of the transactions in the current command and will jump to the transaction for the next command

Remarks — The SetTargetDisconnectOption method the Target Disconnect status for next running for TA700 Board.

If it is set to true then otherwise Completes from that point on, regardless of the number of times the target issues a disconnect. The TA700 will take it from where the target disconnect was issued and try to complete the transaction from that point on.

Use Next Transaction.

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GetTargetDisconnectOption (pbTargetDisconnect)

Parameters

pbTargetDisconnect — Returns last set Target Disconnect status.

Remarks — The GetTargetDisconnectOption method returns the last set Target Disconnect status.

SetCompleteTransactionOption (bCompleteTransaction)

Parameters

bCompleteTransaction — Specifies the Master completion status on time out at next Run.

TRUE: The TA completes the current transaction as soon as possible after GNT# is deasserted.

FALSE: The TA continues to complete the transaction for however many clocks it takes regardless of GNT# being deasserted.

GetCompleteTransactionOption (pbCompleteTransaction)

Parameters

pbCompleteTransaction — Returns the last set Master completion status.

SetAssertFrameOption(pbAssertFrame)

Parameters

bAssertFrame — Specifies Assertion Status of Frame Signal for TA board for next Run.

FALSE: Asserts the frame and starts the transaction regardless of the status of the GNT#.

TRUE: Requests the bus and starts the transaction only after the GNT# is asserted.

GetAssertFrameOption(pbAssertFrame)

Parameters

pbAssertFrame — Returned Assertion Status of last set Frame Signal.

Remarks

SetMasterAbortOption (bMasterAbort)

Parameters

bMasterAbort — Specifies the duty cycle of TA Board on Master Abort.

TRUE: The TA will issue a Master ABORT on the 5th clock if no DEVSEL# is asserted.

FALSE: The FRAME# will stay asserted indefinitely and the TA will not issue a Master ABORT.

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GetMasterAbortOption (pbMasterAbort)

Parameters

pbMasterAbort	Returned duty cycle of TA Board on Master Abort.

SetEventField(nEventNo, nFieldIndex, lpszNewValue)

Parameters

nEventNo	Specifies the Event No that must be modified with lpszNewValue.
nFieldIndex	Specifies the Index of the Event that must be modified with lpszNewValue.
lpszNewValue	Specifies the new Event value that must be set for an Event.
Remarks	The SetEventField method sets the new value lpszNewValue at the specified part of event specified by nFieldIndex.

GetEventField (nEventNo, nFieldIndex, strValue)

Parameters

nEventNo	Specifies the Event No for which Event value will be returned.
NFieldIndex	Specifies the Index of the Event for which Event value will be returned.
strValue	The Event value returned for Event specified by nEventNo & nFieldIndex.

SetPreTrigger (npreTrigger)

Parameters

npreTrigger	Specifies Trigger Point to be set.

GetPreTrigger (npreTrigger)

Parameters

npreTrigger	Returned Trigger Point.

SetSeqFiledInt (nStateNo, nFieldIndex, nNewValue)

Parameters

nStateNo	Specifies the state No that must be updated.
nFieldIndex	Specifies the index of state Part that must be updated.
nNewValue	Specifies the new value of specified part of sequencer state.
Remarks	The SetSeqFieldInt method updates the sequencer state with nNewValue.

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GetSeqFiledInt(nStateNo, nFieldIndex, nValue)

Parameters

nStateNo	Specifies the state No whose data is to be returned. Value between 0-31.
nFieldIndex	Specifies the index of state Part that whose data is to be returned.
nValue	Returned value of specified part of sequencer state.

SetSeqFiledStr (nStateNo, nFieldIndex, strExpression)

Parameters

nStateNo	Specifies the state No whose data is to be retrieved. Range between 0-31.
nFieldIndex	Specifies the index of state Part whose data is to be retrieved.
strExpression	Specifies the value for specified part of sequencer state.

GetSeqFiledStr (nStateNo, nFieldIndex, strExpression)

Parameters

nStateNo	Specifies the state No whose data is to be retrieved. Range between 0-31.
nFieldIndex	Specifies the index of state Part whose data is to be retrieved.
strExpression	Returned value of specified part of sequencer state.

SetElseStatementInt (nStateNo, nElseNo, nFieldIndex, nNewValue)

Parameters

nStateNo	Specifies the state No whose data is to be updated. Range between 0-31.
nElseNo	Specifies the Else No whose data is to be updated. Range between 0-10.
nFieldIndex	Specifies the index of state Part that whose data is to be updated.
nNewValue	Specifies the new value for specified part of sequencer state.

GetElseStatementInt (nStateNo, nElseNo, nFieldIndex, nValue)

Parameters

nStateNo	Specifies the state No whose data is to be retrieved.Range between 0-31.
nElseNo	Specifies the Else No whose data is to be updated.Range between 0-10.
nFieldIndex	Specifies the index of state Part whose data is to be retrieved.
nValue	Returned value of specified part of sequencer state.

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SetElseStatementStr(nStateNo,nElseNo,nFieldIndex,strExpression)

Parameters

nStateNo	Specifies the state No whose data is to be retrieved. Range between 0-31.
nElseNo	Specifies the Else No whose data is to be updated. Ranged between 0-10.
nFieldIndex	Specifies the index of state Part that whose data is to be retrieved.
strExpression	Specifies the value of specified part of sequencer state.

GetElseStatementStr(nStateNo, nElseNo, nFieldIndex, strExpression)

Parameters

nStateNo	Specifies the state No whose data is to be returned. Ranged between 0-31.
nElseNo	Specifies the Else No whose data is to be updated.Ranged between 0-10.
nFieldIndex	Specifies the index of state Part that whose data is to be returned.
strExpression	Specifies the current value of specified part of sequencer state.
Remarks	The GetElseStatementStr method gets specified part of sequencer belonging to strExpression parameter.

SetTimingEnableValue(nTimingEnableValue)

Parameters

nTimingEnableValue	Specifies the Value of Enable parameter for next run. The scale of This parameter is nanosecond, and with .1 nanosecond tolerance.

GetTimingEnableValue(pnTimingEnableValue)

Parameters

pnTimingEnableValue	The Value of Enable parameter returned.

SetTimingTClockValue(nTimingTClkValue)

Parameters

nTimingTClkValue	Specifies the Value of T-Clk parameter for next run. The scale of This parameter is nanosecond, and with .1 nanosecond tolerance.

GetTimingTClockValue(pnTimingTClkValue)

Parameters

pnTimingTClkValue	Value of T-Clk parameter returned.

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SetTimingMasks(ptrTimingMasks)

Parameters

ptrTimingMasks	Specifies the Value of the Signal Masks parameter for next run. The order of the Timing mask is shown below: "AD[64], CBE[8], PAR, PAR64, PERR, SERR, REQ, GNT, REQ64, ACK64, STOP, LOCK, RST, INTA, INTB, INTC, INTD, FRAME,TRDY, IRDY, DEVSEL, IDSEL, PME"

For example:

AD[0]->ptrTimingMasks[0]

AD[1]->ptrTimingMasks[1]

GetTimingMasks(ptrTimingMasks)

Parameters

ptrTimingMasks	The Value of Signal Masks parameter returned. The order of the Timing mask is shown below: "AD[64], CBE[8], PAR, PAR64, PERR, SERR, REQ, GNT, REQ64, ACK64, STOP, LOCK, RST, INTA, INTB, INTC, INTD, FRAME,TRDY, IRDY, DEVSEL, IDSEL, PME"

For example:

ptrTimingMasks[0] -> AD[0]

ptrTimingMasks[1] ->AD[1]

SetTimingMaskAll(bMaskValue)

Parameters

bMaskValue	Specifies the Value of all Signal Masks parameters for next run.
Remarks	SetTimingMaskAll method sets the Value of Timing Masks parameter for next run by bMaskValue.

SetTimingMasksAddress(bAdd32, bMaskValue)

Parameters

bAdd32	Specifies the mode of Masking for address signals. If it will be true the masking is on the Address 32bits els on all address signals. TRUE: Masking is on 32 bits of address FALSE: Masking is on all address signals
bMaskValue	Specifies the value of Masking for address signals.

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GetTimingMasksAddress(ptrAddressMask)

Parameters

ptrAddressMask	Returned value of Masking for address signals.

SetTimingMasksControl(bMaskValue)

Parameters

bMaskValue	Specifies the Value of control Signal Masks parameter for next run.
Remarks	The SetTimingMasksControll method sets the Value of Control Timing Masks parameter for next run by bMaskValue.

GetTimingMasksControl(ptrControlMask)

Parameters

ptrControlMask	Returned value of control Signal Masks parameter.
Remarks	The GetTimingMasksControll method returns the Value of Control Timing Masks parameter.

