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# LeCroy *PETrainer* ML™

PCI Express Multi-Lane Exerciser

## QuickStart User Manual



**For PETracer Software Version 4.30**  
**Manual Version 1.20**

18 February, 2005

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# 1. PETrainer ML Exerciser - Overview

The LeCroy PETrainer ML is a Multi-lane PCI Express™ (x1, x4) Exerciser designed to assist engineers in improving reliability of their solutions and providing advanced capabilities for stress and compliance testing. Together with the LeCroy PETracer ML expert PCI Express protocol analysis solutions, PETrainer ML reduces time to market by enabling users to quickly identify logic and design flaws.

PETrainer ML is designed as a stand alone Multi-lane PCI Express exerciser that is capable of generating and responding to all types of PCI Express transactions while allowing users to create protocol variations and anomalies. The users may also create corner case and stress test scenarios to evaluate the robustness of their solutions. By utilizing PETrainer ML's error injection feature, engineers can create worst-case PCI Express traffic scenarios allowing them to validate the error handling capabilities of their solutions.

When PETrainer ML is used in conjunction with the LeCroy PETracer ML or LeCroy PETracer analyzer, a complete expert test and analysis system is created. This integrated solution delivers traffic generation and expert protocol analysis to assist developers with early validation of designs along with error injection and stress testing in preparation for compliance testing.

## 1.1 PETracer ML Analyzer System

Designed for developers, the LeCroy PETracer ML™ is a PCI Express™ Multi-Lane advanced verification system. The LeCroy PETracer ML hardware taps transparently into the fabric to capture, decode and display x1, x2, x4 and x8 bi-directional transfers of PCI Express traffic. Developers use the CATC Trace™ expert software system to define recording, triggering and filtering conditions and to view, analyze and print the trace. By leveraging years of experience in protocol analysis tools for emerging markets, PETracer ML blends sophisticated functionality with practical features to speed the development of PCI Express IP cores, semiconductors, bridges, switches and systems.

PETracer ML uses a high impedance, non-intrusive probing technology, allowing full, unaltered data pass-through. The analyzer offers a dual approach in tapping into the PCI Express fabric. Whether the design utilizes a card-edged solution, or implements the PCI Express link between circuit board components, PETracer ML provides support for both a slot interposer card and a mid-bus probe.

A single PETracer ML analyzer supports bi-directional x1, x2 and x4 links, as well as unidirectional x8 PCI Express link data capture and analysis. Combining two PETracer ML analyzer systems allows for full bi-directional decode and capture of a x8 PCI Express link.

PETracer ML has many innovative features that dramatically reduce time-to-market for PCI Express solutions, including a comprehensive set of triggering and filtering options that allow the user to capture traffic that is of most interest and relevance.

Users are provided with a list of protocol events from link conditions to error violations, which enables them to set commands to the analyzer to search, isolate and capture the essential data.

PETracer ML also provides accurate, reliable and complete decodes of Transaction Layer Packets (TLPs), Data Link Layer Packets (DLLPs) and all PCI Express primitives. For deeper analysis, you can display packet contents as raw 10-bit codes.

For complete product information, please visit [www.lecroy.com](http://www.lecroy.com).

## 1.2 CATC Trace Software

The PETrainer ML, PETracer ML, and PETracer utilize PETracer software - the PCI Express version of CATC Trace Software. CATC trace software is designed to assist users in analyzing how PCI Express components work together, diagnose problems, and test for interoperability and standards compliance.

The CATC Trace is a powerful and intuitive expert software system embedding detailed knowledge of the protocol hierarchy and intricacies, as defined in the protocol specification. The software allows the user to control the analyzer and exerciser and display captured traffic in a Windows-based graphical display that has been optimized for fast and easy navigation.

For additional information on the CATC Trace, please download the White Paper from the LeCroy website:

[http://www.catc.com/support/white\\_papers/index.html](http://www.catc.com/support/white_papers/index.html).

## 1.3 Specifications

The following specifications describe a combined PETrainer ML and Universal Protocol Analyzer System (UPAS).

### *Package*

|             |   |
|-------------|---|
| Dimensions: | UPAS 10000:<br>12.2x12.2 x 3.5 inches (31.1 x 31.1 x 8.9 cm)<br>PETrainer ML Plug-in:<br>9.3 x 6.7 x 1.3 inches (23.6 x 17.0 x 3.2 cm)  |
| Connectors: | 2 Probe Data (SFF-8470 Multi-lane Copper Connector)<br>UPAS AC power connection<br>External trigger connection (DB-25, BNC)<br>PC connection (USB2.0)<br>Break-out board (type "D") |
| Weight:     | UPAS 10000: 9.5 lbs (4.3 kg)<br>PETrainer ML Plug-in: 1.7 lb (0.77 kg)  |

### *Power Requirements*

90-254 VAC, 47-63 Hz, 100W maximum (universal input)

### *Environmental Conditions*

|                  |                            |
|------------------|----------------------------|
| Operating Range: | 0 to 40 °C (32 to 104°F)   |
| Storage Range:   | -20 to 80 °C (-4 to 176°F) |
| Humidity:        | 10 to 90%, non-condensing  |

### *Probing Characteristics*

|             |   |
|-------------|---|
| Connection: | Slot interposer card (Device emulation)<br>Host Test fixture (Host emulation) |
|-------------|---|

### *Script Memory Size*

2 GBytes

### *PC Host Requirements*

|                   |  |
|-------------------|--|
| Operating System: | Windows 98SE®, Windows 2000®<br>Windows ME®, Windows XP® |
|-------------------|--|

*Wait Conditions*

Time-Based Wait  
Wait for User Input

*PETrainer Features*

|                     |  |
|---------------------|--|
| Error Insertion     | CRC Errors   |
|                     | Running Disparity Errors   |
|                     | Insertion of Invalid 10 bit symbols                                |
|                     | Lane to Lane Skew Insertion  |
|                     | Lane Reversal  |
|                     | Polarity Inversion   |
| Programmable        | ACK all TLP packets  |
| ACK/NAK behavior    | NAK all TLP packets  |
|                     | Automatic ACK/NAK behavior   |
|                     | ACK/NAK delay timer  |
| Programmable Flow   | Set Credit values  |
| control behavior    | Disable Credit checking  |
|                     | Set Update InitFC intervals  |
| Automatic CRC       | DLLP CRC calculation   |
| calculation and     | TLP LCRC calculation   |
| Sequence number     |  |
| assignment          |  |
| Replay buffer       | Programmable Transaction timeout timer                             |
|                     | Auto Recovery behavior after 4 Replays                             |
| Programmable        | Full 4 KByte configuration space configurable by user              |
| configuration space | Accessible through Configuration Reads and Writes over PCI Express |



## 2. Installation

PETrainer ML is a factory-installed hardware module that is sold as part of the Universal Protocol Analyzer System 10000 (UPAS 10K).

