

LeCroy AdvisorTM

USB 2.0 Bus and Protocol Analyzer

User Manual

Manual Version 2.15



For Software Version 2.15

15 November, 2005

Document Disclaimer

The information in this document has been carefully checked and is believed to be reliable. However, no responsibility can be assumed for inaccuracies that may not have been detected. LeCroy reserves the right to revise the information in this document without notice or penalty.

Changes or Modifications

Any change or modification not expressly approved by LeCroy voids the user's authority to operate this equipment.

Trademarks and Servicemarks

LeCroy, Advisor, USBTracer, USBTrainer, USBMobile, USBMobileHS, and BusEngine are trademarks of LeCroy.

Microsoft, Windows 98SE, Windows Me, Windows 2000, Windows XP, and Windows NT are registered trademarks of Microsoft Inc.

All other trademarks are property of their respective companies.

Copyright

Copyright © 2004, LeCroy; All Rights Reserved. This document may be printed and reproduced without additional permission, but all copies should contain this copyright notice.

FCC Conformance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of LeCroy could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

EU Conformance Statement

This equipment complies with the EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC, and their associated amendments for Class A Information Technology Equipment. It has been tested and found to comply with EN55022:1998 Class A (EN61000-3-2:1998, EN61000-3-3:1995) and EN55024:1998 (EN61000-4-2:1998, EN61000-4-3:1996, EN61000-4-4:1996, EN61000-4-5:1996, EN61000-4-6:1997, EN61000-4-11:1998), and EN60950:1999. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Part number: 730-0015-00

TABLE OF CONTENTS

Chapter 1 Overview.....	1
Advisor System Components	1
General Description	1
Features.....	2
Graphical Bus Traffic Display	4
Accurate Time Management.....	5
Comprehensive Error Detection and Analysis	6
Real-Time Event Triggering and Capture Filtering	6
Advanced Event Counting & Sequencing	7
BusEngine Technology.....	7
Specifications	8
Chapter 2 Quick Installation	11
Your First USB Recording	12
Capturing Your First CATC Trace	14
Trace View Features	14
Chapter 3 Detailed Installation	17
System Components/Packing List	17
Stand-Alone Unit	17
Advisor System Setup.....	18
AC Power Source	20
External Interface Breakout Board.....	21
Pin-Outs for the Data In/Out Connector.....	21
Prototype Rework Area	22
PC Connection	22
USB Test Ports	23
Analyzer PC Requirements.....	23
Advisor Program Installation	24
Loading the Advisor USB Drivers	24
Installing the Advisor Application Program	24
Advisor Program Startup	25
Making a Recording	26
Chapter 4 Updates.....	27
Software, Firmware, and BusEngine Revisions	27
Software Updates	28
BusEngine and Firmware Updates	28
Updating the Firmware.....	28
Automatic Updates	29
Manual Updates to BusEngine and Firmware	30
Manually Upgrading the Firmware.....	32

Resetting the Analyzer	32
Chapter 5 Software Overview	33
Starting the Advisor Program	33
Tool Tips	33
The Main Display Windows	34
View Options	36
Resetting the Toolbar	37
Toolbar	38
Status Bar	39
Recording Progress	39
Recording Status	40
Recording Activity	41
Search Status	42
Navigation Tools	42
Zoom In	42
Zoom Out	42
Wrap	42
Advisor Analyzer Keyboard Shortcuts	42
Chapter 6 Recording Options	45
General Recording Options	46
Recording Type	46
Options	46
Buffer Size	47
Trigger Position	47
Options Name	48
Trace File Name & Path	49
Events Recording Options	49
Packet Identifiers	50
Token Patterns	51
Frame Patterns	51
Device Requests	52
Data Pattern	52
Bus Conditions	53
Errors	54
External Input Signals	55
Transactions	57
Data Length	58
Splits	58
Actions Recording Options	59
Actions Window Layout	59
Connecting Events to Actions	60
Connecting Counters to Events	61

Using Action Buttons	63
Trigger.	63
Restart.	63
Filter Out/In	63
Other Actions: External Output Signals	64
Saving Recording Options	65
Recording Bus Data	66
Merging Trace Files	67
Chapter 7 Display Options	71
General Display Options.	72
Saving Display Options for Future Use	73
Color/Format/Hiding Display Options	74
Color Display Options	75
Formats Display Options	76
Hiding Display Options	77
Level Hiding Display Options	78
Saving Display Options	78
Chapter 8 Reading a Trace	81
Trace View Features	81
Set Marker.	82
Edit or Clear Marker.	83
View Raw Bits	84
Using the Packet Buttons	85
Using the Stuff Bit Buttons.	85
Using the Zoom Buttons.	85
Expanding and Collapsing Data Fields.	85
Using the Expand/Collapse Data Field Arrows	85
Double-Clicking to Expand/Collapse Data Fields	85
Expanding or Collapsing All Data Fields.	86
Using the Data Field Pop-up Menus.	86
View Data Block.	87
Pop-up Tool-tips	88
Hide SOF Packets.	88
Hide NAKs	88
Hide Devices.	88
Hide Chirps.	88
Switch to Transactions View.	88
View Decoded Transactions	90
Expanded and Collapsed Transactions	91
Switch to Split Transaction View	92
Switch to Transfer View	93
View Decoded Transfers.	95

Expanded and Collapsed Transfers	95
Decoding Protocol-Specific Fields in Transactions/Transfers	96
Using the Trace Navigator	97
Chapter 9 Decode Requests	101
General Options	101
USB Request.	101
Decoding Standard Requests	102
Decoding Class Requests	103
Decoding Vendor Requests.	103
Decoding USB Requests.	104
Class and Vendor Definition Files	104
Class/Vendor Decoding Options.	106
Request Recipient to Class/Vendor Decoding	106
Class/Vendor Endpoint Decoding.	108
Chapter 10 Other Features.	113
Search	113
Go to Trigger.	113
Go to Packet/Transaction/Transfer....	113
Go to Marker.	114
Go To	114
Find.	118
Find Next	120
Search Direction	120
Edit Comment.	120
Reports	121
File Information	121
Error Summary	122
Timing Calculations	122
Traffic Summary.	123
Bus Utilization	124

1. Overview

The LeCroy Advisor USB2.0 Bus & Protocol Analyzer is another in LeCroy's broad portfolio of analysis tools. As a fourth generation product, it builds upon LeCroy's experience and knowledge of the needs of the USB development and test communities. The Advisor interfaces with standard USB cables and connections to capture and display Hi-Speed and Classic-Speeds USB2.0 bus traffic.



1.1 Advisor System Components

The LeCroy Advisor Analyzer package includes the following items:

- One stand-alone LeCroy Advisor analyzer
- AC power cord with a plug appropriate to your location
- Five USB cables - four short (3 foot/1 M) cables and one long (6 foot/2 M) cable
- One breakout board with nine-pin cable
- LeCroy Advisor software program installation CD
- Product Documentation, including online help

1.2 General Description

The Advisor USB2.0 Protocol Analyzer is a stand-alone unit that is designed to be controlled and configured by a portable or desktop PC connected via its USB port.