IUtilityServer

This interface allows the developer to get some TA board information such as attached LPT no or Bus Frequency which is connected to TABoard. The methods which are available at this Interface are:

SetFpgaFilesPath()

SetInterfaceMode()

SetPortNumber()

AutoDetectSystemFrequency()

AutoDetectSystemFrequency (nSystemFrequency)

Parameters

nSystemFrequency	Specifies the Bus Frequency of TA board connected.
Remarks	The AutoDetectSystemFrequency method gets the Bus Frequency of TA board is connected to the bus

Notice: To detect the System frequency, TA boards must be programmed by calling SetFPGAFilsePath method first. Otherwise the TA may be not be found by the specified FPGA Path.

SetInterfaceMode (nInterfaceMode)

Parameters

nInterfaceMode	Specifies the new Interface Mode for Next run.

Pass 0 for EPP Port.

Pass ≥ 1 for USB Port

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SetPortNumber (nPortNumber)

Parameters

nPortNumber	Specifies port Number for Next run. So software will attach to this port Number, for example you can have more than one EPP or USB port, so it specifies the number of each port, this number is one base.
Remarks	The SetPortNumber method sets the Port number for the next run.

SetFPGAFilesPath (bstrOutputFileName)

Parameters

bstrOutputFileName	Specifies the path of FPGA file that is needed for the TA Run Engine.
Remarks	The SetFpgaFilesPath method Sets the path to FPGA files.

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Examples

The following are some examples of working with TA700 Com API, illustrating the use of all of the methods supported by our library:

IRunProjectServers Interface Examples

```
LPDISPATCH pDispatch = NULL;
IRunProjectServer* Run = NULL;
VERIFY(SUCCEEDED(CoInitialize(NULL)));
VERIFY(SUCCEEDED(CoCreateInstance(
     CLSID_RunProjectServer,
     NULL,
     CLSCTX_ALL,
     IID_IDispatch, (void**)&pDispatch)
));
VERIFY(SUCCEEDED(pDispatch->QueryInterface(
     IID_IRunProjectServer,
     (void**)&Run))
);
//Set the device specifics for TA850 with 0x123 serial id
Run->SetDeviceID(0 , 0x123);


//-- Set port number to  1, so it means that you want to attach to first USB
                                    port
Run->SetPortNumber(1);
//Set the Interface to Hardware to USB Port
Run->SetInterfaceMode(1);
//-- Set the Trigger to trigger on a positive level
Run->SetTriggerOption(1);
//-- By default the TA700 detects and monitors the critical voltages on the
PCI bus but with
//-- this setting the Bus 3.3 Volt will be masked
Run->SetVoltageMasks(2);
//-- By default the TA700 detects all protocol errors specified for PCI, PCI-
                                    X bus but ,with
```


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```
//-- below mask we want that TA700 unmask the 3,6,7th protocol errors
//-- 100 = 4+32+64
long nProtocolErrorMask = 0;
nProtocolErrorMask |= (__int64)1 <<2;
nProtocolErrorMask |= (__int64)1 <<5;
nProtocolErrorMask |= (__int64)1 <<6;
//-- nProtocolErrorMask is equal 100
Run->SetProtocolErrorMask(nProtocolErrorMask);
Run->SetFpgaFilesPath((LPCTSTR)m_strFPGAPath);
//-- SW uses the last compiled exerciser file or MTM file, so there is nor
                                        Compilation
//-- Phase at next run
Run-> EnableCompilerOfExerciser (FALSE);
Run->RunTA700Project((LPCTSTR)m_strProjectName);
CoUninitialize();
```

IChangeProjectServer Interface Examples

```
IChangeProjectServer* Project = NULL;
VERIFY(SUCCEEDED(CoInitialize(NULL)));
VERIFY(SUCCEEDED(CoCreateInstance(
      CLSID_ChangeProjectServer,
      NULL,
      CLSCTX_ALL,
      IID_IDispatch,
      (void**)&pDispatch))
      );
VERIFY(SUCCEEDED(pDispatch->QueryInterface(
      IID_IChangeProjectServer,
      (void**)&Project))
      );
Project->Open((LPCSTR)m_strProjectName);
//-- Upadting EVENT Fields of Project --//
long  nEventNo;
      long  nFieldIndex;
```


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```
//-- Set same setting for all 8 Events
//-- IMPORTANT NOTICE
//-- At TA700ComApi pack, there is the file “TA700ApiCons.h”.
//-- With this file we declare some common values such as: EVN_NAME,
//-- EVN_XFER …, you can add this file to your VC++ project, or you
//-- Declare same values for other projects
//-- If you use this header file the tables below describe the values used.
```

Event Field

XFER type	STRNewValue StrValue
A32	XFER_A32
D32 (Data XFERs only IRDY = 0, TRDY=0, DEVSEL=0)	XFER_D32
D32 (Data XFERs including Wait Cycles, DEVSEL=0)	XFER_D32S
MX32 (DE_Multiplex)	XFER_MX32
A64	XFER_A64
D64 (Data XFERs only IRDY = 0, TRDY=0, DEVSEL=0)	XFER_D64
D64 (Data XFERs including Wait Cycles, DEVSEL=0)	XFER_D64S
MX64 (DE_Multiplex)	XFER_MX64
IDLE	XFER_IDLE
Per User Defined	XFER_USER

“nEventNo” is used to select which event to modify. See the table below for the valid parameters:

EVENT NAME	nEventNo
EV1	EVN_EV1
EV2	EVN_EV2
EV3	EVN_EV3
EV4	EVN_EV4
EV5	EVN_EV5

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EVENT NAME	nEventNo
EV6	EVN_EV6
EV7	EVN_EV7
EV8	EVN_EV8

“nFieldIndex” is used to select which field to modify. See the following table for the valid parameters:

FIELD NAME	nFieldIndex
Name	EVN_NAME
XFER	EVN_XFER
AD[]	EVN_ADD
PAR	EVN_PAR
CBE[]	EVN_CBE
IDSEL	EVN_IDSEL
FRAME#	EVN_FRAME
IRDY#	EVN_IRDY
DEVSEL#	EVN_DEVSEL
TRDY#	EVN_TRDY
STOP#	EVN_STOP
LOCK#	EVN_LOCK
R/G	EVN_R/G
INTX	EVN_INTX
ERR	EVN_ERR
RST#	EVN_RST
PME#	EVN_PME

```
for(int nCount = 0;nCount < 8;nCount++)
{
      Project->SetEventField(nCount, EVN_NAME    ,_T("Add32"));
      Project->SetEventField(nCount, EVN_XFER     ,XFER_A32);
      Project->SetEventField(nCount, EVN_ADD       ,_T("00001"));
      Project->SetEventField(nCount, EVN_PAR,_T("1"));
      Project->SetEventField(nCount, EVN_CBE,_T("0001"));
      Project->SetEventField(nCount, EVN_IDSEL    ,_T("1"));
```


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```
            Project->SetEventField(nCount, EVN_FRAME  ,_T("1"));
            Project->SetEventField(nCount, EVN_IRDY      ,_T("1"));
            Project->SetEventField(nCount, EVN_DEVSEL,_T("1"));
            Project->SetEventField(nCount, EVN_TRDY     ,_T("1"));
            Project->SetEventField(nCount, EVN_STOP     ,_T("1"));
            Project->SetEventField(nCount, EVN_LOCK   ,_T("1"));
            Project->SetEventField(nCount, EVN_RG,_T("10"));
            Project->SetEventField(nCount, EVN_INTX   ,_T("1000"));
            Project->SetEventField(nCount, EVN_ERR,_T("1"));
            Project->SetEventField(nCount, EVN_RST ,_T("1"));
            Project->SetEventField(nCount, EVN_CACHE   ,_T("1"));
            Project->SetEventField(nCount, EVN_PME ,_T("1"));
            Project->SetEventField(nCount, EVN_USER    ,_T("1"));
      }

      BSTR strValue = NULL;

      Project->GetEventField(nEventNo, nFieldIndex,&strValue);

