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LeCroy *PETrainer* EML™

PCI Express Multi-Lane Exerciser

QuickStart User Manual



For PETracer Software Version 4.30
Manual Version 1.10

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1. PETrainer EML Exerciser - Overview

LeCroy PETrainer™ EML, a PCI Express 16-lane advanced exerciser system, is a critical test and verification tool intended to assist engineers in improving the reliability of their systems. PCI Express root complexes or device endpoints can be emulated. Built upon CATC's most advanced Universal Protocol Analysis System™ (UPAS) platform, the UPAS 100k, the PETrainer EML is CATC's second generation PCI Express exerciser. By leveraging years of experience in protocol analysis tools for emerging markets, the PETrainer EML blends sophisticated functionality with intuitive controls to speed the development and testing of PCI Express IP cores, semiconductors, bridges, switches and systems.

The PETrainer EML is a stand-alone PCI Express exerciser that is capable of generating and responding to all types of PCI Express transactions. The powerful scripting language allows for the creation of Transaction Layer Packets (TLPs), Data Link Layer Packets (DLLPs) and Ordered Sets. ACK's or even NACK's can be automatically generated under user control. Any packet field not explicitly specified by the user will be created automatically. For example CRC's can be automatically calculated. Configuration ROM space can be emulated for any device including endpoints, bridges and switches.

A Configuration ROM space can be easily created by exporting a Configuration ROM file created by the PETracer.

The scripting language is powerful yet easy to use. One way to create test scripts is to export traffic from a trace file captured with a CATC PETracer. The exported script can then be modified to generate different test cases, insert errors or create loop tests. The “point and click” capability of the script editor makes modifying or creating scripts from scratch simple. The powerful scripting language allows for a link training script to be created with just three simple commands. Macro's can also be created for frequently used sequences.

For complete product information, please visit www.lecroy.com.

1.1 CATC Trace Software

The PETrainer EML utilizes the CATC Trace™ to assist users in analyzing and exercising 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 set specific real-time triggering and filtering conditions. The CATC Trace utilizes a Windows-based graphical display that has been optimized for fast and easy navigation through a captured traffic session. Users are alerted as violations are detected at all levels of the protocol layering and can easily drill down on areas of interest or collapse and hide fields that are not relevant.

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

<http://www.catc.com/support/whitepapers/index.html>.

Features	Benefits
Script Level Traffic Generation	Programmability to test PCI Express components with more precision and control.
Convert Trace files into generation scripts	Recreate failure scenarios by replaying recorded traffic.
Manual Error Injection	Verify fault handling and identify error recovery.
Host/End-Point Emulation Support	Host emulation platform/end-point emulation interposer allow for design and stress testing.
Programmable Data Link Layer	Ability to modify flow control, ACK/NAK, and retry behaviors.
Flexible/programmable Transaction Layer	User ability to define arbitrary sequence of transactions, payload generation, and conditional repeat of transactions provide users with maximum flexibility.
Raw Generation mode	Allows complete control of each symbol transmitted.
Programmable reply timers	Allows testing of ACK latency timeouts and retry mechanisms.
Point and Click Script Editor	Complex scripts can be created quickly and easily.
3 Year Hardware Warranty	Protect your investment with industry leading warranty.

1.2 Specifications

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

Package

Dimensions:	UPAS 100K: 11.5 x 5.75 x 16.25 inches (29.21 x 14.6 x 41.275cm) PETrainer EML Plug-in module (2 per platform) 9.16 x 6x 1.25 inches (23.26 x 15.24 x 3.175cm)
Connectors:	Two Data Probe Connectors (Molex VHDCI) UPAS AC power connection External trigger connection (Trig In/Out, BNC) 2 High Speed Expansion Ports (Sync In, Sync Out) PC connection (USB 2.0) Break-out-board (type "D")
Weight:	UPAS 100K (w/out modules): 13.5 lbs (6.2 kg) UPAS 100K + 2 Modules: 17.0 lbs (7.6 kg) PETrainer EML Plug-in: 1.7 lb (0.77 kg)

Power Requirements

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

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 (end-point emulation) Test fixture (Root Complex emulation)
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Script Memory Size

4 GB for trace generation, timing and control information

PC Host Requirements

Operating System:	Windows 98SE®, Windows 2000® Windows ME®, Windows XP®
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Wait Conditions