The Advisor uses hardware triggering to capture real-time events and hardware filtering to preserve memory and assist in pinpointing data of interest. Recorded data is then uploaded to the attached PC and displayed on the "CATC Trace" graphical user interface as color-coded packets that can be searched for specific data, errors or other desired conditions.

The Advisor USB2.0 Bus & Protocol Analyzer is the ideal USB tool used in conjunction with any Microsoft Windows-based desktop or portable PC in a USB development lab environment.

The Advisor Analyzer supports the Universal Serial Bus, version 2.0.

Please refer to the *Universal Serial Bus Specification, version 2.0* for details on the protocol. The USB specification is available from the USB Implementers Forum (USB-IF) at

USB Implementers	Tel: +1/503.296.9892
Forum	Fax: +1/503.297.1090
1730 SW Skyline Blvd.	Web: http://www.usb.org/
Suite 203	
Portland, OR 97221	

1.3 Features

General

- Fully compliant with USB 2.0 specification
- Flexible design - reconfigurable hardware for future enhancements
- Supports all USB speeds (High-Speed, Full-Speed, and Low-Speed)
- User friendly "CATC Trace" Interface that displays bus traffic using color and graphics
- Trace Viewer available as free non-recording, view-only software
- Power-on self-diagnostics
- Three year warranty and hot-line customer support

Physical Components

- High impedance tap inserts non-intrusively in any branch of a USB system
- 128MB of physical data recording memory
- Two recording channels - one for High-Speed traffic and one for Classic-Speeds traffic (either Low- or Full-Speed)

- Secondary recording channel aids in the development of multiple speed functions up-stream and down-stream of a speed-matching hub or transaction translator
- Convenient "Detach Device" switch operates with the Classic recording channel to save time and reduce USB cable/connector wear for multiple connects and disconnects to host
- Full-speed USB connection to desktop or portable host PC
- Internal wide-range AC power supply
- Break-out board (included)

Recording Options

- Triggering of new USB2.0 PIDS and split transaction special tokens (i.e. ERR, SPLIT, PING, NYET, DATA2, MDATA)
- CATC Trace will display and enumerate new USB2.0 Micro Frames
- Three forms of triggering: Snapshot, Manual and Event
- Automatically detects and captures high-, full-, and low-speed traffic
- Adjustable buffer size from 0.1MB to 128MB
- Versatile triggering-bit-wise value and mask data patterns up to sixteen bytes wide for Setup transactions and data packets
- Triggering on multiple error conditions - PID bad, bit stuffing bad, CRC bad, end-of-packet bad, babble, loss of activity, frame length violation, time-out or turn-around violation, data toggle violation
- A new transaction sequencer allows triggering or filtering on a token qualified by a data pattern and/or specific handshake, or alternately transactions can be filtered
- Advanced triggering with event counting and sequencing
- Dedicated trigger for recording input and output that is used to interface to external test equipment
- Real-time traffic capture filtering and data packet truncation variable up to 245 bytes

Display Options

- Utilizes USB industry *de facto* standard "CATC Trace" graphical display of bus packets, transactions, split transactions and transfers
- Trace Viewer is backward compatible with Chief, Inspector and Detective™ trace files
- User-friendly trigger position indicated by different colors of pre- and post-trigger packet color

- Markers can be set to assist with navigation and time calculations. Each marker can contain unique comments.
- Hide start-of-frame (SOF) packets as well as hide any packet or transaction
- Search for a specific PID
- Change bit order for all fields except "Data Length," "Time," and "Packet #": , either Msb > Lsb or Lsb >Msb
- Detects & alerts the user to every potential bus error, protocol violation, & combinations thereof
- High resolution, accurate time stamping of bus packets, timing measurement & analysis functions
- Extensive search and packet hiding capabilities
- Comprehensive device class decoding plus user defined protocol decoding

Note Refer to Readme.txt on your installation CD for the latest information on features.

1.4 Graphical Bus Traffic Display

The Advisor USB2.0 Analyzer transaction displays use color and graphics to present the captured transactions in an immediate, understandable and useful format.

Packets are shown on separate rows, with their individual fields both labeled and color-coded. Packets are also numbered (sequentially, as recorded), time-stamped. Protocol errors are automatically detected and visibly highlighted in red so they will not be overlooked.

The display is customizable, allowing the user to control the color scheme and the formatting of field contents. A hide feature allows users to enable the suppression of SOF packets and user defined packets or fields that may be uninteresting in a given context. Display formats can be named and saved for later use. Pop-up "tool-tips" annotate packet fields with even more detailed information about their contents.

The display software operates independently of the hardware, allowing it to function as a stand-alone "trace viewer" that is freely distributed.

Packet	Dir	F	Sync	SOF	Frame #	CRC5	EOP	Idle	Time Stamp
0	-->	S	00000001	0xA5	1940	0x05	233.330 ns	997.133 µs	00003.2708 6671
1	-->	S	00000001	0xA5	1941	0x1A	233.330 ns	996.883 µs	00003.2716 6673
2	-->	S	00000001	0xA5	1942	0x18	233.330 ns	996.950 µs	00003.2724 6665
3	-->	S	00000001	0xA5	1943	0x07	233.330 ns	996.967 µs	00003.2732 6661
4	-->	S	00000001	0xA5	1944	0x17	233.330 ns	997.117 µs	00003.2740 6653
5	-->	S	00000001	0xA5	1945	0x08	233.330 ns	996.967 µs	00003.2748 6654
6	-->	S	00000001	0xA5	1946	0x0A	250.000 ns	997.017 µs	00003.2756 6646
7	-->	S	00000001	0xA5	1947	0x15	233.330 ns	997.050 µs	00003.2764 6642
8	-->	S	00000001	0xA5	1948	0x0B	250.000 ns	997.017 µs	00003.2772 6639

1.5 Accurate Time Management

The Advisor USB2.0 Analyzer uses internal counter/timer circuitry to enable a reliable, accurate (16.67 ns resolution) time stamping of recorded bus traffic. This timing information is available both as a component of the graphical data display and as a contribution to a variety of measurement and analysis functions. Any number of markers can be added by the user to denote specific packets, and further timing measurements can be made from one marker to another or from marker to trigger. All time fields are presented as a time stamp, idle time, bit time or in a new time delta in either decimal or hexadecimal format.

An essential feature of time management is that idle traffic will not consume the analyzer memory. Because of this unique technology, accurate timing calculations can be made while still preserving valuable recording memory for important bus traffic.

1.6 Comprehensive Error Detection and Analysis

The Advisor USB2.0 Analyzer detects and alerts the user to every potential bus error, protocol violation and/or combination thereof. The analyzer contains circuitry in the BusEngine to perform real-time triggering on multiple error conditions, such as PID bad, bit stuffing bad, header or data CRC bad, end-of-packet bad, babble, loss of activity, frame length violation, time-out or turn-around violation and data toggle violation. The analyzer program highlights all the hardware detected errors and further examines the trace file for additional protocol errors, including wrong packet length, data payload violation, and packet termination not on a byte boundary.

