
Ellisys USB Explorer 200

Getting Started Guide



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Chapter 1: Starting out

Introduction

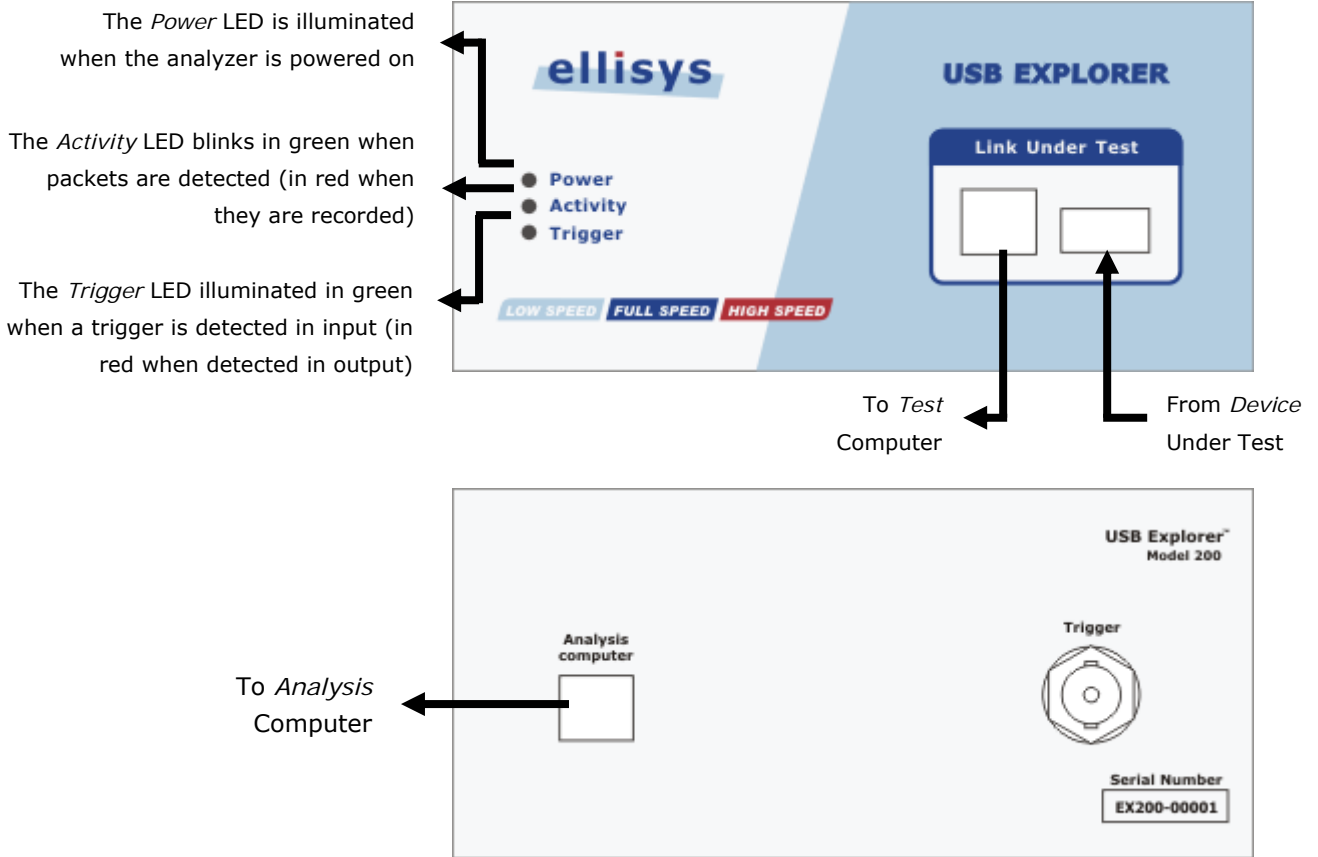
The USB Explorer 200 is a non-intrusive high speed USB 2.0 protocol analyzer allowing you to display the bus states and the packets sent, decode the descriptors, detect errors and incompatibilities in devices or drivers as well as quantify their performance. Very simple to use, it is the ideal companion for anyone developing USB devices, hosts, embedded software or drivers.

Common terms

The following terms are used throughout this manual:

- Analysis software** The analysis software enables users to record data sent by the analyzer and subsequently displays them in a simple, easy-to-follow format.
- Device Under Test** A USB device that is going to be analyzed with the analyzer is called a device under test in this document.
- Test computer** The device under test will be plugged into the test computer through analyzer's *Device Under Test* connectors. The drivers needed for the test device must be installed on the test computer. The test computer can also be an embedded computer, a PDA or even a custom piece of equipment acting like a USB host.
- Analysis computer** The data to be analyzed will be sent to the analysis computer through the analyzer's *Analysis* connector. Ellisys' driver and software must be properly installed on this computer.