Time-Based Wait
 Wait for User Input
 Wait for DLLP, TLP, or Ordered Set

PETrainer EML 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/NAK behavior	ACK all TLP packets NAK all TLP packets Automatic ACK/NAK behavior ACK/NAK delay timer
Programmable Flow control behavior	Set Credit values Disable Credit checking Set Update InitFC intervals
Automatic CRC calculation	DLLP CRC calculation TLP LCRC calculation
Sequence number assignment	
Replay buffer	Programmable Transaction timeout timer Auto Recovery behavior after 4 Replays
Programmable configuration space	Full 4 KByte configuration space configurable by user Accessible through Configuration Reads and Writes over PCI Express
Automatic Tag generation	

2. Installation

PETrainer EML consists of two factory-installed hardware modules that are sold as part of the Universal Protocol Analyzer System 100K (UPAS 100K).

The UPAS 100K, the exerciser modules, 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 EML exerciser modules
- One USB cable
- PETracer software program CD-ROM
- Two Probe data cables
- Breakout board with cable
- User Manual
- Optional: Device Emulator
- Optional: Host Emulation Test Fixture

2.2 Host PC Requirements

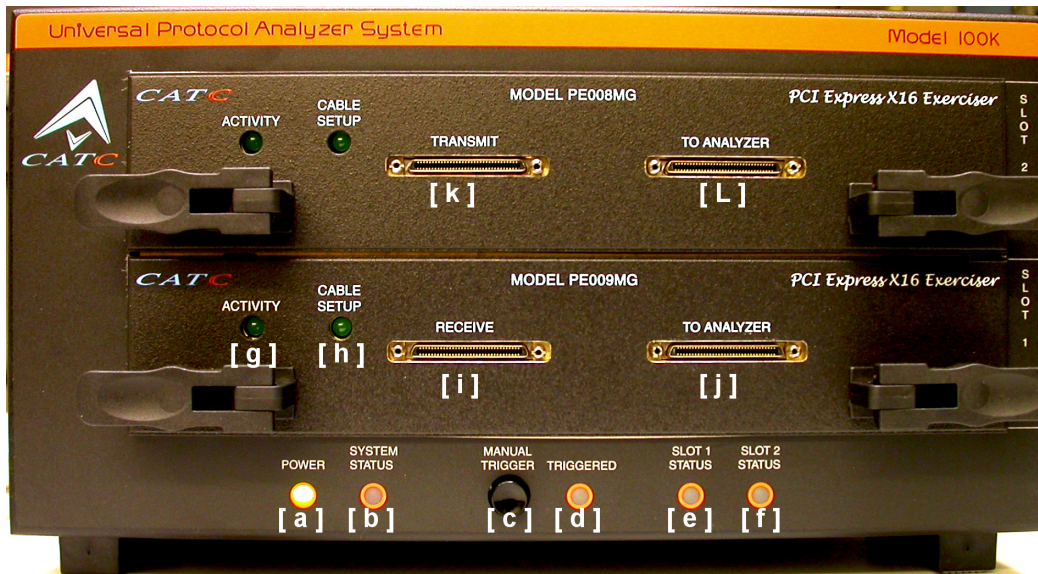
PETrainer EML connects to a Host PC. Please consult the readme file on the installation CD for the latest PC requirements.

2.3 LED Descriptions

When powered on, the PETrainer EML 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] **Power** indicator LED for UPAS - Lights when the unit power is switched on.
- [b] **System Status** indicator LED for UPAS - Lights during initialization/power up of UPAS base unit. Blinks if a self-test fails.
- [c] The **Manual Trigger** push-button - Disabled. On PETracer EML, this button forces an event trigger.
- [d] **Triggered** LED - Disabled. On PETracer EML, this LED lights when the analyzer triggers on an event.
- [e] **Slot 1 Status** - Disabled. On PETracer EML, this LED illuminates when the analyzer in Slot 1 is recording.
- [f] **Slot 2 Status** - Disabled. On PETracer EML, this LED illuminates when the analyzer in Slot 2 is recording.