      //-- Upadting SEQUENCER Fields of Project --//
      //-- Set same setting for all 32 states --//
//-- IMPORTANT NOTICE
//-- At TA700ComApi pack, there is the file “TA700ApiCons.h”.
//-- At this file we declare some common values such as:
//--SEQ_TRIGGER,
//-- SEQ_EXERCISER …, you can add this file to your VC++ project,
 //--You must declare same values for other projects
//-- If you will use this header file below is some description about its
                                        values:
```


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Sequencer Fields

Field Name	nFieldIndex	nNewValue options
Set Trigger	SEQ_TRIGGER	TRUE::FALSE
Start Exerciser	SEQ_EXERCISER	TRUE::FALSE
If(-- Time)	SEQ_IF_TIME	TRUE::FALSE
If Counter	SEQ_IF_COUNT	Count/Time
Time Unit	SEQ_TIME_UNIT	SEQ_NANO_SECOND SEQ_MICRO SECOND SEQ_MILLI_SECOND
Tag Event	SEQ_IF_TAG	TRUE::FALSE
If Then Goto	SEQ_IF_THEN	Define the State to goto (SEQ_S1 ~ SEQ_S31)
Number of ELSE IF statements	SEQ_ELSE_NO(<20)	Number of else statements

Valid values for strExpression and return values for strValue:

SEQ_ALL
SEQ_ANY (Not used in SEQ_STORE)
SEQ_NONE
SEQ_EV1
SEQ_EV2
SEQ_EV3
SEQ_EV4
SEQ_EV5
SEQ_EV6
SEQ_EV7
SEQ_EV8
SEQ_NOTEV1
SEQ_NOTEV2
SEQ_NOTEV3
SEQ_NOTEV4
SEQ_NOTEV5
SEQ_NOTEV6
SEQ_NOTEV7
SEQ_NOTEV8
SEQ_EXPRESSION
SEQ_PEROTOCOL
SEQ_TIMING
SEQ_EXTERNAL

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ELSE Fields

Field Name	nFieldIndex	nNewValue/nValue
ELSE IF condition	SEQ_ELSE_CONDITION	See above
Discard	SEQ_ELSE_DISCARD	TRUE::FALSE
Then Goto	SEQ_ELSE_THEN	SEQ_S0 to SEQ_S31

```
for(int nCount = 0; nCount < 32 ;nCount ++)
      {
      Project->SetSeqFieldInt(nCount,SEQ_TRIGGER,1);
      Project->SetSeqFieldInt(nCount,SEQ_EXERCISER,1);
      Project->SetSeqFieldInt(nCount,SEQ_STORE,SEQ_EV5);
            Project->SetSeqFieldInt(nCount,SEQ_IF_TIME,1);
      Project->SetSeqFieldInt(nCount,SEQ_IF_COUNT,10);
      Project->SetSeqFieldInt(nCount,SEQ_TIME_UNIT,SEQ_MILLI_SECOND);
      Project->SetSeqFieldInt(nCount,SEQ_IF_CONDITION,SEQ_EV5);
      Project->SetSeqFieldInt(nCount,SEQ_IF_TAG,1);
      Project->SetSeqFieldInt(nCount,SEQ_IF_THEN,SEQ_EV5);
      Project->SetSeqFieldInt(nCount,SEQ_ELSE_NO,10);

      Project->SetElseStatementInt(nCount,0,SEQ_ELSE_CONDITION,SEQ_EV5);
      Project->SetElseStatementInt(nCount,0,SEQ_ELSE_DISCARD,1);
      Project->SetElseStatementInt(nCount,0,SEQ_ELSE_THEN,SEQ_EV5);

      Project->SetSeqFieldStr(nCount,SEQ_STORE,_T("EV1+EV2"));
      Project->SetSeqFieldStr(nCount,SEQ_IF_CONDITION,_T("EV2+EV3"));

      Project->SetElseStatementStr(nCount,0,SEQ_ELSE_CONDITION
                                    ,_T("EV3+EV4"));

      }
      Project->GetSeqFieldInt(nStateNo,nFieldIndex,&nValue);
      Project->GetSeqFieldStr(nStateNo,nFieldIndex,&btrExpression);
      Project-GetElseStatementStr(nStateNo,nElseNo,nFieldIndex,
      &btrExpression);
```


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```
Project->GetElseStatementInt(nStateNo,nElseNo,nFieldIndex,&nValue);
Project ->SetTimingEnableValue(150);
Project ->SetTimingMasks(TimingMask);
Project ->SetTimingTClockValue(30);
Project ->SetTimingMaskAll(TRUE);
Project ->SetTimingMasksAddress(TRUE,FALSE);
Project ->SetTimingMasksControl(FALSE);
Project->Close();
CoUninitialize();
```

IUtilityServer Interface Examples

```
UtilityServer* Utility = NULL;
VERIFY(SUCCEEDED(CoInitialize(NULL)));
VERIFY(SUCCEEDED(CoCreateInstance(
     CLSID_UtilityServer,
     NULL,
     CLSCTX_ALL,
     IID_IDispatch,
     (void**)&pDispatch))
     );
VERIFY(SUCCEEDED(pDispatch->QueryInterface(
     IID_IUtilityServer,
     (void**)&Utility))
     );
long nPortNo = 0;
//Set the device specifics for a TA700 or TA800
TempUtility->SetDeviceID(1,0);
//Set the port Number to 1, so it means that you want to attach to first USB
                                        port
TempUtility->SetPortNumber(1);
//Set the Interface to Hardware to USB Port
TempUtility->SetInterfaceMode(2);
CoUninitialize();
```


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Data File Structure

The format for the SMP consists of 3 parts:

Header 32 Bytes

Data (Sample size *number of sample size) bytes

Display Information Not used by TA700ComAPI, for screen display of GUI only.

HEADER GROUP NAME	BYTES USED
SAMPLE SIGNATURE[1]	1-16
NUMBER OF SAMPLES IN FILE (in Hex; LSB -> MSB)	17-20
TRIGGER POSITION (in Hex; LSB-> MSB relative to start of file	21-24
SIZE OF EACH SAMPLE (in Hex; LSB, MSB)	25-26
CLOCK TIME (ns)9in Hex; LSB, MSB)	27-28
SETUP TIME (For Timing Modes, otherwise is RESERVED)	29-30
HOLD TIME (For Timing Modes, otherwise is RESERVED)	31-32

1. This field can be any one of the following values:
   “SampleOptionANE”: PCI Analyzer/Exerciser Mode data file
   “SampleOptionTIE”: PCI Synchronous Timing Analyzer Mode data file
   “SampleOptionOAE”: PCI Asynchronous Timing Analyzer Option A Mode data file
   “SampleOptionOBE”: PCI Asynchronous Timing Analyzer Option B Mode data file
   “SampleXptionANE”: PCI-X Analyzer/Exerciser Mode data file
   “SampleXptionTIE”: PCI-X Synchronous Timing Mode data file
   “SampleXptionOAE”: PCI Asynchronous Timing analyzer Option A Mode data file
   “SampleXptionOBE”: PCI Asynchronous Timing analyzer Option B Mode data file

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DATA MAPPING											
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
AD[63..00] ADD[64] DATA[64]		AD[39..34]	AD[39]	36	X							
			AD[38]			X						
			AD[37]				X					
			AD[36]					X				
			AD[35]						X			
			AD[34]							X		
			AD[33]								X	
			AD[32]									X
	AD[31..00] ADD[32] DATA[32]	AD[31..24]	AD[31]	37	X							
			AD[30]			X						
			AD[29]				X					
			AD[28]					X				
			AD[27]						X			
			AD[26]							X		
			AD[25]								X	
			AD[24]									X
		AD[23..16]	AD[23]	38	X							
			AD[22]			X						
			AD[21]				X					
			AD[20]					X				
			AD[19]						X			
			AD[18]							X		
			AD[17]								X	
			AD[16]									X

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DATA MAPPING												
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
	AD[31..00] ADD[32] DATA[32]	AD[15..8]	AD[15]	39	X							
			AD[14			X						
			AD[13]				X					
			AD[12]					X				
			AD[11]						X			
			AD[10]							X		
			AD[9]								X	
			AD[8]									X
		AD[7..0]	AD[7]	40	X							
			AD[6]			X						
			AD[5]				X					
			AD[4]					X				
			AD[3]						X			
			AD[2]							X		
			AD[1]								X	
			AD[0]									X
	CBE[7..0]	CBE[7..4]	CBE[7]	41	X							
			CBE[6]			X						
			CBE[5]				X					
			CBE[4]					X				
		CBE[3..0]	CBE[3]						X			
			CBE[2]							X		
			CBE[1]								X	
			CBE[0]									X

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DATA MAPPING												
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
	CONTROL SIGNALS		PAR	42	X							
			PAR64			X						
			SDONE				X					
			SBO#					X				
			SERR#						X			
			PERR#							X		
			REQ#								X	
			GNT#									X
			REQ64#	43	X							
			ACK64#			X						
			LOCK#				X					
			STOP#					X				
			FRAME#						X			
			IRDY#							X		
			TRDY#								X	
			DEVSEL#									X
			IDSEL#	44	X							
			RST#			X						
			INTA#				X					
			INTB#					X				
			INTC#						X			
			INTD#							X		
			PME#								X	
			USER#									X