The UPAS 10000, the exerciser module, and associated software are easily installed. You can begin traffic generation after following the steps in this chapter.

### 2.1 System Components/Packing List

- Factory-installed PETrainer ML exerciser module
- One USB cable
- PETracer software program CD-ROM
- Probe data cable
- Breakout board with cable
- User Manual
- Optional: Device Emulation Interposer
- Optional: Host Emulation Test Fixture

### 2.2 Host PC Requirements

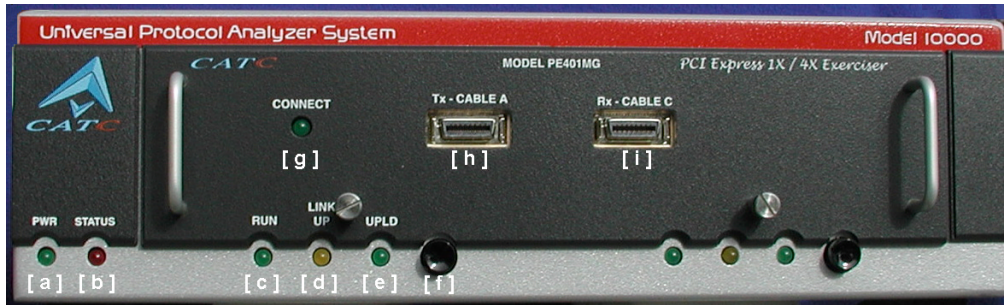
PETrainer ML connects to a Host PC. Please consult the readme file on the installation CD for the latest PC requirements.

### 2.3 LED Descriptions

When powered on, the PETrainer ML activates the user-accessible controls and LEDs on the front and rear panels of the UPAS.

**Warning** Do not open the UPAS enclosure. There are no operator serviceable parts inside. Refer servicing to LeCroy.

### UPAS LEDs (from left to right)



- [ a ] Green **PWR** (power) indicator LED for UPAS - Lights when the unit power is switched on.
- [ b ] Red **Status** indicator LED for UPAS - Lights during initialization/power up of UPAS base unit. Blinks if a self-test fails.

The following LEDs on the UPAS function in conjunction with the PETrainer ML module inserted above it.

- [ c ] Green **Run** LED - Lights when script execution is in process.
- [ d ] Orange **Link Up** LED - Lights when the PCI Express link is trained.
- [ e ] Green **UPLD** (Upload) - Lights when script is transferred from PC to PETrainer.
- [ f ] Manual Trigger push-button - Disabled.

### LEDs and Connectors on the PETrainer ML Module

- [ g ] Green **Connect** LED - Indicates that cabling is correct.
- [ h ] **Tx Cable A** - Corresponds to connector A on probe data cable
- [ i ] **Rx Cable C** - Corresponds to connector C on probe data cable

## 2.4 Rear Panel Description

From left to right, the UPAS rear panel contains the following components:



### USB type “B” host computer connector

This connector links the PETrainer ML to the Host PC. for the purpose of downloading scripts and controlling the behavior of the exerciser.

### *RS-232 25 pin "Data In/Out" Connector*

This connector is used to connect the exerciser to a break-out board. By driving a specific pattern to the break-out board, the script execution can be stalled.

### *BNC Connectors "Ext. In" and "Ext. Out"*

These BNC connectors are not used for the PETrainer exerciser. They are used when a PETracer analyzer module is installed in the UPAS and allow the analyzer to transmit or receive external trigger signals.

### *Wide range AC connector module*

- Power socket
- Power on/off switch
- Enclosed 5x20 mm 2.0A 250 V fast acting glass fuse

**Warning** For continued protection against fire, replace fuse only with the type and rating specified above.

## 2.5 Installing the PETracer Software

PETracer software operates all four of LeCroy's PCI Express products: PETrainer ML, PETracer EML, PETracer ML, and PETracer. When a PETrainer ML device is attached, traffic generation features are enabled.

**Step 1** On the PC, insert the installation CD. The installation window opens and displays links to the PETracer software, user manuals, the readme file and Acrobat Reader.

**Step 2** Select **Install Software** and follow onscreen instructions.

The PETracer software will install automatically on the PC hard disk. Included in the installation will be two USB drivers:

- **ctcupa10.sys** - UPAS 10K driver
- **petranx4.sys** -- PETrainer ML driver

## 2.6 Setting Up PETrainer ML

**Step 1** Remove the exerciser and UPAS from its shipping container.

The exerciser module will already be installed in the UPAS.

**Step 2** Connect the exerciser unit to a 100-volt to 240-volt, 50 Hz to 60 Hz, 120 W power outlet using the provided power cord.

**Note** The exerciser is capable of supporting supply voltages between

100-volt and 240-volt, 50 Hz or 60 Hz, thus supporting all known supply voltages around the world.