PETrainer EML Modules

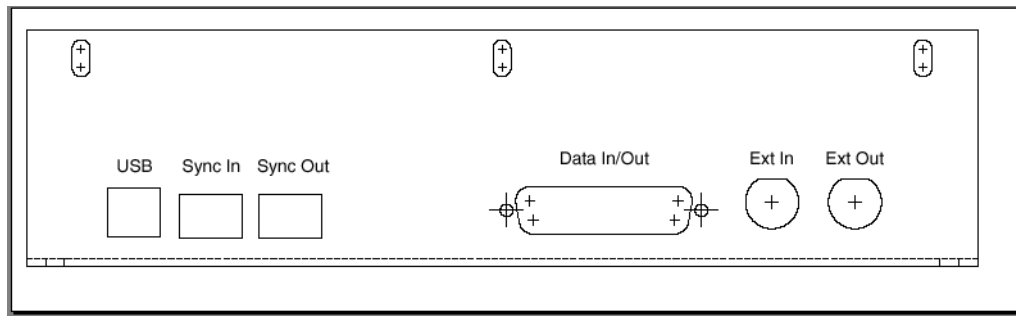
- [g] **Activity** LED - On the **Transmit** module, this LED illuminates when linkup is established between the Exerciser and the DUT. On the **Receive** module, this LED illuminates when there is traffic on the link.
- [h] **Cable Setup** LED - On the **Transmit** module, this LED illuminates when an connection is established between the Exerciser and host emulator or device emulator.
- [i] **Receive Probe Data Connector**. Receives traffic from DUT.

- [j] **To Analyzer** - Transmits generated traffic from Exerciser to the **Receive** channel on a PETracer EML analyzer. This is an optional connection for users adding a PETracer EML analyzer to their setup.
- [k] **Transmit Probe Data Connector**- Sends generated traffic from Exerciser to DUT.
- [L] **To Analyzer** - Sends traffic received from DUT on the **Transmit** channel on a PETracer EML analyzer. This is an optional connection for users adding a PETracer EML analyzer to their setup.

2.4 Rear Panel Description

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

Rear Panel



USB Connector

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

SFP "Sync In" and "Sync Out" Connectors

These connectors allow multiple UPAS 100K chassis to send synchronization and control messages to one another. Currently, these ports are not activated and are reserved for a future release.

RS-232 40 pin "Data Input/Output" Connector

Not used by PETrainer EML.

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 of LeCroy's PCI Express protocol analyzer and exerciser products:

Exercisers

- PETrainer ML
- PETrainer EML

Analyzers

- PETracer
- PETracer ML
- PETracer EML

The PETracer software is installed on a Microsoft Windows-based PC and serves as the interface for the exerciser and/or analyzer. When an exerciser is attached, traffic generation features are enabled.

To install the PETracer software, perform the following steps:

Step 1 On the PC, insert the installation CD. The installation window opens and displays links to the PETracer software, user manuals, a 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. During installation, all necessary USB drivers will be loaded automatically.

2.6 Setting Up PETrainer EML

Step 1 Remove PETrainer EML from its shipping container.

Step 2 Connect the PETrainer EML 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.

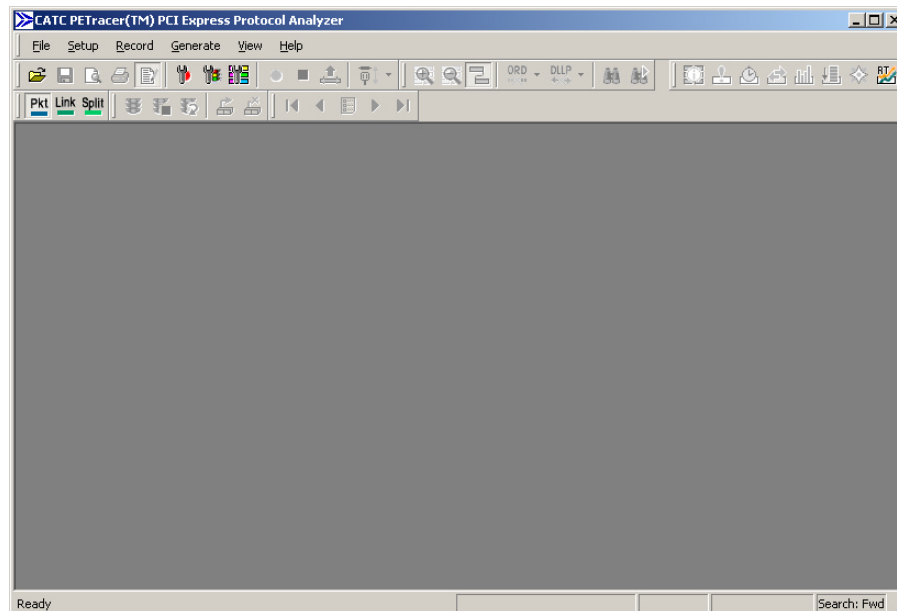
- Step 3** Connect the USB cable between the USB port on the back of the UPAS and a USB port on the PC.
- Step 4** Install Device Emulator or Host Emulator as described in the next sections. Also install cables between the Emulator and PETrainer EML exerciser. All hardware and cables should be setup prior to power-up.
- Step 5** 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 6** 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 EML to the Device Under Test