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DATA MAPPING												
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
ERROR 23..16	TIME TAG		TIME TAG MSB	45	X	X	X	X	X	X	X	X
			TIME TAG	46	X	X	X	X	X	X	X	X
			TIME TAG	47	X	X	X	X	X	X	X	X
			TIME TAG	48	X	X	X	X	X	X	X	X
			TIME TAG LSB	49	X	X	X	X	X	X	X	X
		ERROR 56..63	ERROR 63	50	X							
			ERROR 62			X						
			ERROR 61				X					
			ERROR 60					X				
			ERROR 59						X			
			ERROR 58							X		
			ERROR 57								X	
			ERROR 56									X
		ERROR 48..55	ERROR 55	51	X							
			ERROR 54			X						
			ERROR 53				X					
			ERROR 52					X				
			ERROR 51						X			
			ERROR 50							X		
			ERROR 49								X	
			ERROR 48									X
		ERROR 40..47	ERROR 47	52	X							
			ERROR 46			X						
			ERROR 45				X					

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DATA MAPPING												
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
		ERROR 40..47	ERROR 43	52					X			
			ERROR 42							X		
			ERROR 41								X	
			ERROR 40									X
		ERROR 32..39	ERROR 39	53	X							
			ERROR 38			X						
			ERROR 37				X					
			ERROR 36					X				
			ERROR 35						X			
			ERROR 34							X		
			ERROR 33								X	
			ERROR 32									X
		ERROR 24..31	ERROR 31	54	X							
			ERROR 30			X						
			ERROR 29				X					
			ERROR 28					X				
			ERROR 27						X			
			ERROR 26							X		
			ERROR 25								X	
			ERROR 24									X
		ERROR 23..16	ERROR 23	55	X							
			ERROR 22			X						
			RRROR 21				X					
			ERROR 20					X				

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DATA MAPPING												
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
		ERROR 23..16	ERROR 19	55					X			
			ERROR 18							X		
			ERROR 17								X	
			ERROR 16									X
		ERROR 15..8	ERROR 15	56	X							
			ERROR 14			X						
			ERROR 13				X					
			ERROR 12					X				
			ERROR 11						X			
			ERROR 10							X		
			ERROR 9								X	
			ERROR 8									X
		ERROR 7..0	ERROR 7	57	X							
			ERROR 6			X						
			ERROR 5				X					
			ERROR 4					X				
			ERROR 3						X			
			ERROR 2							X		
			ERROR 1								X	
			ERROR 0									X
	ExSignal	XGRP3	XX15	58	X							
			XX14			X						
			XX13				X					
			XX12					X				

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DATA MAPPING												
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
	ExSignal	XGRP2	XX11	58					X			
			XX10							X		
			XX09								X	
			XX08									X
		XGRP1	XX07	59	X							
			XX06			X						
			XX05				X					
			XX04					X				
		XGRP0	XX03						X			
			XX02							X		
			XX01								X	
			XX00									X
TE_AD[63..0]	TE_AD[63..32]	TE_AD[63..56]	TE_AD[63]	60	X							
			TE_AD[62]			X						
			TE_AD[61]				X					
			TE_AD[60]					X				
			TE_AD[59]						X			
			TE_AD[58]							X		
			TE_AD[57]								X	
			TE_AD[56]									X
		TE_AD[55..48]	TE_AD[55]	61	X							
			TE_AD[54]			X						
			TE_AD[53]				X					
			TE_AD[52]					X				

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DATA MAPPING												
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
		TE_AD[55..48]	TE_AD[51]	61					X			
			TE_AD[50]							X		
			TE_AD[49]								X	
			TE_AD[48]									X
		TE_AD[47..40]	TE_AD[47]	62	X							
			TE_AD[46]			X						
			TE_AD[45]				X					
			TE_AD[44]					X				
			TE_AD[43]						X			
			TE_AD[42]							X		
			TE_AD[41]								X	
			TE_AD[40]									X
		TE_AD[39..32]	TE_AD[39]	63	X							
			TE_AD[38]			X						
			TE_AD[37]				X					
			TE_AD[36]					X				
			TE_AD[35]						X			
			TE_AD[34]							X		
			TE_AD[33]								X	
			TE_AD[32]									X
	TE_AD[31..0]	TE_AD[31..24]	TE_AD[31]	64	X							
			TE_AD[30]			X						
			TE_AD[29]				X					
			TE_AD[28]					X				

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DATA MAPPING												
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
		TE_AD[31..24]	TE_AD[27]	64					X			
			TE_AD[26]							X		
			TE_AD[25]								X	
			TE_AD[24]									X
		TE_AD[23..16]	TE_AD[23]	65	X							
			TE_AD[22]			X						
			TE_AD[21]				X					
			TE_AD[20]					X				
			TE_AD[19]						X			
			TE_AD[18]							X		
			TE_AD[17]								X	
			TE_AD[16]									X
		TE_AD[15..8]	TE_AD[15]	66	X							
			TE_AD[14]			X						
			TE_AD[13]				X					
			TE_AD[12]					X				
			TE_AD[11]						X			
			TE_AD[10]							X		
			TE_AD[9]								X	
			TE_AD[8]									X
		TE_AD[7..0]	TE_AD[7]	67	X							
			TE_AD[6]			X						
			TE_AD[5]				X					
			TE_AD[4]					X				

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DATA MAPPING											
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**						
					7	6	5	4	3	2	1	0
		TE_AD[7..0]	TE_AD[3]	67					X			
			TE_AD[2]							X		
			TE_AD[1]								X	
			TE_AD[0]									X
	TE_C/BE[7..0]	TE_C/BE[7..4]	TE_C/BE[7]	68	X							
			TE_C/BE[6]			X						
			TE_C/BE[5]				X					
			TE_C/BE[4]					X				
		TE_C/BE[3..0]	TE_C/BE[3]						X			
			TE_C/BE[2]							X		
			TE_C/BE[1]								X	
			TE_C/BE[0]									X
TIMING ERRPOR CONTROL SIGNALS			TE_PAR	69	X							
			TE_PAR64			X						
			TE_SDONE				X					
			TE_SBO#					X				
			TE_SERR#						X			
			TE_PERR#							X		
			TE_REQ#								X	
			TE_GNT#									X
			TE_REQ64#	70	X							
			TE_ACK64#			X						
			TE_LOCK#				X					
			TE_STOP#					X				

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DATA MAPPING												
GROUPING	**GROUPING**	**GROUPING**	**SIGNAL NAME**	**BYTE**	**BIT USED**							
					7	6	5	4	3	2	1	0
			TE_FRAME#	70					X			
			TE_IRDY#							X		
			TE_TRDT#								X	
			TE_DEVSEL#									X
			TE_IDSEL	71	X							
			TE_RST#			X						
			TE_INTA#				X					
			TE_INTB#					X				
			TE_INTC#						X			
			TE_INTD#							X		
			TE_PME#								X	
			TE_USER#									X
			NOT USED	72	X							
			TEQ_PAR			X						
			TEQ_IDSEL				X					
			TEQ_PERR#					X				
			TEQ_AD						X			
			TEQ_CBE							X		