**Step 3** Connect the USB cable between the USB port on the back of the UPAS and a USB port on the PC.

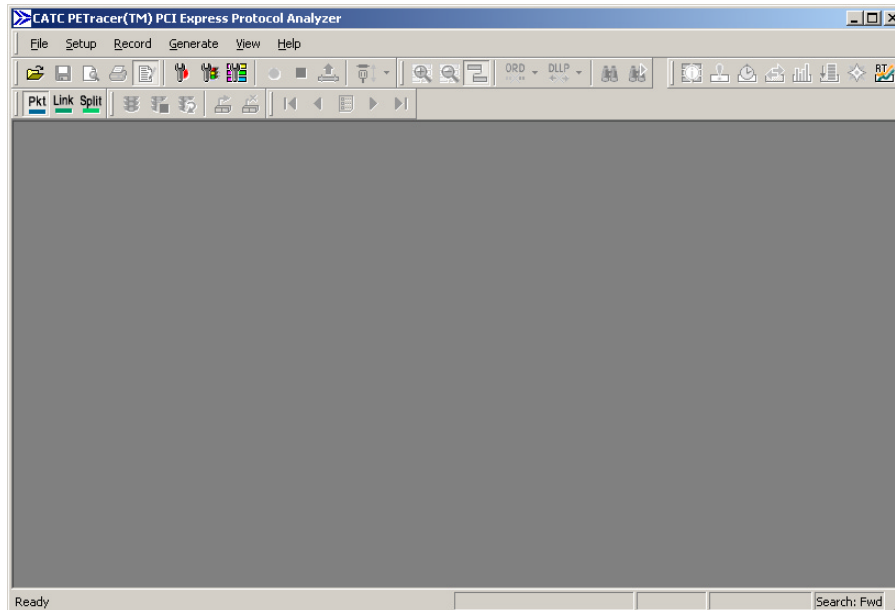
**Step 4** Turn on the power switch on the rear of the UPAS.

**Note** At power-on, the exerciser initializes itself in approximately five seconds and performs an exhaustive self-diagnostic that lasts about fifteen seconds. The Status LED of the UPAS base unit turns red on power up/initialization. The LED remains on approximately 20 seconds while the exerciser performs self-diagnostic testing. If the diagnostics fail, the Status LED will blink red, indicating a hardware failure. If this occurs, call LeCroy Customer Support for assistance.

The host operating system detects the exerciser.

**Step 5** Start the PETracer application from the Start menu:  
**Start > Programs > CATC > PETracer > CATC PETracer.**

The PETracer program opens.



**Note** The software may be used with or without an exerciser or analyzer. When used without an exerciser or analyzer attached to the computer, the program functions as a Trace Viewer to view captured traffic and to create traffic generation files.

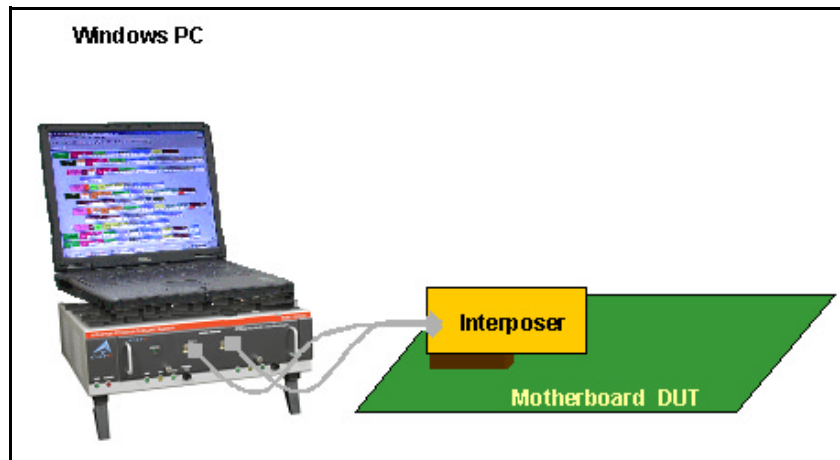
## 2.7 Connecting PETrainer to the Device Under Test

PETrainer ML can test both the host and device sides of a PCI Express link through the use of two types of adapter:

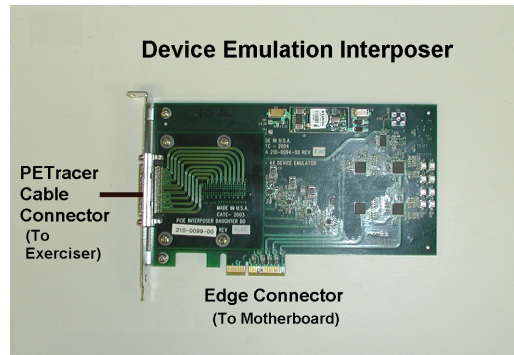
- Motherboards and host controllers - using a **device emulation interposer**. A device emulation interposer is a PCI Express adapter card that fits into slotted PCI Express devices.
- PCI Express add-on cards - using a **host emulation test fixture**. A host emulation test fixture is a box-like adapter with a slot for testing PCI Express cards.

Both of these test devices can be purchased from LeCroy.

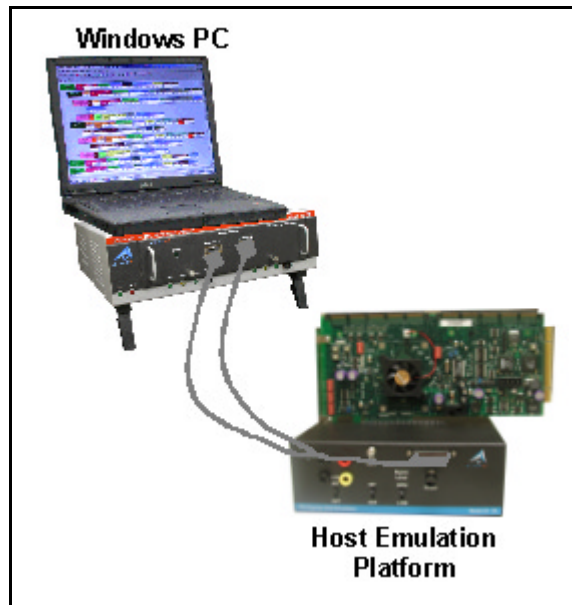
## 2.8 Device Emulator Interposer - Description



The LeCroy Device emulation interposer is an adapter that provides a way of connecting a PETrainer ML exerciser or PETracer ML analyzer to a PCI Express motherboard. The interposer has two connectors: a connector for a data cable and an edge connector for inserting the interposer into a slotted DUT.