1.7 Real-Time Event Triggering and Capture Filtering

No attribute of a bus and protocol analyzer is more important than its capacity for extracting useful information from a crowded stream of bus traffic. The ability to accurately identify, and selectively record, transactions of interest is the trait most valuable to the user. The Advisor USB2.0 Analyzer offers a unique approach to this challenge. By using a set of "recording resources", over a dozen configurable hardware building blocks, each can be optimized to perform a particular activity appropriate to the task. A recording resource can independently await an initialization signal, monitor its external environment (external signals, other resources) in search of a particular event and take a subsequent action (triggering, inclusive or exclusive filtering, counting, etc.). Under control of the user interface, these resources can be selected, configured and combined to both search for complex trigger conditions and selectively capture the associated transactions.

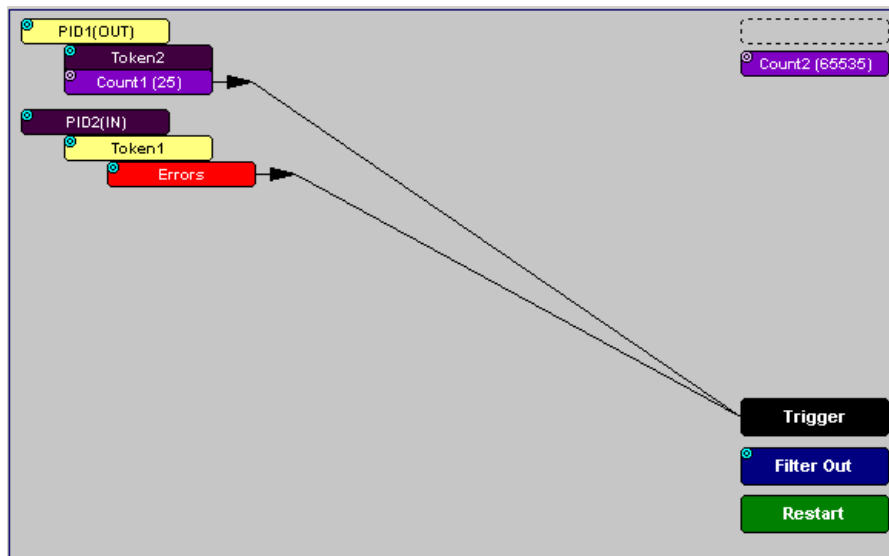
Thus, as well as triggering on basic events, such as specific bus conditions, packet identifiers (PID), etc. (see the Specifications section for a complete list), the Advisor USB2.0 Analyzer can easily manage the most challenging requirements. For example: "trigger on the fifth occurrence of a SETUP Token device number nine", or "trigger on a SET INTERFACE request, following a specified eight-byte bulk data pattern match from this scanner, and do not capture any start-of-frame (SOF) packets."

The user can also configure the size of the recording memory, specify the pre/post-trigger capture ratio, and truncate the capture of large data packets up to the first 256 bytes.

1.8 Advanced Event Counting & Sequencing

The count and sequence options define the rules for data recording sessions. These options provide the ability to configure and control the order of events that have been selected to trigger the USB2.0 Advisor Analyzer or filter the recording. There are two counters and a restart option that causes the sequencing to start again.

By utilizing this feature a designer can specify a specific sequence of events that must occur before the analyzer triggers and finishes capturing data. This is extremely important in allowing a designer to pinpoint certain types of events for recording. Without this feature a designers must scroll through potentially megabytes of recorded data to locate a specific sequence or occurrence of a sequence that can take hours to locate before being able to begin analyzing the data of interest.



1.9 BusEngine Technology

LeCroy's BusEngine Technology is at the heart of the new Advisor USB2.0 Analyzer. The revolutionary BusEngine core uses state-of-the-art Electrically Programmable Logic Device (EPLD) technology and incorporates both the real-time recording engine and the configurable building blocks that implement data/state/error detection, triggering, capture filtering, external signal monitoring and event counting &

sequencing. And like the flash-memory-based firmware that controls its operation, all BusEngine logic is fully field upgradeable, using configuration files.

1.10 Specifications

Package

Dimensions:	9.2 x 8.4 x 2.5 inches (23.4 x 21.3 x 6.4 cm)
Connectors:	AC power connection Trigger IN/OUT input (BNC) Host connection (USB, type "B") Data connector (Data In/Out, 9-pin DB)
Weight:	2.8 lbs. (1.2 kg)

Power Requirements

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

Environmental Conditions

Operating Range:	0 to 55°C (32 to 131°F)
Storage Range:	-20 to 80°C (-4 to 176°F)
Humidity:	10 to 90%, non-condensing

Switches

Power:	on/off
Manual Trigger:	when pressed forces trigger event
Detach Device:	when pressed detaches the device from the classic speed connection

LEDs

Power (PWR):	illuminated when the analyzer is powered on
Recording (REC):	illuminated when the analyzer is actively recording traffic data
Triggered (TRG):	illuminated during power-on testing, and when the analyzer has detected a valid trigger condition
Uploading (UPLD):	illuminated when the analyzer is uploading its recording memory to the host PC for displaying purposes

Recording Memory Size

128 Megabyte DRAM for traffic data capture, timing, state and other data

Host Compatibility

Works with any PC equipped with a functioning USB port and running Microsoft Windows 98SE, Windows Me, Windows 2000, and XP operating systems.

2. Quick Installation

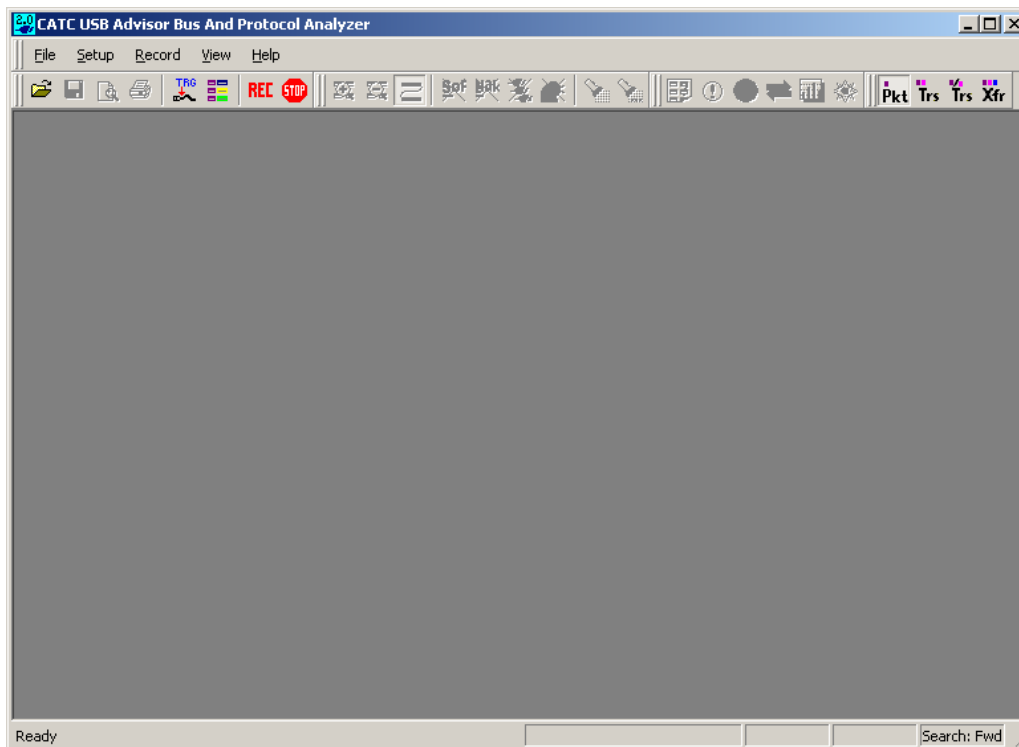
The USB2.0 Advisor Bus & Protocol Analyzer components and software are easily installed and quickly ready to run on most personal computer systems. You can begin making USB recordings after following these initial steps. However, if you are new to personal computers and protocol Analyzers, if you are unsure about what to do after reading the Quick Installation instructions, or if your Analyzer does not work after you follow these instructions, read through the subsequent sections in this manual.