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APPENDIX B

TA700 PCI Card

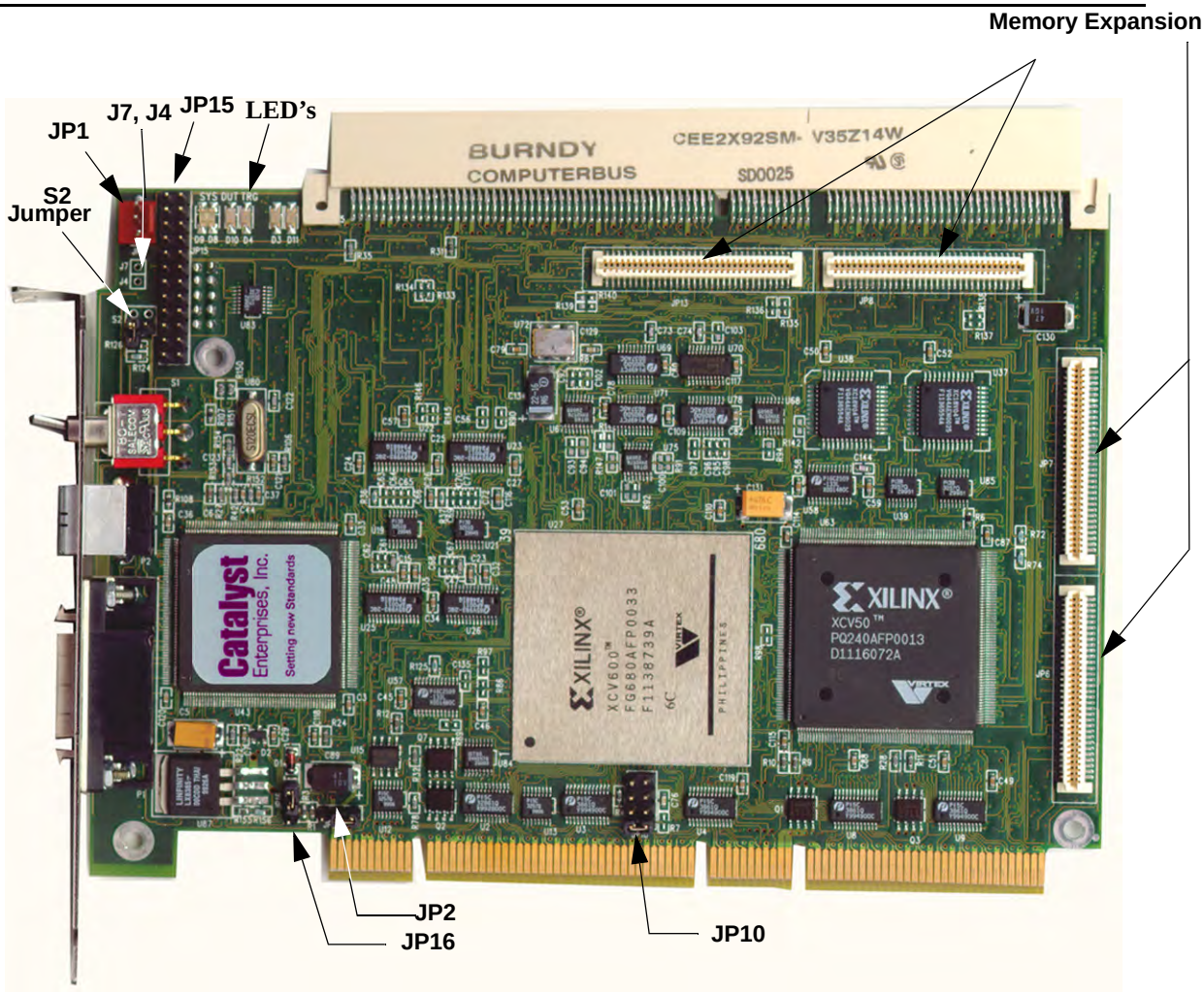


Figure 158 TA700 PCI Analyzer Card

TA700 PCI Analyzer card supports all available features. The features are enabled with the access code as described in "Authorization" on page 22.

Status LED Function Description

SYS When green it indicates that the system and DUT voltages are within 5% of their nominal values. If any of +5V, 3.3V, +12V drop by more than 5%, the SYS LED turns red. Upon power on it comes up red during a power self test and turns green when the software executes.

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DUT Indicates that voltage to the DUT is on. In this case the user may not remove or insert any card in the top connector of the TA700.

TRIG Indicates that the analyzer has met the trigger condition and is awaiting for the post-trigger data to be captured.

D3, **D11** When illuminated, the TA700 has been configured.

Jumper Configuration

Note: If your board does not have JP16 then use alternate jumper configuration as provided on page 229.

TA700 +3.3V Power Source selection

JP2	
Shunt 1-2 center to left	+3.3V from on board 5V regulator
Shunt 2-3 center to right	+3.3V Bus Power **(Default)**

TA700 +5V Power Source Selection

JP16	
Shunt 1-2 center to bottom	+5V from external supply
Shunt 2-3 top to center	+5V Bus Power **(Default)**

Connecting an External Power Supply

Install Shunt 1-2 center to left on JP2 (3.3V)

Install Shunt 1-2 center to bottom on JP16 (+5V)

Connect the external power supply to JP1 as follows:

JP1	
JP1.1 Top pin	+5VEX
JP1.2 Center pin	+5VEX
JP1.3 Bottom	GND

This configuration applies +5V power to the TA700 from the external power supply and redirects the 3.3V power from the on board regulator.

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Bus Protocol & Speed Sensing

JP10	
Shunt 1-2 Top two	PCI-X 133MHz
Shunt 3-4 Below top	DUT capabilities
Shunt 5-6 Next to bottom	PCI-X 66MHz
Shunt 7-8 Bottom two	PCI **(Default)**

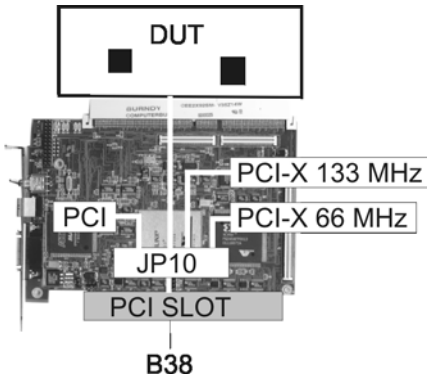
Note: The JP10 jumper settings tell the central system arbiter what the capability of the board. The PCI and PCI-X bus speed and type is determined by the system BIOS at powerup. During the time that RST# is asserted, the system reads the signals on B49 (M66EN) and B38 (PCIXCAP) from all of the boards asserted on the bus. At the rising edge of RST# a message defining the bus protocol and operating speed that satisfies the lowest performance on the bus is sent to all of the cards on the bus. This message is sent by the following five control signals: FRAME, IRDY#, TRDY#, DEVSEL# and STOP#.

For example, if PCIX CAP is set to 0, the DUT is only PCI protocol capable and if M66EN is 0, then the bus speed is PCI 33MHz and for M66EN = 1 the DUT is PCI 66MHz capable. For non zero values of PCIX CAP the bus speed is dependant on the voltage level and can be either, PCIX 66MHz or PCIX 133 MHz.

Additionally the JP10 jumper setting allows the same bus information to be acquired from the DUT during RST# or allow setting a predefined protocol and bus speed regardless of the DUT capability

The bus information returned at the rising edge of RST# that must be decoded by the DUT for proper information is also decoded by the TA700 and is displayed on the bottom of the screen.

Caution The JP10 setting information and the bus data returned at the rising edge of RST# do not have to match if there is more than one agent on the bus.



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TA700 Power Up configuration

S2 Jumper	Bottom two
Open (Note 1.)	TA700 Declared as PCI agent **(Default)**
Installed (Note 2)	TA700 Transparent to the System BIOS

Note 1: The TA700 operating as a PCI agent requires 256 I/O space and 1 Meg of memory from the host system.

Note2: The TA700 will not respond to any transactions including configuration.

S2 Jumper (Factory Use Only)	Top two
Open	X
Installed	A

J7 Trigger Out

J4 GND

External Signals

JP15	Pin	Pin	
Ext_In0	1	2	Ext_In1
Ext_In2	3	4	Ext_In3
Ext_In4	5	6	Ext_In5
Ext_In6	7	8	Ext_In7
Ext_In8	9	10	Ext_In9
Ext_In10	11	12	Ext_In11
Ext_In12	13	14	Ext_In13
Ext_In14	15	16	Ext_In15
GND	17	18	GND
GND	19	20	Key
Ext_O0 *	21	22	Ext_O1 *
Ext_O2 *	23	24	Ext_O3 *

***** Not Implemented

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Alternate Jumper Configuration

Use this if your board does not have JP16.

TA700 +3.3V Power Source selection

JP2	
Shunt 1-2 center to left	+3.3V from external power supply.
Shunt 2-3 center to right	+3.3V Bus Power **(Default)**

Bus Protocol & Speed Sensing

JP10	
Shunt 1-2 Top two	PCI-X 133MHz
Shunt 3-3 Below top	DUT capabilities
Shunt 5-6 Next to bottom	PCI-X 66MHz
Shunt 7-8 Bottom two	PCI **(Default)**

External Power Selection

JP1	
1	+3.3VEX
2	+5VEX
3	GND

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TA700 Power Draw

Board Model **TA700 Rev F**

Conditions for the measurements:

1. Current measured with PCIX6432, Fluke 75 Multimeter, HP1631D Storage scope.
2. No Extended Memory (M700) installed.
3. Bus traffic generated from TST660 board.
4. TA700's 3.3V generated internally**.**

Measurements.

Scenario 1. Board powered ON and idle. Interface cable not connected.

Bus Speed (MHz)	Power Rail	Current Draw (Amps)	Power Consumed (Watts)
100	5V	2.21	11.05
66	5V	1.78	8.90
33	5V	1.19	5.95

Scenario 2. Board configured and idle, SW session opened.

Bus Speed (MHz)	Power Rail	Current Draw (Amps)	Power Consumed (Watts)
100	5V	1.45	7.25
66	5V	1.42	7.10
33	5V	1.40	7.00

Scenario 3. Board running Analyzer test.

Bus Speed (MHz)	Power Rail	Current Draw (Amps)	Power Consumed (Watts)
100	5V	2.95	14.75
66	5V	2.16	10.80
33	5V	1.38	6.90

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Scenario 4. Board running Asynchronous Timing test.

Not Applicable since running this configuration mode is not recommended when internal 3.3V is set to internally generated.

Scenario 5. Frequency Measurement by TA700 SW

Bus Speed (MHz)	Power Rail	Current Draw (Amps)	Power Consumed (Watts)
100	5V	4.09	20.45
66	5V	3.81	19.05
33	5V	3.43	17.15

Note: Frequency measurement is done every 4 seconds and extra current draw lasts 100 ms.