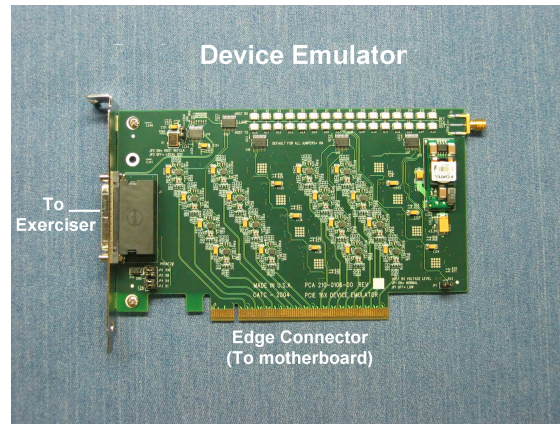
PETrainer EML (bottom left) connected to a Host Emulator adapter (top) and a PETracer EML analyzer (right). The Host Emulator has a PCI Express graphics card inserted into it.

PETrainer EML 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 emulator**. A device emulator is an adapter card that fits into motherboards and other 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 - Description



The LeCroy Device Emulator is an adapter that provides a way of connecting a PETrainer EML exerciser to a PCI Express motherboard. The emulator has two connectors: a connector for a data cable and an edge connector for inserting the Device Emulator into a slotted DUT.

2.9 Installing the Device Emulator

To install the Device Emulator into the DUT, perform the following steps.

- Step 1** If not already powered off, power off the PETrainer/UPAS 100K system and the DUT. The PETrainer power switch is located on the back of the UPAS.
- Step 2** Check the Jumper settings. The default is to have all jumpers installed on the device emulator. The jumpers can be used to modify the following:
- **JP1 (Host RX Voltage Level):** This jumper can be removed to reduce the differential voltage level that the DUT receives from the PETrainer to (0.45V - 0.65V). When installed (default) the differential voltage level is (.9V - 1.2V).
 - **JP2 (Refclk):** This jumper can be removed for systems that do not provide a 100MHz RefClk to the PCI Express slot. When installed (default), the PETrainer will use the RefClk that is provided by the DUT. Note, this jumper **MUST** be installed if the DUT is providing a Spread Spectrum enabled RefClk.
 - **JP3-JP6 (PRSNT2#):** These jumpers can be used to open circuit the Presence detect signals driven to the PCI Express connector. When removed the PRSNT2# signal is floating. When installed

(default) the PRSNT2# signal is tied to GND. There are 4 PRSNT2# signals on the PCI Express connector, one for each lane width (x1, x4, x8, and x16).

- Step 3** Insert the edge connector on the Device Emulator into a PCI Express slot in the DUT. The Device Emulator is designed to fit tightly into any standard x16 PCI Express slot. To connect to a x1, x4, or x8 slot, you will need to install a slot reducer, available from LeCroy.
- Step 4** The Device Emulator 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 emulator can sit flat with the motherboard. To remove the face plate, unscrew the two screws that hold it onto the emulator.
- Step 5** Attach probe data cables between the two connectors on the emulator and the **Transmit** and **Receive** ports on the exerciser.
- Step 6** At this point the emulator is ready for use. Skip ahead to Section 2.12, “Final Steps: Power On the Exerciser and DUT” on page 14.

2.10 Host Emulation Test Fixture - Description



Host emulation test fixture with a PCI-E graphics card on top.

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 Transmit") - Connects to the Transmit port on PETrainer EML.

Data Cable Connector ("To Exerciser Receive") - Connects to the Receive port on PETrainer EML.

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)

Clock Select - Selects from the following clocking options:

- **Ext** - a user supplied reference via the "RefCLK" SMA connector.
- **Int** - an internal supplied 100 MHz reference clock.
- **Int SSC** - an internal supplied Spread Spectrum Clock.

Power Select switch - Selects between the internal power supply and the external power jacks on the back of the emulator unit. When "External" power is selected, both 3.3V and 12V supplies must be provided by the user via the banana jacks on the back of the emulator.