- Step 1** Connect the AC power cable to the rear of the Analyzer.
- Step 2** Connect the USB port on the back of the Analyzer to the PC for analysis by using the LONG (6-foot/2-meter) USB cable.
- Step 3** Insert the CD-ROM.
- Step 4** Turn on the Power switch located on the rear of the Analyzer.
- Step 5** Click **NEXT** when you see the Add **New Hardware Wizard** window.
- Step 6** Follow the on-screen Plug and Play instructions under Windows.
- Step 7** Click **Finish** when you see the message that says "Windows has finished installing the software that your new hardware requires" and the file "Advisor.inf" has been installed on your host PC.
- Step 8** Click **Install Software** and follow the on-screen instructions.
- Step 9** Launch the LeCroy Advisor program from the LeCroy programs group.
- Step 10** From the **Help** menu, select **About Advisor ...**

If the information below is present, you can record a trace:

- Advisor Software Version
- Advisor Firmware Version
- BusEngine Version
- Unit Serial Number

The following window opens:

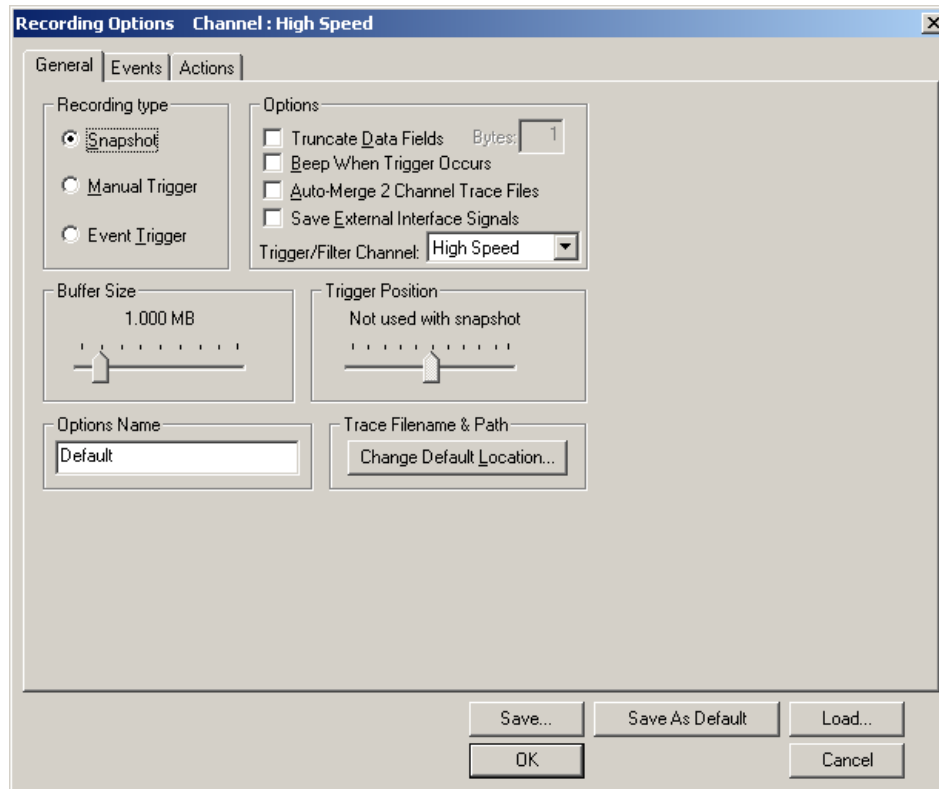


2.1 Your First USB Recording

After installing and launching the software, you can test Advisor by performing the following steps.

- Step 1** Connect a USB cable to each of the two connectors on the Advisor module, then connect the other ends to the USB device under test and USB host system.
- Step 2** Select **Recording Options** under **Setup** on the Menu Bar.
- Step 3** Select the **General** tab.

The following dialog box will open showing factory default settings such as “Snapshot” and 1 Mbyte buffer size. For your first recording, you can leave these settings unchanged.




Step 4 Click OK to activate the recording options you selected.

Step 5 Turn on the USB devices that are to be tested and cause them to generate USB traffic.

Step 6 Click  on the Tool Bar.


Advisor starts to record the USB traffic immediately. After 1 Mbyte of traffic is recorded, the analyzer will upload the data and display the packets in the trace window.

Step 7 If you wish to terminate the recording before the snapshot automatically completes, click  on the Tool Bar.

When the recording session is finished, the traffic is uploaded from the Analyzer to the hard drive on your PC as a file named **data.usb** or whatever name you assigned as the default filename. While the file is being uploaded, you should see a brown progress bar at the bottom of the screen. When the bar disappears, it indicates that the data has been uploaded to disk.

Step 8 To save a current recording for future reference, select **Save As** under **File** on the Menu Bar.