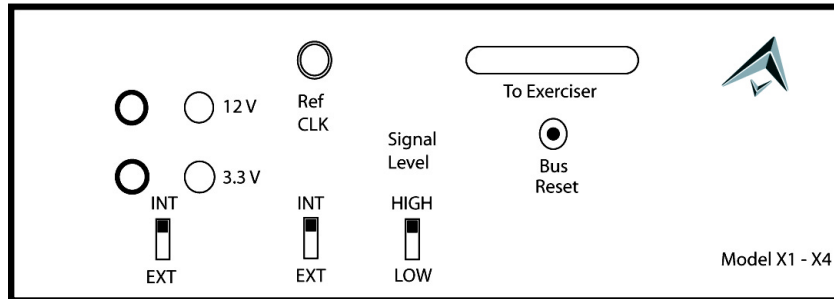


## 2.9 Host Emulation Test Fixture - Description



The LeCroy Host Emulation Test Fixture is a hardware enclosure with a slot

on top for accommodating a PCI Express card.



### Host Emulation Test Fixture

**Data Cable Connector** ("To Exerciser") - To connect to the PETrainer ML and/or PETracer ML analyzer.

**Bus Reset button** - Reset asserts PERST # for > 250 ms

**Signal Level switch** - Hi = PCI Express compliant (0.9V - 1.2V). Low = Testing (0.45V - 0.65V)

**Power Switch** - Selects between the internal power supply and the banana jacks on the front panel of the unit. When "External" power is selected, both 3.3V and 12V supplies must be provided by the user.

**Reference Clock** - Selects between the internal supplied 100 MHz reference or the user supplied reference via the "RefCLK" SMA connector.

## 2.10 Installing the Device Emulation Interposer

To install the interposer into the DUT, perform the following steps.

- Step 1** If not already powered off, power off the PETrainer/UPAS 10K system and the DUT.
- Step 2** Insert the edge connector on the Device Emulation Interposer into a PCI Express slot in the DUT. The interposer is designed to fit tightly into any standard x4, x8, or x16 PCI Express slot.
- Step 3** The slot interposer is shipped from LeCroy with a metal face plate for attachment to a PC case. If you are working with a motherboard that is not in a PC case, you may prefer to remove the metal face plate so the interposer can sit flat with the motherboard. To remove the face plate, unscrew the two screws that hold it onto the interposer.
- Step 4** Attach probe data cable as described below in Section 2.12, "The Probe Data Cable."

## 2.11 Installing the Host Emulation Test Fixture

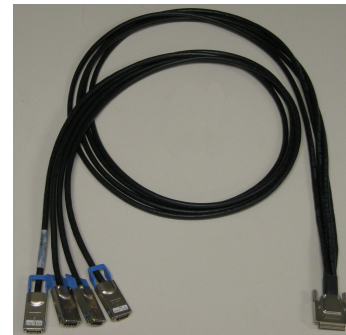


**Host emulation test fixture with DUT card on top**

- Step 1** If not already powered off, power off the PETrainer/UPAS 10K system and the DUT.
- Step 2** Insert the male edge connector of the DUT into the PCI Express slot on top of the Host Emulation Test Fixture.
- Step 3** Attach probe data cable as described in the next section.

## 2.12 The Probe Data Cable

The probe data cable is used to transfer x1 and x4 link PCI Express data to and from the exerciser. The cable has a single wide connector on one end for connecting to the interposer or the Host Emulation Test Fixture. At the cable's other end are four smaller connectors labeled A, B, C, and D. These connectors attach to ports on the front of a PETrainer ML or PETracer ML system.



Each of the small connectors can only transmit in one direction. This means that at a minimum, two connectors will always be needed: one to transmit and one to receive.



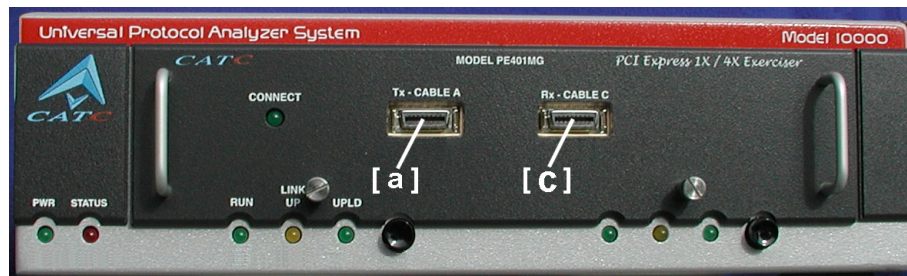
Each connector transmits four physical lanes of uni-directional traffic. The lanes and port assignments are shown in the illustration below.

Cable A, for example, transmits Lanes 0, 1, 2, and 3.

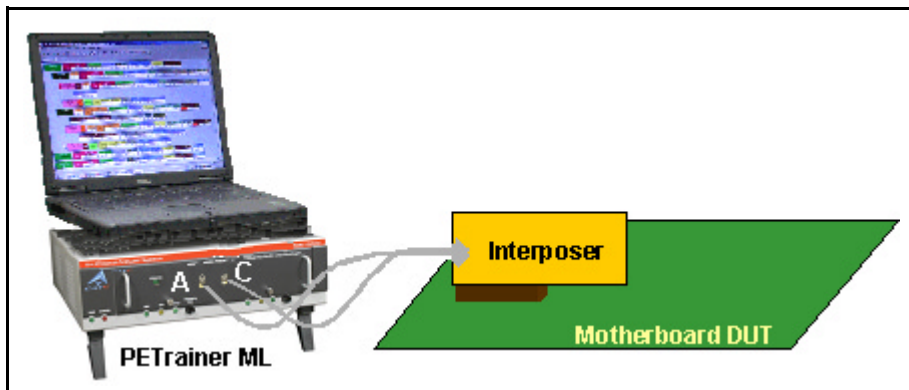
| Cable Connectivity |        |                            |
|--------------------|--------|----------------------------|
| Cable              | Lane   | Exerciser/Analyzer Port    |
| Cable A            | Lane 0 | PETrainer ML<br>Tx-Cable A |
|                    | Lane 1 |                            |
|                    | Lane 2 |                            |
|                    | Lane 3 |                            |
| Cable C            | Lane 0 | PETrainer ML<br>Rx-Cable C |
|                    | Lane 1 |                            |
|                    | Lane 2 |                            |
|                    | Lane 3 |                            |
| Cable B            | Lane 0 | PETracer ML<br>Port 1      |
|                    | Lane 1 |                            |
|                    | Lane 2 |                            |
|                    | Lane 3 |                            |
| Cable D            | Lane 0 | PETracer ML<br>Port 2      |
|                    | Lane 1 |                            |
|                    | Lane 2 |                            |
|                    | Lane 3 |                            |