Front and back panels of the analyzer



Connecting the analyzer to the analysis computer

The USB Explorer 200 is a high speed, full speed and low speed USB 2.0 protocol analyzer that sends data using a high speed USB 2.0 connection. The recommended configuration requires two computers, one for communicating with the device under test and the other for displaying the results of the analysis.

Although the USB Explorer 200 can download analyzed data on a full speed USB 1.1 connection, it is strongly recommended that you connect it using a high speed USB 2.0 port to obtain optimal performance. If you experience any trouble with your analyzer, please ensure it is connected on a high speed USB 2.0 enabled host controller before contacting our technical support.

Configuration with two computers: recommended configuration

The use of two computers is the recommended configuration (see Figure 1). The test computer is ascribed to the test device, and the analysis computer handles downloads and analyses data coming from the analyzer.

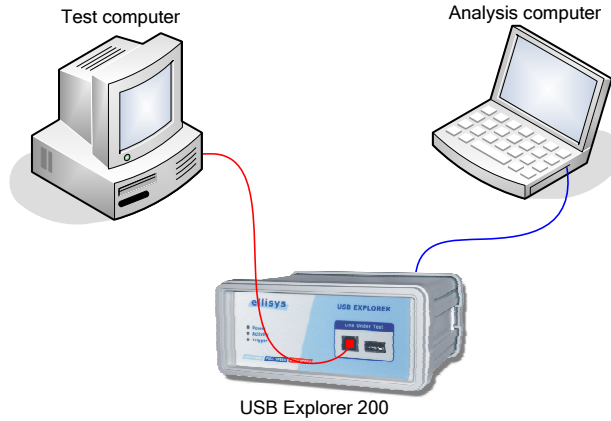


Figure 1 - Configuration with two computers

Configuration with only one computer

It is possible to use just one computer for both testing and analysis, but this option is not recommended (see Figure 2). This configuration can only be used when the available computer is very powerful and when the device under test requires little processing power. You must, however, ensure that **two or more host controllers** are available on the computer. If there is only one host controller on your computer, buy a CardBus or PCI extension card available on the market. Please refer to the chapter on *Troubleshooting* to determine if your computer has two host controllers. The following diagram shows how to use the analyzer with only one computer.

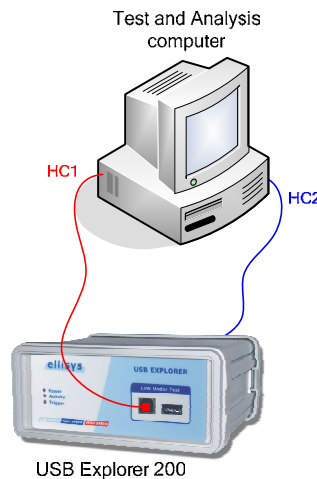


Figure 2 - Configuration with only one computer

Although this particular configuration can work for most peripherals under test, we actually highly recommend a configuration involving two computers.

Connecting a device for analysis

Connecting only one Device Under Test

The most straightforward configuration involves only one device to be analyzed. Figure 3 shows how to properly connect the device under test.

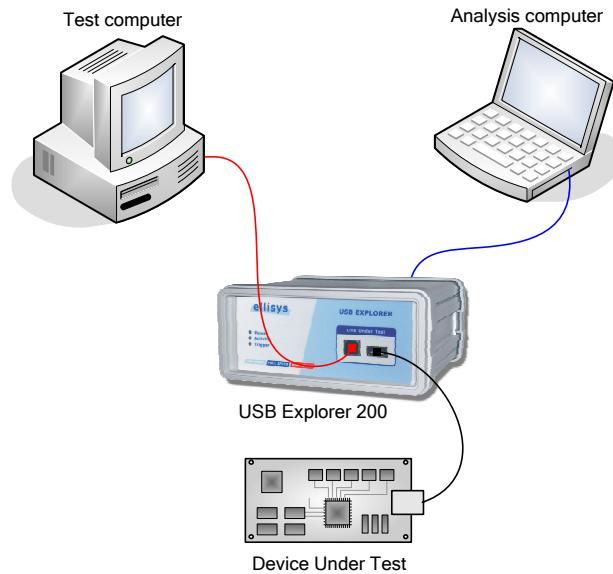


Figure 3 - Connecting only one Device Under Test

To prevent problems which could arise from your cables' length, please follow the following instructions:

- The blue cable must be no longer than 5 meters.
- The total length of the red and black cables must not exceed 3 meters. A greater length could result in an abnormally high error rate on the bus being analyzed.