Reference Clk connector - Provides a point of attachment for an external reference clock.

Emulator Power LED - Lights when emulator is powered on.

PCIe Slot Power LED - Lights when the PCI Express connector on the Host Emulator is supplying power. Power can be provided either via the internal power supply or by an external power supply via the banana jacks on the back of the emulator. If an external power source is provided, the **Power Select** switch should be set to **Ext**.

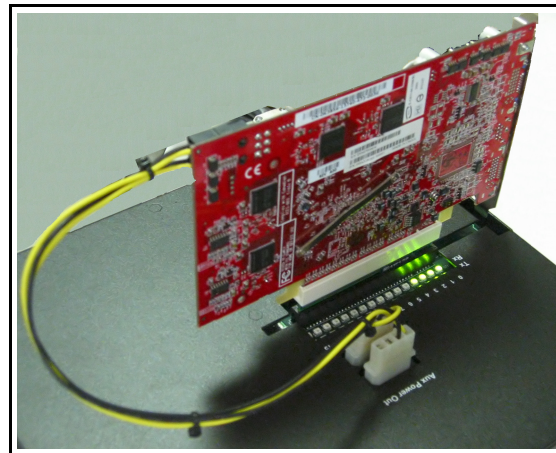
2.11 Installing the Host Emulation Test Fixture

Step 1 If not already powered off, power off the PETrainer/UPAS 100K 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. If you are testing a x1, x4, or x8 device, install a slot reducer in the Host Emulator before installing the DUT.
- Step 3** Attach a probe data cable to the **To Exerciser Transmit** port on the Host Emulator and the **Transmit** port on the PETrainer.
- Step 4** Attach a second probe data cable between the **To Exerciser Receive** port on the Host Emulator the **Receive** port on the PETrainer.



- Step 5** If the DUT is 150 watt device such as a graphics card, connect the card's external power cables to the two external power ports on top of the Host Emulator.



2.12 Final Steps: Power On the Exerciser and DUT

- Step 1** If testing a motherboard, power on the motherboard. If testing a PCI-Express device such as a graphics card, power on the Host Emulator.

- Step 2** Power on the PETrainer EML 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 3** Open the PETracer application on the PC host system. The exerciser is now ready for traffic generation.
- Step 4** Check the **Cable Setup** LEDs on the front of the exerciser for indication of proper connectivity.

2.13 Optional: Adding a PETracer EML Analyzer

A PETracer EML can be added to the above setup to allow the recording of traffic between the PETrainer EML exerciser and the device under test. A photo of such a setup is shown in Section 2.7, “Connecting PETrainer EML to the Device Under Test” on page 10. When an analyzer is added to the setup, a single PC administers both the exerciser and analyzer.

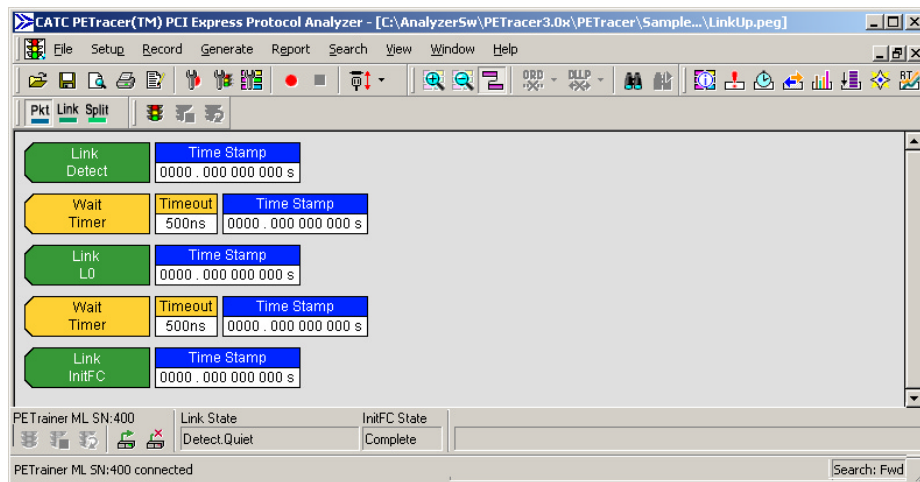
- Step 1** Connect a USB cable between the PETracer EML analyzer and the host PC for PETrainer EML. The same PC will administer both devices.
- Step 1** Connect data cables between the two **To Analyzer** ports on the PETrainer EML and the **Data In** ports on the PETracer EML analyzer.
- Step 2** Connect a power cable to the analyzer.
- Step 3** Power on the analyzer.
- Step 4** Start the PETracer application. When both PETracer EML and PETrainer EML are attached and running, the PETracer application will detect both platforms. At this point, you are ready to set the Recording Options in PETracer EML and start both traffic generation and trace recording.