Scenario 6. FPGA Configuration Time.

Power Rail	Current Draw (Amps)	Power Consumed (Watts)
5V	4.09	20.45

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TA700 Extended Memory Card

The 4 Mega sample extended memory card plugs into the 4 Memory Expansion connectors on the TA700 PCI Analyzer card. See Figure 158.

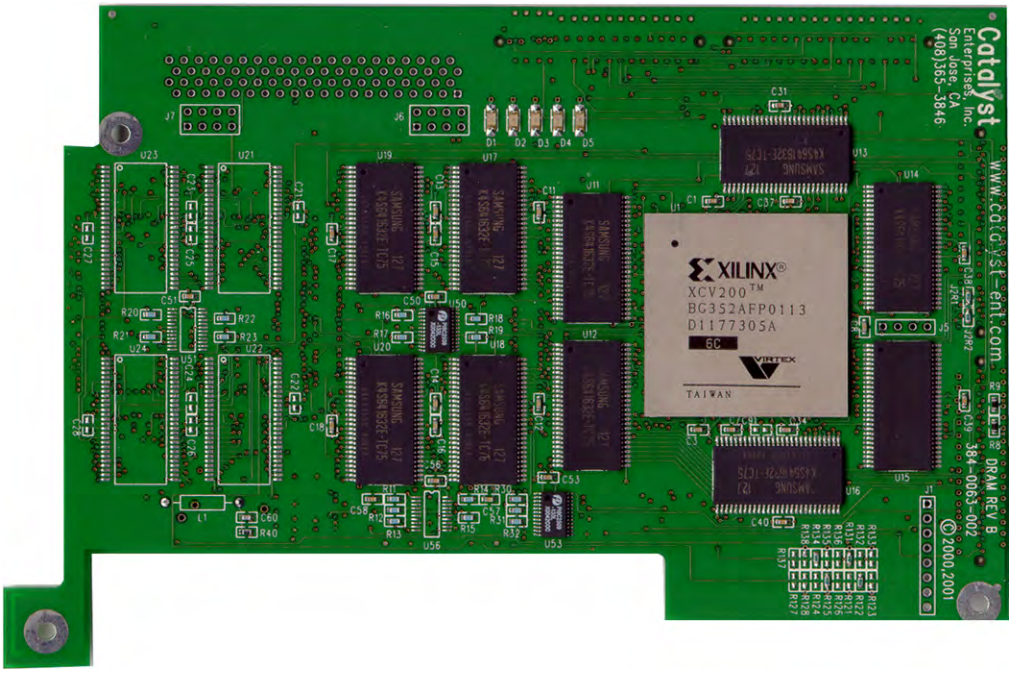


Figure 159 TA700 Extended Memory Card

Specifications:

Maximum operating speed	100 MHz
Sampling	4 Mega samples of all PCI signals + time tag.

Note 1: There must be a stable clock on the bus prior to capturing data to the extended memory.

Note 2: Extended Memory does not capture External Signals and Protocol Errors.

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APPENDIX C

TA700C CompactPCI Card

Figure 160 shows a TA700C CompactPCI Analyzer card identifying status LED locations, external signal, external trigger input and output connections and external power jumper location.

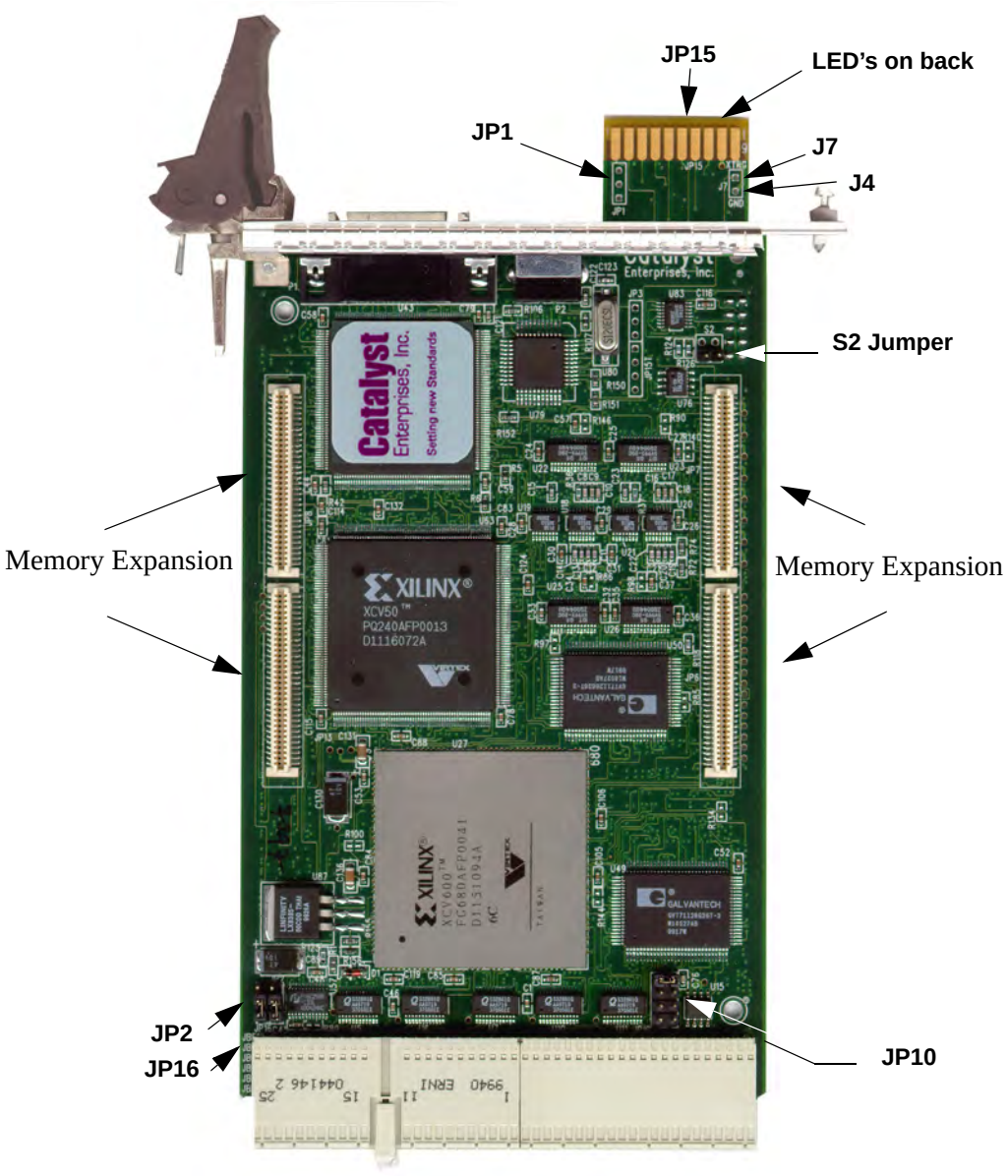


Figure 160 TA700C CompactPCI Analyzer Card

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Status LED Function Description

SYS (Red/Green LED)	When green it indicates that the system voltages are within 5% of their nominal values. If any of +5V, 3.3V, +12V drop by more than 5%, the SYS LED turns red. Upon power on it comes up red during a power self test and turns green when the software executes.
D3, **D11**	When illuminated, the TA700C has been configured.
TRIG	Indicates that the analyzer has met the trigger condition and is awaiting for the post-trigger data to be captured.

Jumper Configuration

TA700C +3.3V Power Source selection

JP2	
Shunt 1-2 top to center	+3.3V from on board 5V regulator
Shunt 2-3 bottom to center	+3.3V Bus Power **(Default)**

TA700C +5V Power Source Selection

JP16	
Shunt 1-2 top to center	+5V from external supply
Shunt 2-3 bottom to center	+5V Bus Power **(Default)**

Connecting an External Power Supply

Install Shunt 1-2 top to center on JP2 (3.3V)

Install Shunt 1-2 top to center on JP16 (+5V)

Connect the external power supply to JP1 as follows:

JP1	
JP1.1 Bottom pin	+5VEX
JP1.2 Center pin	+5VEX
JP1.3 Top Pin	GND

This configuration applies +5V power to the TA700C from the external power supply and redirects the 3.3V power from the on board regulator.