### 2.13 Attaching the Probe Data Cable to PETrainer ML

Connector **A** on the probe data cable goes to port **Tx Cable A** and connector **C** goes to port **Rx Cable C** on the exerciser.



PETrainer ML front panel showing where connectors A and C attach

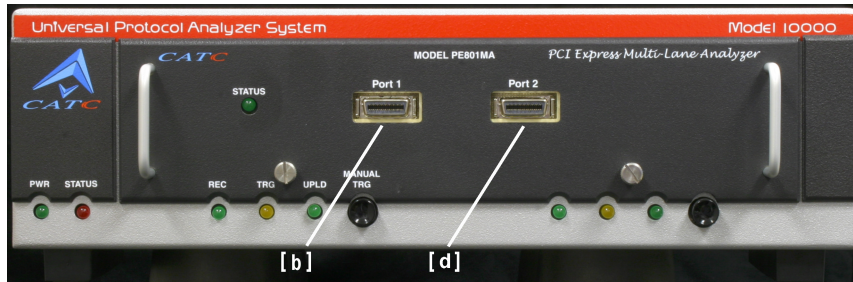


### Add a PETracer ML to Device Emulation Test Setup

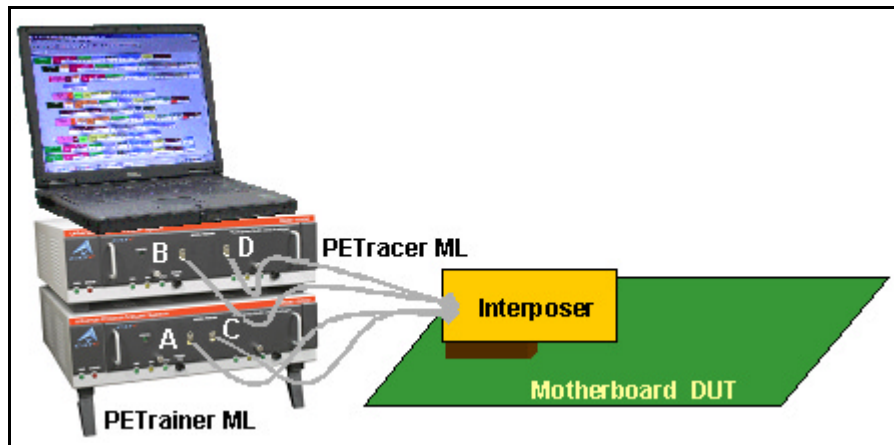
To add a PETracer ML to the above setup,

**Step 1** Attach connectors A and C to the exerciser as described above.

**Step 2** Attach connectors B to **Port 1** and connector D to **Port 2** on the PETracer ML analyzer.



**PETracer ML front panel showing where connectors B and D attach**

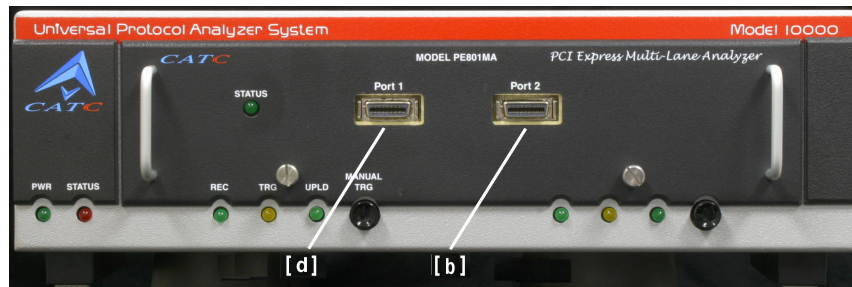


### Add a PETracer ML to Host Emulation Test Setup

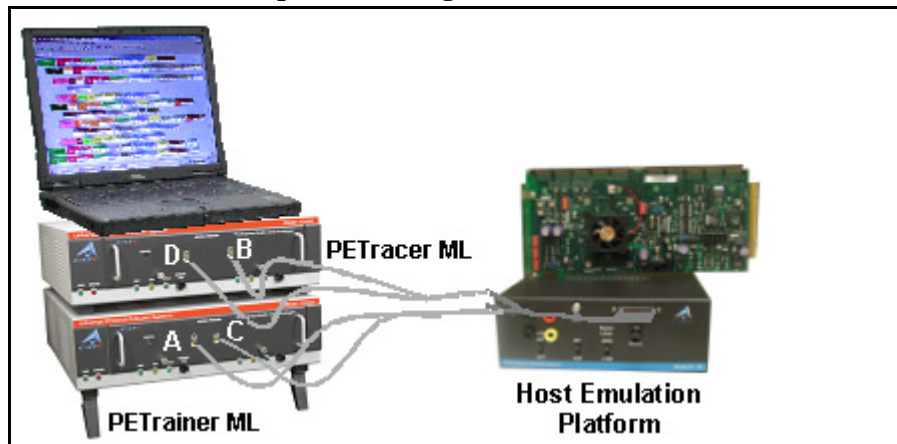
To add a PETracer ML to a Host Emulation setup,

**Step 1** Attach connectors A and C to the exerciser as described above.

**Step 2** Attach connectors D to **Port 1** and connector **D** to **Port 2** on the PETracer ML analyzer.



**PETracer ML front panel showing where connectors B and D attach**



## 2.14 Final Steps: Connect USB Cable and Power On the Exerciser and DUT

- Step 1** Connect the provided USB cable between the UPAS 10K/PETrainer ML and the PC host system that will run the PETracer software.
- Step 2** Power on the PCI Express system under test.
- Step 3** Power on the UPAS 10K/exerciser. The exerciser's green power LED will light, and the red status LED will turn on for approximately 20 seconds while the exerciser performs self-diagnostics.
- Step 4** Open the PETracer application on the PC host system. The exerciser is now ready for traffic generation.