OR

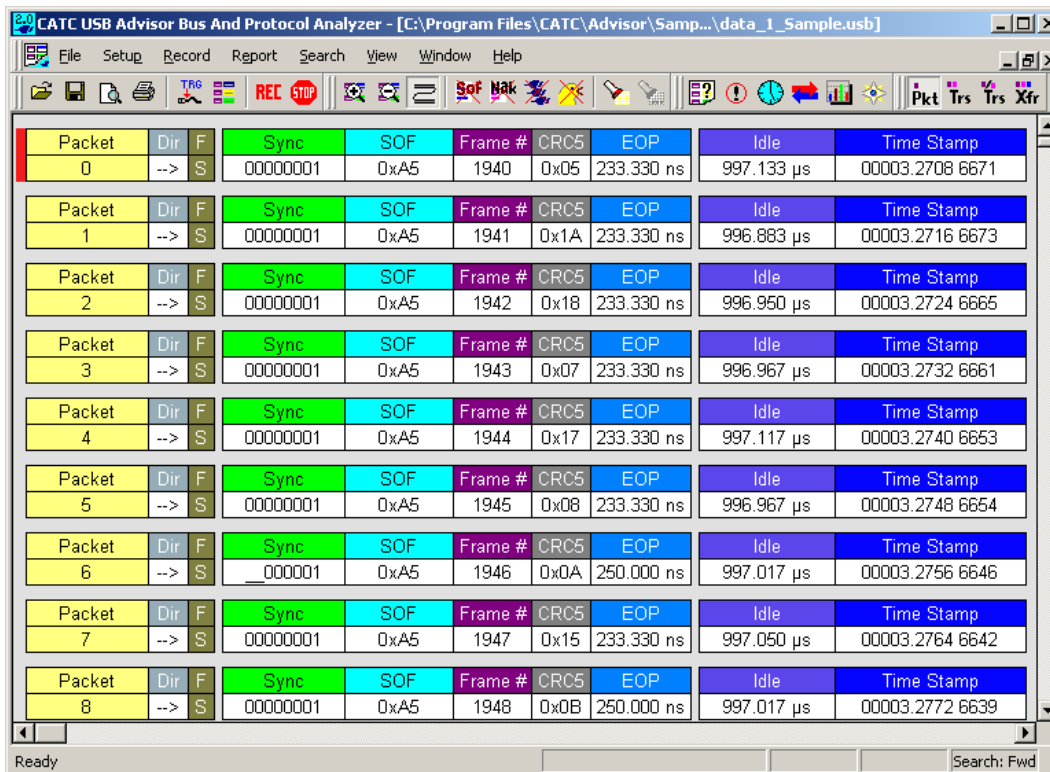
Click  on the Toolbar.

You see the standard **Save As** screen.

Step 9 Give the recording a unique name and save it to the appropriate directory.

Capturing Your First CATC Trace

After a moment, the recording will terminate and the results will display.



The screenshot shows the CATC USB Advisor Bus And Protocol Analyzer window. The title bar indicates the file path: [C:\Program Files\CATC\Advisor\Samp...\data_1_Sample.usb]. The menu bar includes File, Setup, Record, Report, Search, View, Window, and Help. The toolbar contains various icons for file operations, recording control (REC, STOP), and analysis tools. Below the toolbar is a table displaying captured packets. The table has columns for Packet, Dir, F, Sync, SOF, Frame #, CRC5, EOP, Idle, and Time Stamp. The data shows 9 packets (0-8) with various frame numbers and CRC5 values. The status bar at the bottom shows 'Ready' and a search function set to 'Fwd'.

Packet	Dir	F	Sync	SOF	Frame #	CRC5	EOP	Idle	Time Stamp
0	-->	S	00000001	0xA5	1940	0x05	233.330 ns	997.133 μs	00003.2708 6671
1	-->	S	00000001	0xA5	1941	0x1A	233.330 ns	996.883 μs	00003.2716 6673
2	-->	S	00000001	0xA5	1942	0x18	233.330 ns	996.950 μs	00003.2724 6665
3	-->	S	00000001	0xA5	1943	0x07	233.330 ns	996.967 μs	00003.2732 6661
4	-->	S	00000001	0xA5	1944	0x17	233.330 ns	997.117 μs	00003.2740 6653
5	-->	S	00000001	0xA5	1945	0x08	233.330 ns	996.967 μs	00003.2748 6654
6	-->	S	00000001	0xA5	1946	0x0A	250.000 ns	997.017 μs	00003.2756 6646
7	-->	S	00000001	0xA5	1947	0x15	233.330 ns	997.050 μs	00003.2764 6642
8	-->	S	00000001	0xA5	1948	0x0B	250.000 ns	997.017 μs	00003.2772 6639

Trace View Features

- The Advisor packet view display makes extensive use of color and graphics to fully document the captured traffic.
- Packets are shown on separate rows, with their individual fields both labeled and color coded.

- Packets are numbered (sequentially, as recorded), time-stamped (with a resolution of 16.67 ns), and highlighted to show the transmitted speed (low-speed, full-speed or high-speed).
- Display formats can be named and saved for later use.
- Pop-up Tool Tips annotate packet fields with detailed information about their contents
- Data fields can be collapsed to occupy minimal space in the display (which can in turn be zoomed in and out to optimize screen utilization).

The display software can operate independent of the hardware and so can function as a stand-alone Trace Viewer that may be freely distributed.

Each row numerates, labels, and color-codes a USB packet

Before Trigger

Packet	Dir	F	Sync	SOF	Frame #	CRC5	EOP	Idle	Time Stamp	
2734	-->	S	00000001	0xA5	721	0x0D	250 ns	996.883 µs	00010.2143 3631	
2735	-->	S	00000001	0xA5	722	0x0F	233 ns	996.900 µs	00010.2151 3619	
2736	-->	S	00000001	0xA5	723	0x10	233 ns	350 ns	00010.2159 3607	
2737	-->	S	00000001	0xB4	0	0	0x08	233 ns	183 ns	00010.2159 3802
2738	-->	S	00000001	0xC3	8 bytes	0xBB29	233 ns	483 ns	00010.2159 3987	
2739	<--	S	00000001	0x4B	233 ns			983.200 µs	00010.2159 4510	
2743	-->	S	00000001	0xA5	724	0x0E	250 ns	333 ns	00010.2167 3596	
2744	-->	S	00000001	0xA5	725	0x0F	233 ns	350 ns	00010.2167 3584	

After Trigger

Packet	Dir	F	Sync	SOF	Frame #	CRC5	EOP	Idle	Time Stamp	
2737	-->	S	00000001	0xB4	0	0	0x08	233 ns	183 ns	00010.2159 3802
2738	-->	S	00000001	0xC3	8 bytes	0xBB29	233 ns	483 ns	00010.2159 3987	
2739	<--	S	00000001	0x4B	233 ns			983.200 µs	00010.2159 4510	
2743	-->	S	00000001	0xA5	724	0x0E	250 ns	333 ns	00010.2167 3596	
2744	-->	S	00000001	0xA5	725	0x0F	233 ns	350 ns	00010.2167 3584	

Time-stamp appended to each packet

Filtered Traffic is displayed as a gray line

Specifies speed packet transmitted

Indicates a marked comment is set

3. Detailed Installation

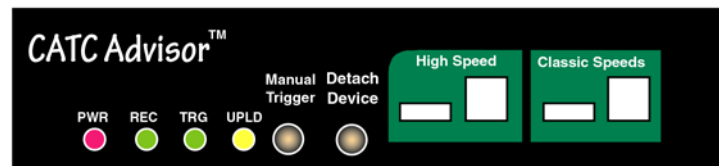
3.1 System Components/Packing List

- One stand-alone Advisor Analyzer module
- One AC power cord
- One External Interface Breakout Board with a 9-pin cable
- Five USB cables: four 3-foot (1-meter) cables and one 6-foot (2-meter) cable
- Advisor software program installation CD
- Product documentation, including online help

3.2 Stand-Alone Unit

The Advisor Analyzer has several user-accessible controls on its front and rear panels.