Connecting more than one Device Under Test

USB analyzers are able to analyze traffic coming only from devices connected under them. If a device is connected above the analyzer, it will only register data packets coming from the host. The Figure 4 shows an incorrect connection: the USB mouse is connected 'above' the analyzer.

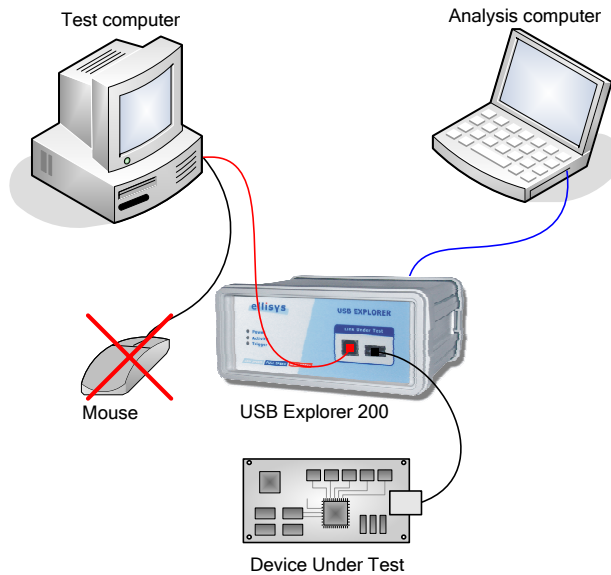


Figure 4 - Wrong connection with more than one DUT

When the analyzer is used to analyze multiple devices, this analysis must necessarily involve a USB hub. In this way, you can ensure that all the devices to be analyzed are, in fact, 'below' the analyzer. You should be aware, however, that the analyzer will record all hub and devices traffic. Though it could result in a large amount of data, this won't cause inconvenience because the software's functions can filter out extra traffic very easily. Figure 5 illustrates how to connect correctly several devices under test.

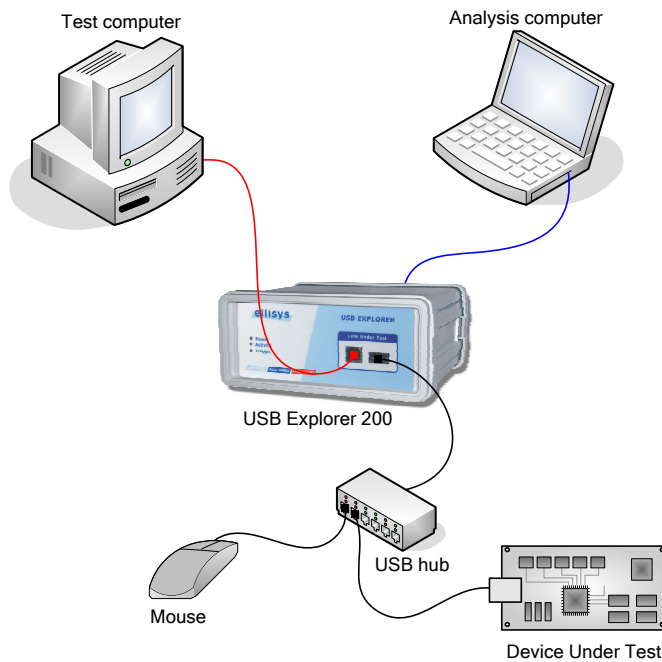


Figure 5 - Correct connection with more than one DUT using a Hub

Installing the software and the drivers

Please refer to the USB Analysis Software User's Manual for more information about the installation of the analysis software and the device driver.

First data acquisition

Before using the analyzer to make your first data acquisition, ensure that you have successfully completed every step needed to install the software and the drivers.

Follow these steps to proceed with your first data acquisition:

1. Connect the USB analyzer to the analysis computer as demonstrated in the section entitled *Connecting the analyzer to the analysis computer*. You must first have successfully installed the analysis software and drivers.
2. Run the analysis software and press keys 'Ctrl+R' (*Start Recording*). Refer to the chapter on *Troubleshooting* if the software indicates that no analyzer is connected.
3. Connect the USB device to be analyzed as discussed in the section entitled *Connecting a device for analysis*. For greater safety, first connect a simple commercial device that you can understand easily. The number of valid transactions should increase slowly. You can save data acquisition after it has been recording for a few seconds by clicking the 'Save' button.
4. Congratulations! You have just used the analyzer to record your first data acquisition. You can now read the USB Analysis Software User's Manual to fully benefit from all the available power in the analysis software.