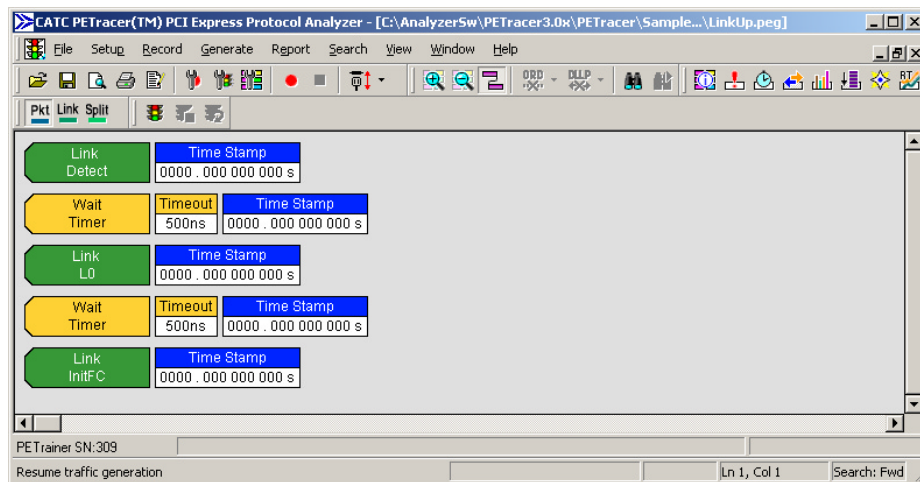


## 3. Generating Link Training Traffic

Once the PETrainer ML and DUT have been cabled and powered on, you can test the setup by generating some traffic. The following steps show how to configure the exerciser to generate a Link Training sequence.

To start traffic generation, follow these steps:

- Step 1** If it is not running, start the PETracer software.
- Step 2** Open the traffic generation file *Linkup.peg* by selecting **File > Open** from the menu. The following packets display in the main window.

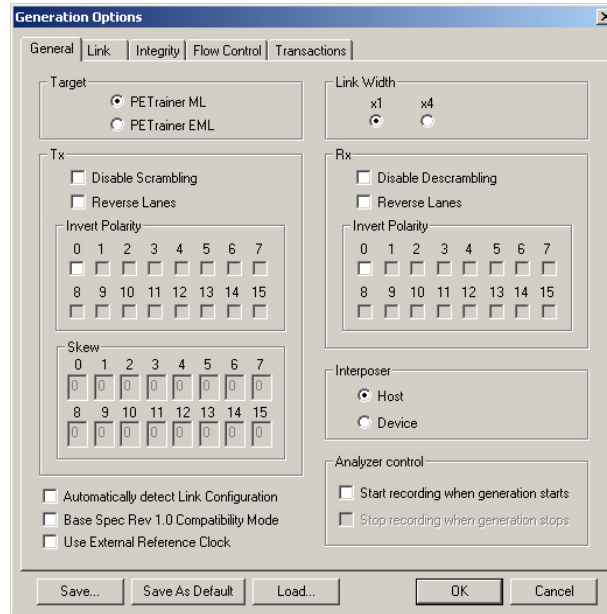


- Step 3** The trace window shows the type of traffic that is to be generated in the current generation session.

### 3.1 Set the Generation Options

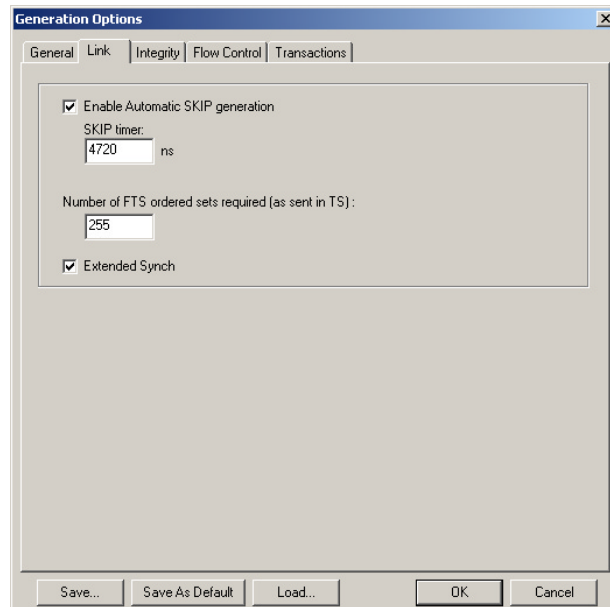
Before beginning generation, you will need to set options in the Generation Options dialog box.

- Step 1** Open the Generation Options dialog box by selecting **Setup > Generation Options** from the menu. The Generation Options dialog will then open. By default, the General page displays.