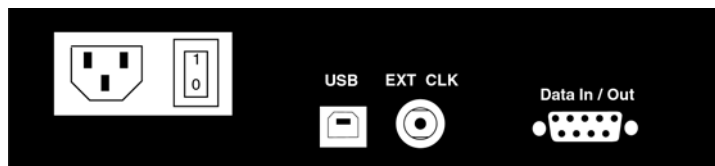
Figure 1: Front Panel



- Red PWR (power) indicator LED (illuminates when the unit power is switched on)
- Green REC (recording) LED (illuminates when the unit is recording)
- Yellow TRG (triggered) LED (illuminates when the unit triggers an event. Also lights during power-on testing and blinks when the hardware is faulty)
- Green UPLD (upload) LED (illuminates when unit is uploading data to host PC)
- **Manual Trigger** push-button (allows a manual Trace capture)
 - After beginning a recording session, press the **Manual Trigger** switch to force a Trigger condition. The session completes when a specified post-Trigger amount of bus data is recorded or when you manually stop a recording session.
- **Detach Device** push-button (allows a momentary disconnection of the device from the host on the Classic Speeds port).

- This is especially useful when the traffic of interest occurs during device enumeration. Use the **Detach Device** switch shortly after starting recording to capture a Trace of the device's enumeration.
- Two USB ports, **High Speed** and **Classic Speeds**, each with a type "A" and a type "B" connector.
 - **High Speed** is used to record 480 Mb/s High-Speed traffic only
 - **Classic Speeds** is used to record either 12 Mb/s or 1.5 Mb/s Classic-Speed traffic

Figure 2: Universal Protocol Analyzer Rear Panel



- Wide range AC connector module
 - Power socket
 - 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.

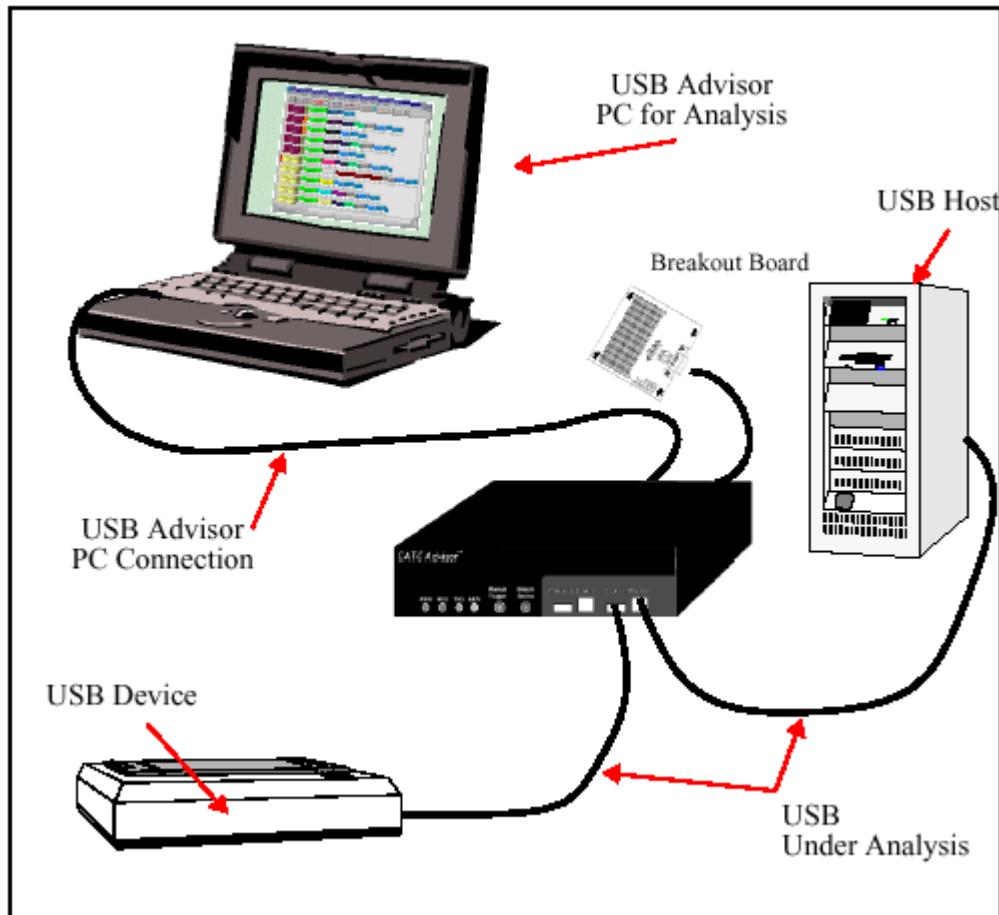
- Power on/off switch
- USB type "B" host computer connector
- **Data In/Out** DB-9 (9-pin) external interface connector

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

3.3 Advisor System Setup

The Advisor Analyzer functions with any personal computer using the Windows 98SE, Windows ME, Windows 2000, or Windows XP operating systems and equipped with a functional USB interface.

The Analyzer is a stand-alone unit configured and controlled through a personal computer USB port. It can be used with portable computers for field service and maintenance as well as with desktop units in a development environment. It is easily installed by connecting a cable between the computer's USB port and the Analyzer's USB port.

Figure 3: USB Advisor Connection

The Advisor Analyzer provides on-the-fly detection of and triggering on such events as specific user-defined bus conditions, packets matching any Packet Identifier (PID), packets matching a Token or Setup transaction, data patterns, and errors and bus conditions. Whether recording manually or with a specified Trigger condition, the Advisor Analyzer continuously records the bus data in a wrap-around fashion until manually stopped or until the Trigger Event is detected and a specified post-Trigger amount of bus data is recorded.

Upon detection of a triggering event, the Analyzer continues to record data up to a point specified by the user. Real-time detection of events can be individually enabled or disabled to allow triggering on events as they happen. This includes predefined exception or error conditions and a user-defined set of Trigger events. The unit can also be triggered by an externally supplied signal. An external DB-9 connector provides a path for externally supplied data or timing information to be recorded along with bus traffic.

Real-time event detection information is available via an external DB-9 connector.

The Advisor software provides powerful search functions that enable investigation of particular bus events and allow the software to identify and highlight specific events. In addition to immediate analysis, you can print any part of the data. Use the **Save As** feature to save the data on disk for later viewing. The program also provides a variety of timing information and data analysis reports.

The Advisor Analyzer is designed to work with either desktop or laptop computers equipped with a functional USB interface.

To set up the system hardware, follow these steps:

- Step 1** Connect the Analyzer to an AC power source.
- Step 2** Connect the External Interface Breakout Board to the **Data In/Out** connector (optional).
- Step 3** Connect to the personal computer via USB.
- Step 4** Connect the USB host and the device being analyzed to either the High-Speed or Classic-Speed USB port.

3.4 AC Power Source

- Step 1** Connect the Analyzer box to a 100-volt to 240-volt, 50 Hz to 60 Hz, 120 W power outlet using the provided power cord.

Note The Analyzer 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 2** Use the power switch located on the rear panel to turn the analyzer unit on and off.

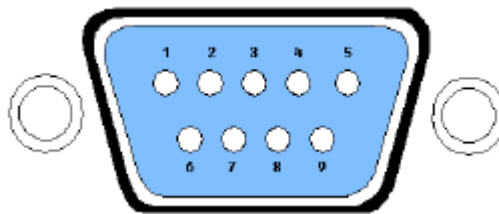
Note At power-on, the analyzer initializes itself in approximately 25 seconds and performs an exhaustive self-diagnostic that lasts about 45 seconds. The Status LED illuminates during the power-on testing and turns off when testing is finished. If the diagnostics fail, the Status LED blinks, indicating a hardware failure. If this occurs, call LeCroy Customer Support for assistance.