Chapter 2: Frequently Asked Questions

General

Which recording speeds can be supported?

The USB Explorer 200 supports recording of low speed (1.5 Mbit/s), full speed (12 Mbit/s) and high speed (480 Mbit/s) links. It can record traffic from any USB 2.0 device. Owing to its powerful decoding engine, the USB Explorer 200 automatically detects the appropriate recording speed for an unequalled ease of use.

Which type of configuration do I need to apply to a USB Explorer?

The analyzer records the data to be analyzed in real time using a USB 2.0 connection. For this reason, two host controllers are necessary: the first to connect the peripheral to be tested and the other to record the data. You must therefore have either:

- Two computers, one for analysis and the other for testing
- One computer with two host controllers. This is the case when an USB 2.0 extension card is used.

To obtain the best performance, we highly recommend the use of two computers.

The analyzer records data using a USB 2.0 connection. Do I need a USB 2.0 host controller?

No. The analyzer works just as well with a High speed connection (480 Mbit/s) as with a Full speed one (12 Mbit/s). But you must be aware that a full speed connection may not be sufficient if the flow of data is too large.

What is the maximum quantity of data that I can record?

The analyzer uses the host-computer memory to store its information. The maximum quantity of data is therefore limited by the size of the central memory (RAM).

Hardware

Is it possible to upgrade the analyzer firmware?

Yes, the hardware of the analyzer is upgradeable. The electronic components are updated with each new software release. No user intervention is therefore required.

Which packets light up the Activity indicator?

DATA packets light up the Activity indicator for around ten milliseconds. In a busy bus case, this indicator blinks rapidly.

Chapter 3: Troubleshooting

Installation

How can I determine if I have two host controllers?

The analysis software will let you know (in the **About** dialogue box) how many host controllers are available on your computer. You can use the Toolbar to access this dialogue box.

I have got one host controller and I'd like to add a second one. How can I achieve this?

Installing a USB extension card is the easiest way to add a host controller to your computer. Furthermore, nowadays most of these extension cards are USB 2.0-compatible, which will enable you to wholly gain from all your analyzer's power. Talk to your local dealer about getting a USB 2.0 host controller card.

I would like to connect the USB analyzer on a EHCI host controller but it seems that it doesn't work. What can I do?

We took note that several EHCI drivers supplied by manufacturers of USB 2.0 add-in cards could cause problem. We strongly recommend the use of the Microsoft EHCI driver. You can find more information on the installation of this driver at:

<http://www.usbman.com/USB%202%20News.htm>

Why can't I run the analysis software installation file?

The analysis software installation file requires Microsoft Windows Installer 2.0 or higher. Updated files are available from the download site:

<http://www.usbexplorer.com/download.php>

Chapter 4: Technical data

Highlights

- Compatible with all three USB 2.0 speeds
- Automatic discovery of the Link Under Test speed
- Measurement of USB bus states and low level protocols
- Affordable price allowing to supply each developer with one unit
- Non intrusive analysis
- Small and robust enclosure, powered by the USB bus
- Perfect for off-site interventions
- Download of the analyzed data in real time with a high speed USB 2.0 connection
- Scalable design of the hardware
- Display of transactions and transfers layers
- High level decoding of requests and descriptors
- Powerful display filters
- Exportation of analyzed data to several formats (XML, text, raw, etc.)
- Didactic display with reference to the specification
- Software development kit available
- Free viewer software

Applications

- Enumeration issues validation
- USB device and host development
- Performance analysis
- USB drivers and software stacks debugging
- Quick learning of USB protocol
- Test-bench automation

Requirements

- Pentium III 600MHz
- 128 MB RAM
- USB 2.0 EHCI host controller
- Resolution 800x600 256 colors
- Windows® 2000 Service Pack 4, Windows® XP Service Pack 1 or above
- Internet Explorer 5.0 or above

Specifications

Enclosure

- Width: 150 mm (5.91 inches)
- Length: 120 mm (4.72 inches)
- Height: 65 mm (2.56 inches)
- Weight: 750 g (1.7 pounds)

Analysis Computer connector

- USB 2.0 high speed (480 Mbit/s)

Link Under Test connectors

- USB 2.0 high speed (480 Mbit/s), full speed (12 Mbit/s) et low speed (1.5 Mbit/s)
- Automatic speed discovery of Device Under Test

Trigger connector

- Type: BNC
- Input: 5 V max, 1 Mohms
- Output: 3.3 V, max 20 mA
- Absolute maximum ratings: -0.5 V .. +6.5 V, 50 mA