3. Generating Link Training Traffic

Once the PETrainer EML 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.

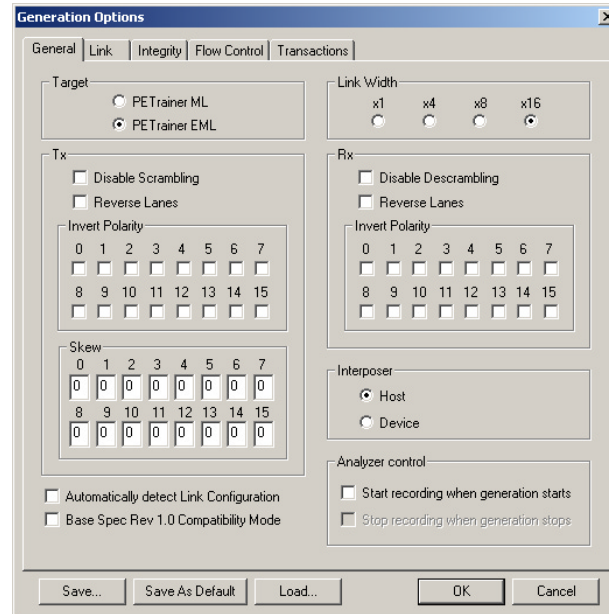


- Step 3** The trace window shows the type of traffic that is to be generated in the current generation session.

3.1 Set the Generation Options

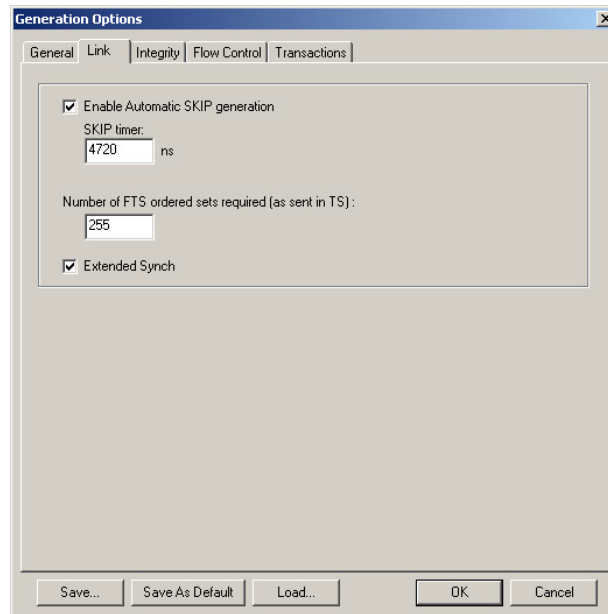
Before beginning generation, you will need to set options in the Generation Options dialog box.

- 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.



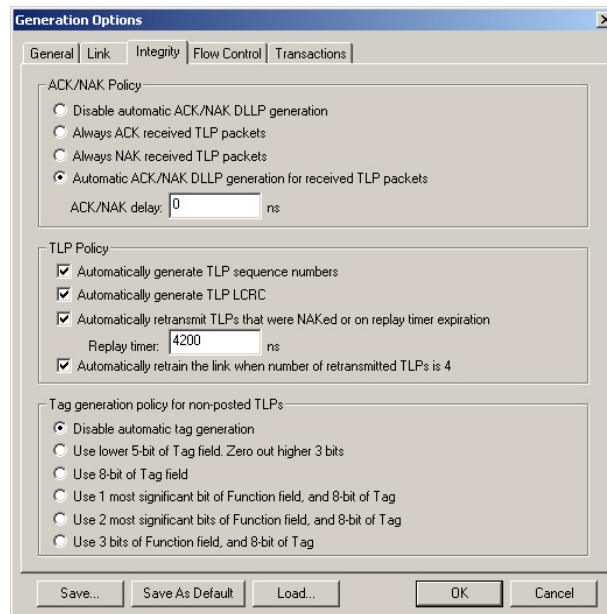
- Step 2** Check the box next to **Base Spec Rev. 1.0 Compatibility Mode** to select 1.0 compatibility mode. For testing 1.0A devices, leave this box unchecked.
- Step 3** Set the generation direction based on type of device you are emulating. Select one of the two **Interposer** options:
- Host Emulation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