3.5 External Interface Breakout Board

The External Interface Breakout Board is an accessory that allows convenient access to several potentially useful standard, fast TTL output and input signals. It also offers a simple way to connect logic analyzers or other tools to the Advisor Analyzer unit. Four ground pins and one 5-volt pin are provided.

The Breakout Board connects via a cable to the **Data In/Out** connector located on the rear of the analyzer box. Each signaling pin is isolated by a 100 Ω series resistor and a buffer inside the Analyzer box.

Data In/Out Connector (on cable)



Pin-Outs for the Data In/Out Connector

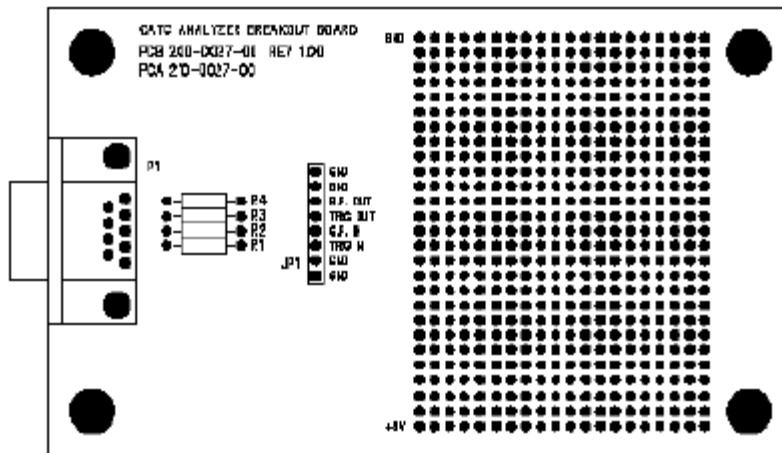
Table lists the pin-out and signal descriptions for the **Data In/Out** connector on a cable that connects to the Breakout board.

Data In/Out Connector – Pin-Out

Pin	Signal Name	Signal Description
1	+5V	+5 Volts, 250mA DC source
2	TRG IN	(*) Trigger Input
3	GP IN	(*) General Purpose Input
4	TRG OUT	(*) Trigger Output
5	GP OUT	(*) General Purpose Output
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	GND	Ground

Note (*) Pins 2 and 3 have the same function: they allow external signals to be used to cause triggering or recording. Pins 4 and 5 are used to transmit output signals.

External Interface Breakout Board



Prototype Rework Area

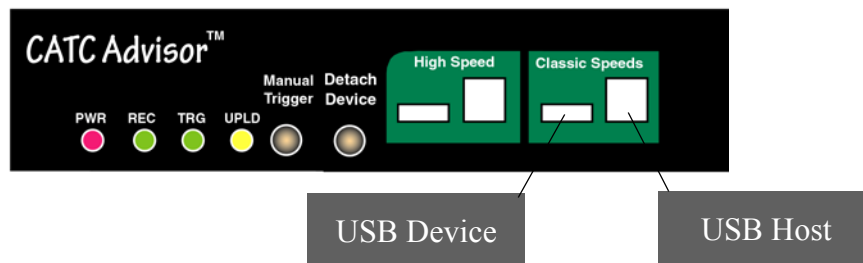
The Breakout Board contains a prototype rework area for making custom circuits for rapid development. The area consists of plated-through holes, 20 columns wide by 27 rows long. The top row of holes is connected to GND and the bottom row is connected to +5V. The remaining holes are not connected. Use the rework area to insert custom components and wire-wrap their respective signal, power, and ground pins.

PC Connection

Use the **LONGEST (6-foot/2-meter)** of the five USB cables provided to connect the host computer to the Advisor Analyzer box.

3.6 USB Test Ports

The USB Bus uses keyed connectors so that the type 'A' connector joins a cable directed to downstream devices or to a hub and the type 'B' connector joins a cable directed to an upstream host controller or to a hub. A USB hub is used to join multiple devices to an upstream host controller and therefore has both type 'A' and type 'B' connectors.



These ports have both type 'A' and type 'B' connectors so the Analyzer can conveniently tap a USB branch. To connect your USB branch for analysis, use the **SHORT** (3-foot/1-meter) USB cables to insert the Analyzer in place of the existing cables. Connect one cable to the type 'A' connector and join it downstream to your device or hub. Connect the other cable to the type 'B' connector and join it upstream to your host or hub.

Note The Advisor Bus & Protocol Analyzer is not a hub device; it connects to a USB branch by inserting a non-intrusive, high impedance tap. Because of the poor signal quality in the middle of a USB cable, LeCroy recommends using the shortest possible cables so that the total length of both cables together is less than 6 feet. The USB cables provided with your Analyzer meet this requirement. When longer cables are used, the Analyzer may record incorrect data.

3.7 Analyzer PC Requirements

The following is a list of recommended configuration for the host machine that runs the Advisor application and that is connected to the Advisor Analyzer:

- Microsoft Windows 98SE, ME, 2000 or XP. The Advisor application can be used on machines with Windows NT 4.0 to view trace files. Microsoft Internet Explorer, version 5 or newer.
- For optimum performance, use processors of Intel's PentiumIII/Pentium4 family, AMD's Athlon/Duron family, or other compatible processors with clock speed of 500mHz or higher (Processors of Intel's Pentium II/Celeron family or AMD's K6 family with clock speed of 300mHz is a minimum).

- For the best performance, it is recommended to have physical RAM twice the size of the recording buffer setup - 256MB or more (minimum of 128MB of RAM).
- At least 20MB of free hard disk space is required for the installation. Additional disk space is needed for storing the recorded data in files during the recordings process (can be as much as 150MB when recording a full buffer size).
- Display: Resolution of 1024 x 768 with at least 16-bit color is recommended (resolution of 800 × 600 with 16-bit color is a minimum).
- A USB interface is required to connect to the Advisor analyzer. This is not a requirement if the application is going to be used only as a viewer.

3.8 Advisor Program Installation

The LeCroy Advisor software is provided on CD-ROM and requires a Windows 98SE, Windows ME, Windows 2000, or Windows XP operating system.

Loading the Advisor USB Drivers

Step 1 Insert the Advisor CD-ROM into your computer.

Step 2 Power-on the Advisor Analyzer.

Step 3 Connect the USB cable to the rear of the analyzer and to the personal computer.

The host operating system detects the Analyzer and begins to install the USB driver.

Step 4 When Windows prompts you for a file, browse to the CATC CD-ROM.

Installing the Advisor Application Program

To install the Advisor program, follow these steps:

Step 1 Insert the Advisor CD-ROM into your computer.

Step 2 Insert the USBAdvisor CD-ROM.