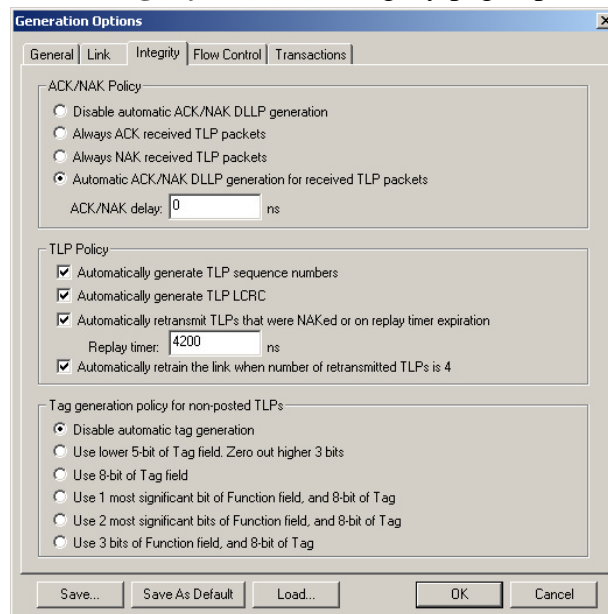
- Step 2** Check the box next to **Base Spec Rev. 1.0 Compatibility Mode** to select 1.0 compatibility mode. For testing 1.0A devices, leave this box unchecked.
- Step 3** Set the generation direction based on type of device you are emulating. Select one of the two **Interposer** options:
- Host Emulation - Select **Host**
  - Device Emulation - Select **Device**

**Step 4** Select the **Link** tab. The Link page opens.



**Step 5** Select **Enable Automatic Skip Generation** but leave setting at default value: 4720 ns.

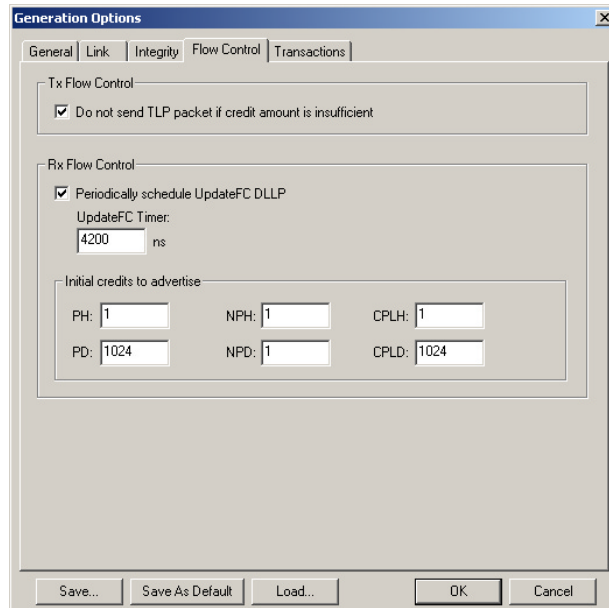
**Step 6** Click **Integrity** tab. The Integrity page opens.



**Step 7** Check to enable **Automatic ACK/NAK DLLP generation for received TLP packets**.

**Step 8** Enable all four TLP policies and set **ACK/NAK Delay = 0 ns**.

**Step 9** Click the **Flow Control** tab. The Flow Control page opens.



**Step 10** Check the checkbox to enable **Do not send TLP packet if credit amount is insufficient**.

**Step 11** Check the checkbox to enable **Periodically schedule UpdateFC DLLP**.

**Step 12** Use defaults for all other boxes.

**Step 13** Click **OK** to apply all changes and close the Generation Options dialog.

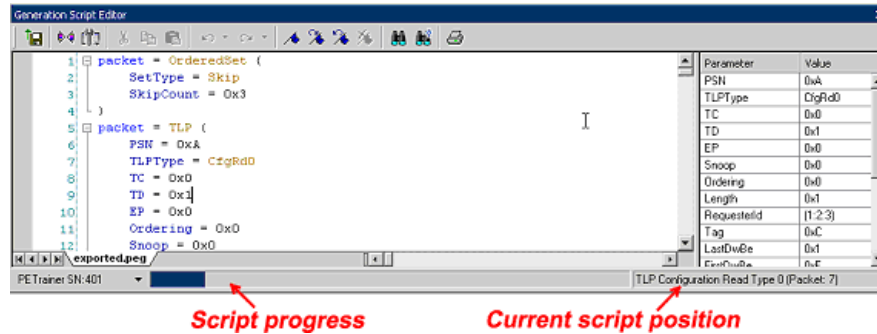
## 3.2 Begin Traffic Generation

**Step 1** To begin traffic generation, click  .

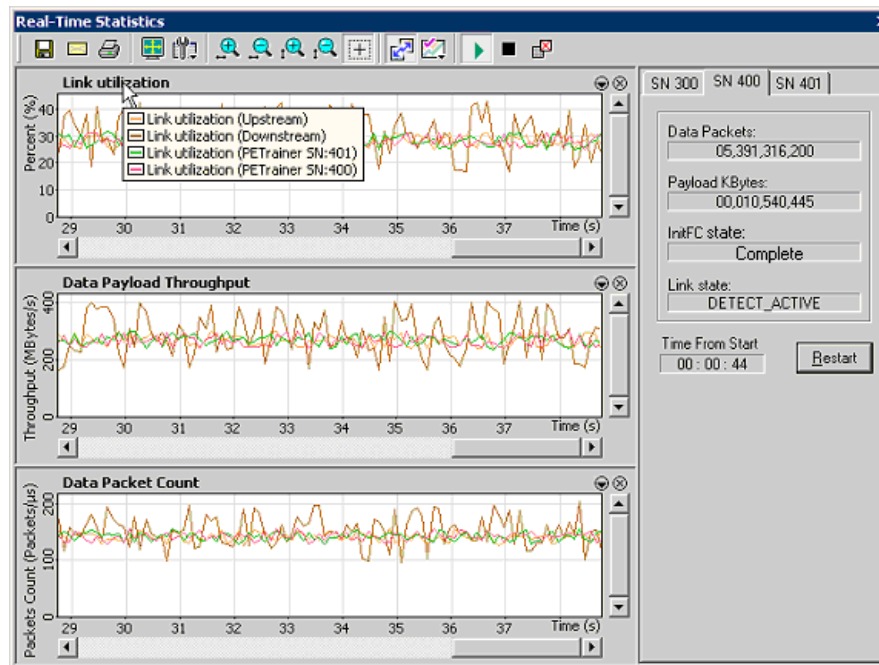
At this point, the PETracer software downloads the script to PETrainer ML device. Once the download completes, the PETrainer ML device starts executing the script.