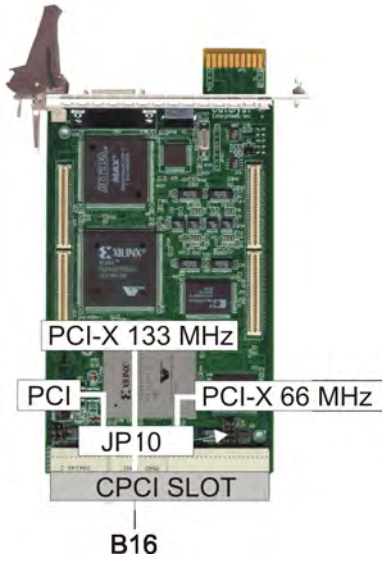
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Bus Protocol & Speed Sensing

JP10	
Shunt 1-2 Top two	PCI-X 133MHz
Shunt 3-4 Next to top	N/A
Shunt 5-6 Next to bottom	PCI-X 66MHz
Shunt 7-8 Bottom two	PCI **(Default)**

Note: The JP10 jumper settings tell the central system arbiter the capability of the board. The PCI and PCI-X bus speed and type is determined by the system BIOS at powerup. During the time that RST# is asserted, the system reads the signals on D21 (M66EN) and B16 (PCIX CAP) from all of the boards asserted on the bus. At the rising edge of RST# a message defining the bus protocol and operating speed that satisfies the lowest performance on the bus is sent to all of the cards on the bus. This message is sent by the following five control signals: FRAME, IRDY#, TRDY#, DEVSEL# and STOP#.

Caution The JP10 setting information and the bus data returned at the rising edge of RST# do not have to match if there is more than one agent on the bus.



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TA700C Power Up configuration

S2 Jumper	Bottom two
Open	TA700C Declared as PCI agent **(Default)**
Installed	TA700C Transparent to the System BIOS

Note: The TA700C operating as a PCI agent requires 256 I/O space and 4 Meg of memory from the host system.

S2 Jumper (Factory Use Only)	Top two
Open	X
Installed	A

J7 Trigger Out

J4 GND

External Signals

JP15	**Pin**	**Pin**	
Ext_In0	1	2	Ext_In1
Ext_In2	3	4	Ext_In3
Ext_In4	5	6	Ext_In5
Ext_In6	7	8	Ext_In7
Ext_In8	9	10	Ext_In9
Ext_In10	11	12	Ext_In11
Ext_In12	13	14	Ext_In13
Ext_In14	15	16	Ext_In15
GND	17	18	GND
GND	19	20	GND

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TA700C Extended Memory

The 4 MS extended memory card plugs into the 4 Memory Expansion connectors on the TA700C CompactPCI Analyzer card. See Figure 160

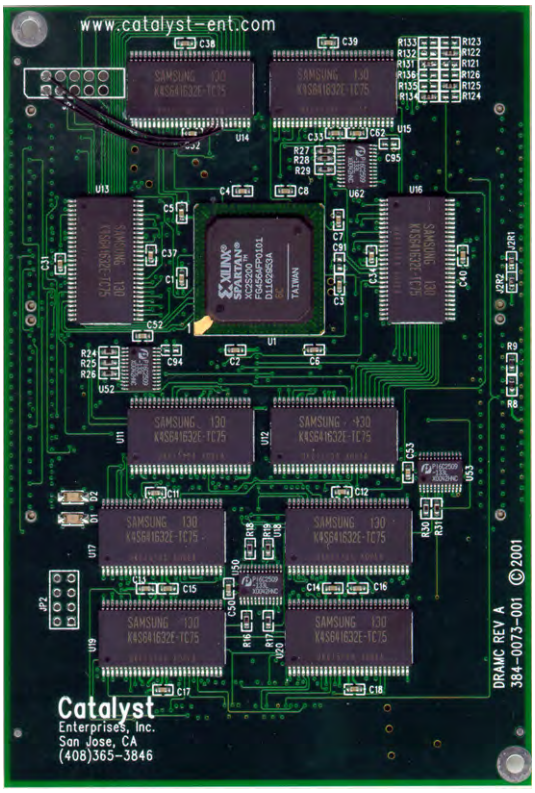


Figure 161 TA700C Extended Memory Card

Specifications:

Maximum operating speed	100 MHz
Sampling	4 Mega samples of all PCI signals + time tag.

Note: There must be a stable clock on the bus prior to capturing data to the extended memory.

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APPENDIX D

TA700PDC PMC Module Analyzer Exerciser

Figure 162 shows a TA700PDC PMC Module Analyzer identifying status LED locations, external signal, external trigger input and output connections and external power jumper location.

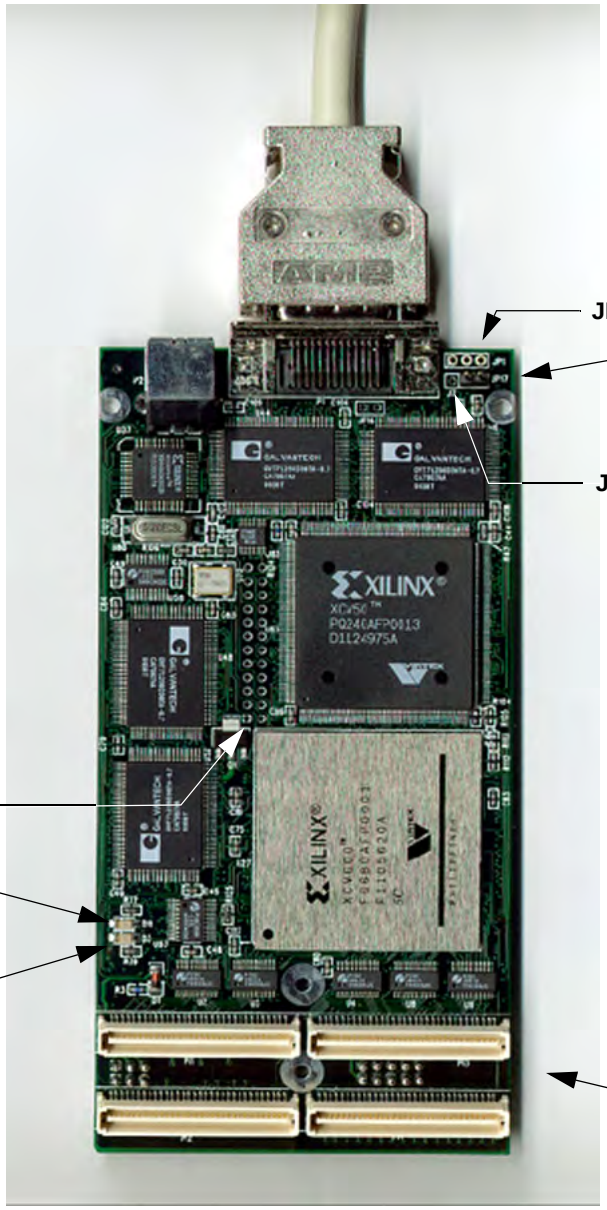


Figure 162 TA700PDC PMC Module Analyzer Exerciser

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Status LED Function Description

D3, **D11** When illuminated, the TA700PDC has been configured.

Jumper Configuration

TA700P +3.3V Power Source selection

JP2	
Shunt 1-2 center to right	+3.3V External Power
Shunt 2-3 center to left	+3.3V Bus Power **(Default)**

TA700P +5V Power Source Selection

JP3	
Shunt 1-2 center to right	+5V External Power
Shunt 2-3 center to left	+5V Bus Power **(Default)**

Connecting an External Power Supply

JP1	
JP1.1 Left pin	+3.3VEX
JP1.2 Center pin	+5VEX
JP1.3 Right pin	GND

TA700 Power Up configuration

JP17	
Open	TA700P Declared as PCI agent **(Default)**
Closed	TA700P Transparent to the System BIOS

Note: The TA700P operating as a PCI agent requires 256 I/O space and 4 Meg of memory from the host system.

J7 Trigger Out

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External Signals

JP15	**Pin**	**Pin**	
Ext_In0	1	2	Ext_In1
Ext_In2	3	4	Ext_In3
Ext_In4	5	6	Ext_In5
Ext_In6	7	8	Ext_In7
Ext_In8	9	10	Ext_In9
Ext_In10	11	12	Ext_In11
Ext_In12	13	14	Ext_In13
Ext_In14	15	16	Ext_In15
Ext_O0 *	17	18	Ext_O1 *
Ext_O2 *	19	20	Ext_O3 *
GND	21	22	GND
GND	23	24	Key

Pin 1 is square pad.

JP16 is for factory use only.

***** Not Implemented

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APPENDIX E

TA800 PCI Card

Figure 163 shows a TA800 PCI Analyzer card identifying status LED locations, external signal, external trigger input and output connections and external power jumper location.