Indicators

- Power: lights up when the analyzer in powered on
- Activity: lights up in green when packets are detected (in red when they are recorded)
- Trigger: lights up in green when a trigger is detected in input (in red when detected in output)

Memory

- 32 MBytes of FIFO memory
- Analyzed data is transmitted continuously

Bus analysis

- Timestamp: 16.67 ns (60 MHz) precision
- Low-level errors: detection of bit-stuffing, CRC5 and CRC16 errors
- Bus states: detection and measurement of Reset, Suspend, Keep Alive and High Speed Handshake states

Power Requirements

- Powered by the USB bus of the Analysis computer
- No external power supply needed

Hardware update

- The decoding engine and the firmware can be updated by software

Product Warranty

- Two years limited warranty

Ellisys reserves itself all rights to change product features and specifications without notice.

Chapter 5: Limited Warranty Terms and Conditions

Coverage

Ellisys warrants to the original customer of its products that its products are free from defects in material and workmanship for the warranty period. Subject to the conditions and limitations set forth below, Ellisys will, at its option, either repair or replace any part of its products that prove defective by reason of improper workmanship or materials. Repaired parts or replacement products will be provided by Ellisys on an exchange basis, and will be either new or refurbished to be functionally equivalent to new. If Ellisys is unable to repair or replace the product, it will refund the current value of the product at the time the warranty claim is made. In no event shall Ellisys' liability exceed the original purchase price of product.

Excluded Products and Problems

This limited warranty does not cover any damage to this product that results from improper installation, accident, abuse, misuse, natural disaster, insufficient or excessive electrical supply, abnormal mechanical or environmental conditions, or any unauthorized disassembly, repair, or modification. This limited warranty also does not apply to any product on which the original identification information has been altered, obliterated or removed, has not been handled or packaged correctly, or has been sold as second-hand. This limited warranty only applies to the original customer of the product for so long as the original customer owns the product. This limited warranty is non-transferable.

This limited warranty covers only repair, replacement or refund for defective Ellisys products, as provided above. Ellisys is not liable for, and does not cover under warranty, any loss of data or any costs associated with determining the source of system problems or removing, servicing or installing Ellisys products.

Obtaining Warranty Service

To obtain warranty service, you may return a defective product to the authorized Ellisys dealer or distributor from which you purchased the Ellisys product. Please confirm the terms of your dealer's or distributor's return policies prior to returning the product. Typically, you must include product identification information, including model number and serial number with a detailed description of the problem you are experiencing. You must also include proof of the date of original retail purchase as evidence that the product is within the applicable warranty period.

The returned product will become the property of Ellisys. Repaired or replacement product will be shipped at Ellisys' expense. Repaired or replacement product will continue to be covered by this limited warranty for the remainder of the original warranty or 90 days, whichever is longer.

Limitations

THE FOREGOING IS THE COMPLETE WARRANTY FOR ELLISYS PRODUCTS AND SUPERSEDES ALL OTHER WARRANTIES AND REPRESENTATIONS, WHETHER ORAL OR WRITTEN. EXCEPT AS EXPRESSLY SET FORTH ABOVE, NO OTHER WARRANTIES ARE MADE WITH RESPECT TO ELLISYS PRODUCTS AND ELLISYS EXPRESSLY DISCLAIMS ALL WARRANTIES NOT STATED HEREIN, INCLUDING, TO THE EXTENT PERMITTED BY APPLICABLE LAW, ANY WARRANTY THAT MAY EXIST UNDER NATIONAL, STATE, PROVINCIAL OR LOCAL LAW INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, ARE LIMITED TO THE PERIODS OF TIME SET FORTH ABOVE. SOME STATES OR OTHER JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES OR LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

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Severability

If any provision or any portion of any provision contained in these terms is held to be invalid, illegal or unenforceable by a court of competent jurisdiction, then the remaining provisions, and if a portion of any provision is unenforceable, then the remaining portion of such provision shall, nevertheless, remain in full force and effect. The parties undertake to negotiate in good faith with a view to replace such invalid, illegal or unenforceable provision or part thereof with another provision not so invalid, illegal or unenforceable with the same or similar effect, and further agree to be bound by the mutually agreed substitute provision.

Warranty Period

The warranty begins on the date of purchase and covers a period of two (2) years.

Governing Law

These conditions and terms shall be governed by and construed in accordance with the law of Switzerland.

Jurisdiction; Venue

The parties consent to the exclusive personal jurisdiction of, and venue in, the District Court of Geneva, Switzerland.