As the script executes, the Status bar displays the script's progress. The "Current script position" field displays the command description and trace packet number currently being generated.



Step 2 Open the Real-Time Statistics window by clicking .



The Real-time statistics window has three graph areas: "Link Utilization", "Data Payload Throughput" and "Data Packet Count".

Each graph area has Upstream and Downstream graphs for PETracer device (if connected to PC) plus as many graphs as PETrainer devices connected to PC.

To the right of the three graphs is a "Statistics Accumulation" area. In this area you are looking for two messages:

**InitFC State - Complete** (shown in the example above), and

**Link State - LO**

If the messages appear, then it means that the exerciser successfully completed the Link training.

## How to Contact LeCroy

| Type of Service               | Contact  |
|-------------------------------|--|
| Call for technical support... | US and Canada: 1 (800) 909-2282<br>Worldwide: 1 (408) 727-6600   |
| Fax your questions...         | Worldwide: 1 (408) 727-6622  |
| Write a letter...             | LeCroy<br>Protocol Solutions Group<br>Customer Support<br>3385 Scott Blvd.<br>Santa Clara, CA 95054<br>USA |
| Send e-mail...                | support@CATC.com   |
| Visit LeCroy's web site...    | <a href="http://www.lecroy.com/">http://www.lecroy.com/</a>  |

## Limited Hardware Warranty

So long as you or your authorized representative ("you" or "your"), fully complete and return the registration card provided with the applicable hardware product or peripheral hardware products (each a



"Product") within fifteen days of the date of receipt from LeCroy or one of its authorized representatives, LeCroy warrants that the Product will be free from defects in materials and workmanship for a period of three years (the "Warranty Period"). You may also complete your registration form via the internet by visiting <http://www.lecroy.com/support/register/>. The Warranty Period commences on the earlier of the date of delivery by LeCroy of a Product to a common carrier for shipment to you or to LeCroy's authorized representative from whom you purchase the Product.

### What this Warranty Does Not Cover

This warranty does not cover damage due to external causes including accident, damage during shipment after delivery to a common carrier by LeCroy, abuse, misuse, problems with electrical power, including power surges and outages, servicing not authorized by LeCroy, usage or operation not in accordance with Product instructions, failure to perform required preventive maintenance, software related problems (whether or not provided by LeCroy), problems caused by use of accessories, parts or components not supplied by LeCroy, Products that have been modified or altered by someone other than LeCroy, Products with missing or altered service tags or serial numbers, and Products for which LeCroy has not received payment in full.

**Coverage During Warranty Period**

During the Warranty Period, LeCroy or its authorized representatives will repair or replace Products, at LeCroy's sole discretion, covered under this limited warranty that are returned directly to LeCroy's facility or through LeCroy's authorized representatives.

**How to Obtain Warranty Service**

To request warranty service, you must complete and return the registration card or register via the internet within the fifteen day period described above and report your covered warranty claim by contacting LeCroy Technical Support or its authorized representative.

LeCroy Technical Support can be reached at 800-909-7112 or via email at [support@catc.com](mailto:support@catc.com). You may also refer to LeCroy's website at <http://www.lecroy.com> for more information on how to contact an authorized representative in your region. If warranty service is required, LeCroy or its authorized representative will issue a Return Material Authorization Number. You must ship the Product back to LeCroy or its authorized representative, in its original or equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. LeCroy must receive the Product prior to expiration of the Warranty Period for the repair(s) to be covered. LeCroy or its authorized representative will thereafter ship the repaired or replacement Product to you freight prepaid by LeCroy if you are located in the continental United States. Shipments made outside the continental United States will be sent freight collect.

Please remove any peripheral accessories or parts before you ship the Product. LeCroy does not accept liability for lost or damaged peripheral accessories, data or software.

LeCroy owns all parts removed from Products it repairs. LeCroy may use new and/or reconditioned parts, at its sole discretion, made by various manufacturers in performing warranty repairs. If LeCroy repairs or replaces a Product, the Warranty Period for the Product is not extended.

If LeCroy evaluates and determines there is "no trouble found" in any Product returned or that the returned Product is not eligible for warranty coverage, LeCroy will inform you of its determination. If you thereafter request LeCroy to repair the Product, such labor and service shall be performed under the terms and conditions

of LeCroy's then current repair policy. If you chose not to have the Product repaired by LeCroy, you agree to pay LeCroy for the cost to return the Product to you and that LeCroy may require payment in advance of shipment.

### **General Provisions**

THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE ADDITIONAL RIGHTS THAT VARY BY JURISDICTION. LECROY'S RESPONSIBILITY FOR DEFECTS IN MATERIALS AND WORKMANSHIP IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS LIMITED WARRANTY STATEMENT. EXCEPT AS EXPRESSLY STATED IN THIS WARRANTY STATEMENT, LECROY DISCLAIMS ALL EXPRESS AND IMPLIED WARRANTIES FOR ANY PRODUCT INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES THAT MAY ARISE FROM ANY COURSE OF DEALING, COURSE OF PERFORMANCE OR TRADE USAGE. SOME JURISDICTIONS MAY NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE PRECEDING LIMITATION MAY NOT APPLY TO YOU.

LECROY DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS LIMITED WARRANTY STATEMENT OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING, WITHOUT LIMITATION, ANY LIABILITY FOR THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES, PRODUCTS NOT BEING AVAILABLE FOR USE, OR FOR LOST DATA OR SOFTWARE. LECROY'S LIABILITY TO YOU MAY NOT EXCEED THE AMOUNT YOU PAID FOR THE PRODUCT THAT IS THE SUBJECT OF A CLAIM. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

The limited warranty on a Product may be transferred for the remaining term if the then current owner transfers ownership of the Product and notifies LeCroy of the transfer. You may notify LeCroy of the transfer by writing to Technical Support at LeCroy, 3385 Scott Blvd., Santa Clara, CA 95054 USA or by email at: support@catc.com. Please include the transferring owner's name and address, the name and address of the new owner, the date of transfer, and the Product serial number.