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



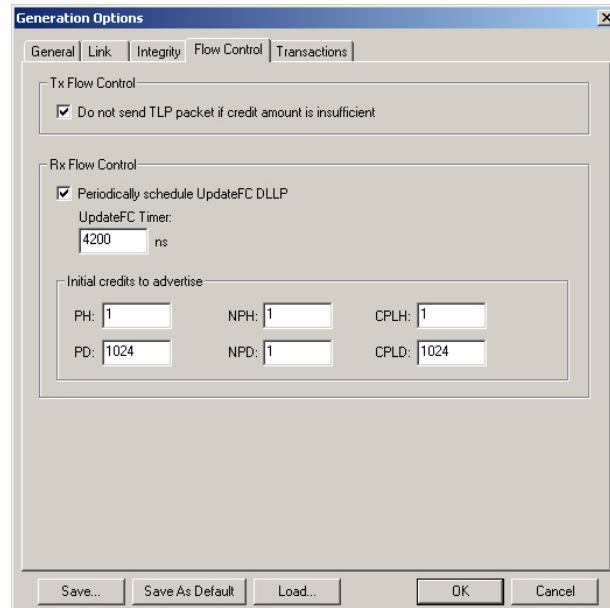
Step 5 Select **Enable Automatic Skip Generation** but leave setting at default value: 4720 ns.

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.



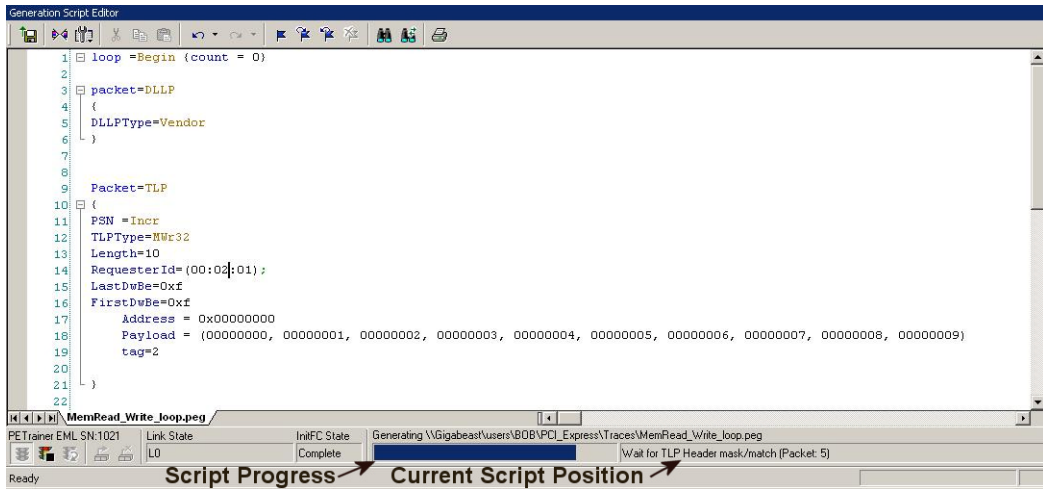
- Step 10** Check the checkbox to enable **Do not send TLP packet if credit amount is insufficient**.
- Step 11** Check the checkbox to enable **Periodically schedule UpdateFC DLLP**.
- Step 12** Use defaults for all other boxes.
- Step 13** Click **OK** to apply all changes and close the Generation 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 EML device. Once the download completes, the PETrainer EML 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 In the Status Bar, look for two messages:

- **InitFC State - Complete**
- **Link State - LO**

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

Note: Link training can also be performed by clicking the **Trainer Connect** button on the Status bar.

How to Contact LeCroy

Type of Service	Contact
Call for technical support...	US and Canada: 1 (800) 909-2282 Worldwide: 1 (408) 653-1260
Fax your questions...	Worldwide: 1 (408) 727-6622
Write a letter...	LeCroy Protocol Solutions Group Customer Support 3385 Scott Blvd. Santa Clara, CA 95054 USA
Send e-mail...	support@CATC.com
Visit LeCroy's web site...	http://www.lecroy.com/

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. 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.