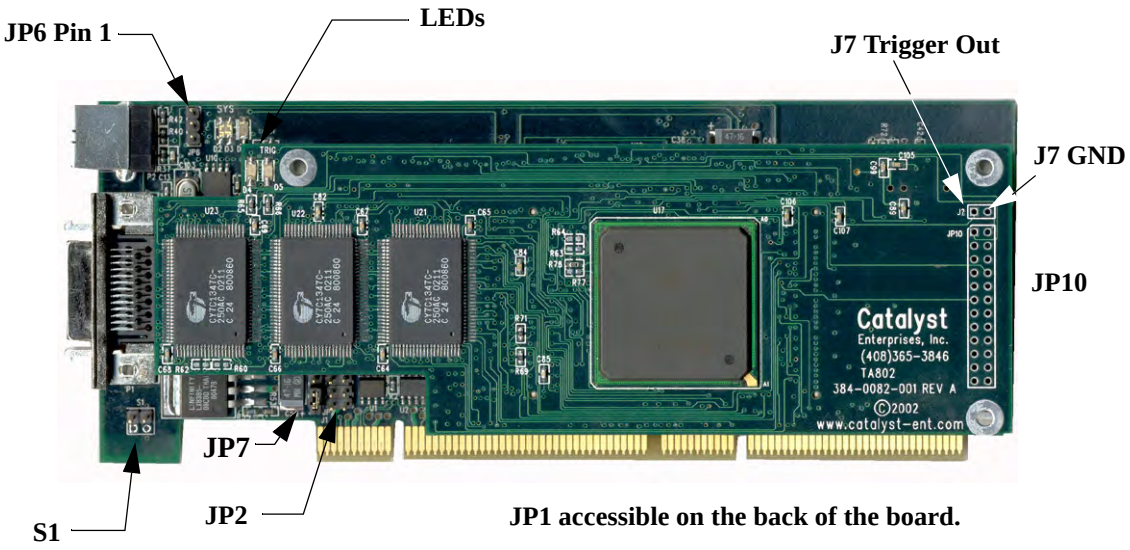


Figure 163 TA800 PCI Analyzer Card

Status LED Function Description

SYS (Red/Green LED) When green it indicates that the system voltages are within 5% of their nominal values. If any of +5V, +3.3V +3.3V_{aux}, +3.3V_{io} or +12V drop by more than 5%, the SYS LED turns red. Upon power on it comes up red during a power self test and turns green when the software executes.

TRIG Indicates that the analyzer has met the trigger condition and is awaiting for the post-trigger data to be captured.

D1, D2 When both are illuminated, the TA800 FPGAs are properly configured.

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Jumper Configuration

TA800 +3.3V Power Source selection

JP7	
Shunt 1-2 top to center	+3.3V from on board 5V regulator
Shunt 2-3 bottom to center	+3.3V Bus Power **(Default)**

External Power External +5V connects to JP6 Pins 1 & 2 Gnd is pin 3. JP6 is keyed to mate with the Catalyst power supply.

Trigger Out J7 Pin 1, gnd J7 pin 2 see **Figure 163**.

External Outputs:

JP1	
1 thru 4	External Outputs [0:3]
5 thru 8	GND

Bus Protocol & Speed Sensing

JP2	
Shunt 1-2 Top two	PCI-X 133MHz **(Default)**
Shunt 3-4 Next to top	PCI-X 66MHz
Shunt 5-6 Next to bottom	PCI

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TA800 Power Up configuration

S1 Jumper	Bottom two
Open	TA800 Declared as a PCI agent **(Default)**
Installed **(See note 1.)**	TA800 is transparent to the System BIOS

Note 1. Jumper is used on TA800 Rev. A boards only. Rev. B boards perform this function with switch S1.1.

Switch S1.1	
OFF	TA800 Declared as a PCI agent **(Default)**
ON	TA800 is transparent to the System BIOS

Note 2. Switch S1.2 on Rev, B boards is for internal use only.

Note 3. The TA800 operating as a PCI agent requires 256 I/O space and 4 Meg of memory from the host system.

External Inputs JP10 (Supported on TA800 Rev. B only)

Color	**Signal**	**Pin**	**Pin**	**Signal**	**Color**
Brown	Ext_In0	1	2	GND	Red
Orange	-	3	4	-	Yellow
Green	GND	5	6	-	Blue
Magenta	-	7	8	GND	Gray
White	-	9	10	-	Black
Brown	GND	11	12	-	Red
Orange	-	13	14	GND	Yellow
Green	-	15	16	-	Blue
Magenta	GND	17	18	-	Gray
White	-	19	20	GND	Black
Brown	-	21	22	-	Red
Orange	KEY	23	24	-	Yellow

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APPENDIX F

TA850 PCI Card

Figure 164 shows a TA850 PCI Analyzer card identifying status LED locations, external signal, external trigger input and output connections and external power jumper location.

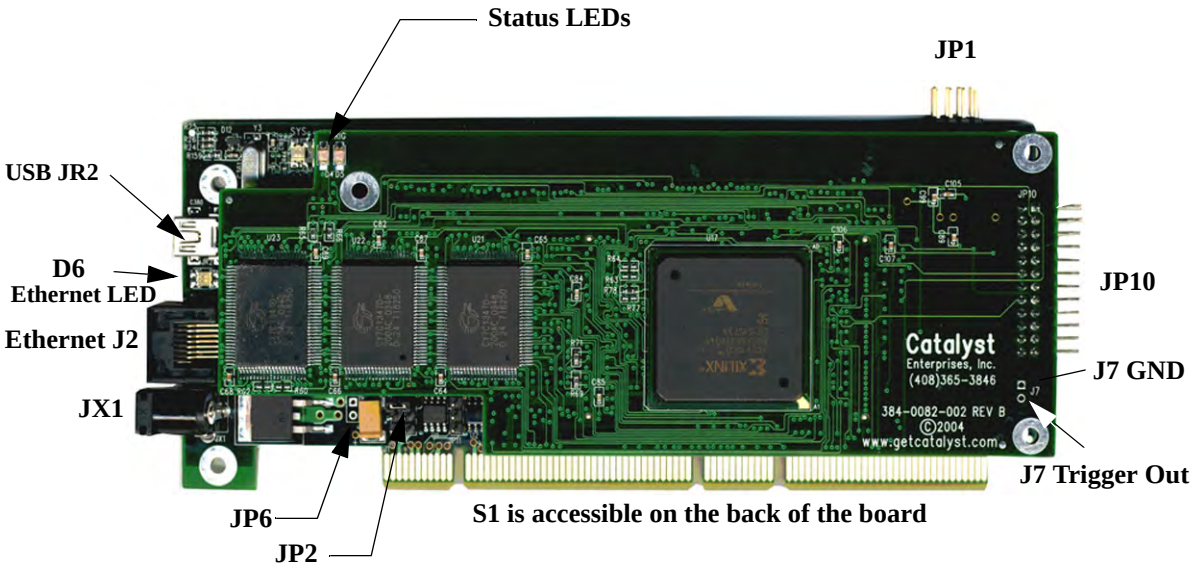


Figure 164 TA850 PCI Analyzer Card

Status LED Function Description

SYS (Red/Green LED)	When green it indicates that the system voltages are within 5% of their nominal values. If any of +5V, +3.3V +3.3V_{aux}, +3.3V_{io} or +12V drop by more than 5%, the SYS LED turns red. Upon power on it comes up red during a power self test and turns green when the software executes
TRIG	Indicates that the analyzer has met the trigger condition and is awaiting for the post-trigger data to be captured.
D1, D2	When both are illuminated, the TA850 FPGAs are properly configured.

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Jumper Configuration

External Power JX1 Center +3.3V, Outer GND. **JP6 must be set IAW Note 3,** otherwise a power supply contention may occur.

Trigger Out J7 Pin 1, gnd J7 pin 2 see **Figure 164**.

External Outputs:

JP1	
1 thru 4	External Outputs [0:3]
5 thru 8	GND

Bus Protocol & Speed Sensing

JP2	
Shunt 1-2 Top two	PCI-X 133MHz **(Default)**
Shunt 3-4 Next to top	PCI-X 66MHz
Shunt 5-6 Next to bottom	PCI

Switch S1.1	
OFF	TA850 Declared as a PCI agent **(Default)**
ON	TA850 is transparent to the System BIOS

Note 1. Switch S1.2 is for internal use only.

Note 2. The TA850 operating as a PCI agent requires 256 I/O space and 4 Meg of memory from the host system.

Note 3. With **JP6** installed, power is supplied from the bus. To use external power input, remove **JP6**.

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External Inputs JP10

Color	Signal	Pin	Pin	Signal	Color
Brown	Ext_In0	1	2	GND	Red
Orange	Ext_In1	3	4	Ext_In2	Yellow
Green	GND	5	6	Ext_In3	Blue
Magenta	Ext_In4	7	8	GND	Gray
White	Ext_In5	9	10	Ext_In6	Black
Brown	GND	11	12	Ext_In7	Red
Orange	Ext_In8	13	14	GND	Yellow
Green	Ext_In9	15	16	Ext_In10	Blue
Magenta	GND	17	18	Ext_In11	Gray
White	Ext_In12	19	20	GND	Black
Brown	Ext_In13	21	22	Ext_In14	Red
Orange	GND	23	24	Ext_In15	Yellow

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