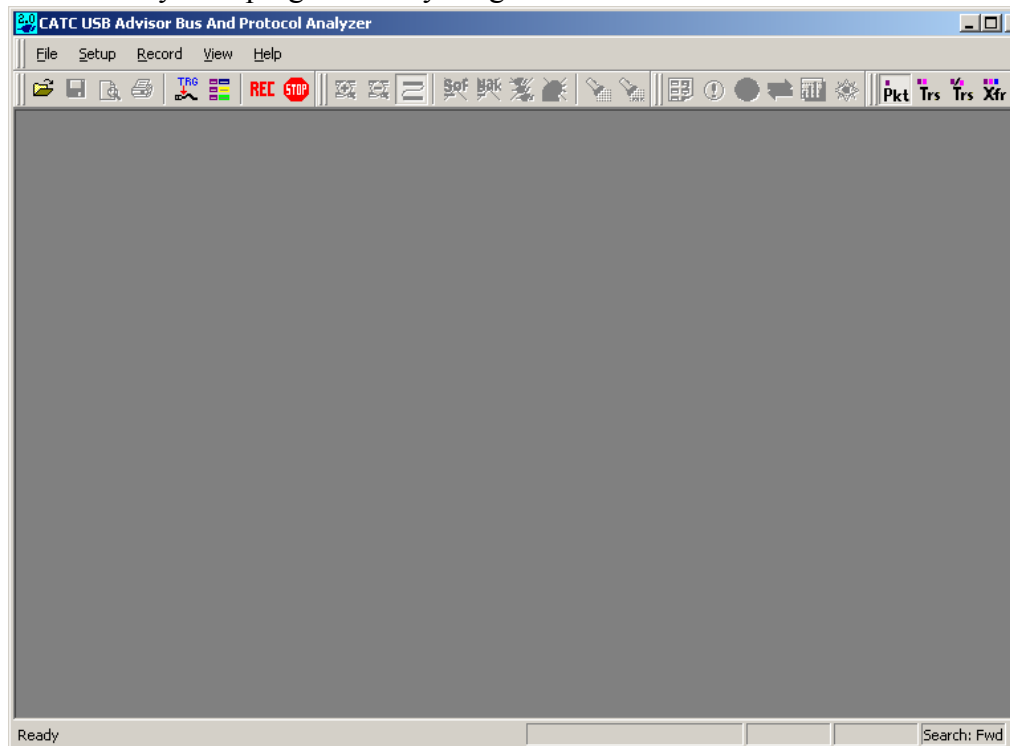
Step 3 Click **Install Software**.

Step 4 Follow the installation instructions on your screen.

The CATC Advisor Install Wizard automatically installs the necessary files to the computer's hard drive. Advisor software is installed in the **C:\Program Files\LeCroy\Advisor** directory unless you specify otherwise. Follow the installation instructions on your screen.

3.9 Advisor Program Startup

You can start the Advisor program from the Desktop or from the installed directory. The program always begins with its main screen active:



The software may be used with or without Advisor. When used without Advisor, the program functions in a Trace Viewer mode to view, analyze, and print captured protocol traffic.

When the program is used with the Advisor Protocol Analyzer attached to the computer, you can set trigger conditions, record, monitor and analyze the activity of your USB bus.

3.10 Making a Recording

After installation, the software is configured to make a Snapshot recording of USB traffic.

To make your first recording of this traffic, see See Section 2.3 "Making a USB Recording."

4. Updates

From time to time as modifications are made to the Advisor Analyzer, it is necessary to update the Advisor for optimal performance. Updates can be performed two ways: either automatically or manually. This chapter describes both procedures.

4.1 Software, Firmware, and BusEngine Revisions

The **Readme.txt** file on the installation CD and in the installed directory gives last-minute updates about the current release. Included with each release are the most recent downloadable images of the Firmware and the BusEngine.

Once the Analyzer has completed the self diagnostics and is connected to the PC, you can check the latest revision of the software and BusEngine by selecting **About Advisor...** from the **Help** menu.



About USB Advisor details revisions of the following software and hardware:

- Advisor Software Version
- Advisor Firmware Version
- BusEngine Version
- Unit Serial Number

Note When contacting LeCroy for technical support, please have available all the revisions reported in the **About USB Advisor** window.

4.2 Software Updates

When a new software release is available, it is posted on the Support page of the LeCroy website at **www.lecroy.com/support.html**.

To update the software,

- Step 1** In the **About Advisor** screen, verify which version of Advisor Software you are currently running.
- Step 2** Find the latest released software version on the LeCroy website under **Support**.

If you are running the latest version of the software, no further action is needed.

If you are **not** running the latest version, continue to Step 3.
- Step 3** Download the Zip files from the website.
- Step 4** Unzip the files into your choice of directory.
- Step 5** Click **Start**, then **Run**, and browse to where you unzipped the files.
- Step 6** Select the program named **Setup** and click **Open**.
- Step 7** Click **OK** to run the Setup and begin the installation.
- Step 8** Follow the on-screen instructions to complete the installation.
- Step 9** Read the Readme file for important information on changes in the release.

4.3 BusEngine and Firmware Updates

BusEngine and Firmware updates often need to be performed when you update the Advisor software. These updates can be performed automatically or manually. Both processes are described.


Updating the Firmware

Within a new software release, it may also be necessary to update the Analyzer's firmware for proper operation. The Readme file informs you if this is necessary.

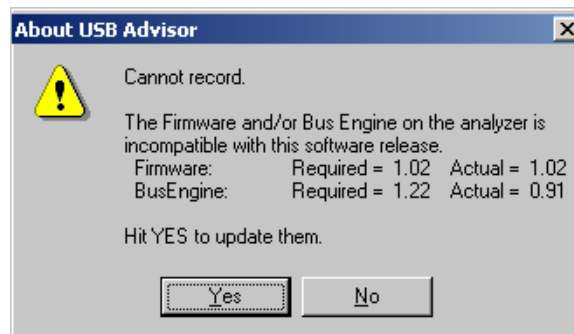
Automatic Updates

When the Advisor software is updated, the software may become incompatible with the BusEngine and Firmware. If a recording is attempted, Advisor will display an error message and then automatically begin an update process for the BusEngine and Firmware.

To perform an automatic BusEngine and Firmware update, follow these steps:

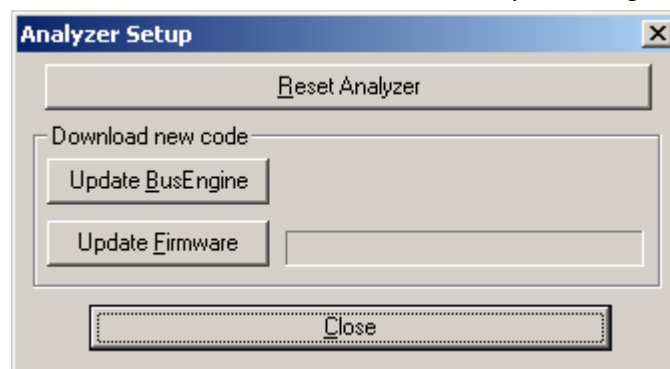
- Step 1 If needed, update the Advisor software using the steps outlined in "Software Updates" described above.
- Step 1 Turn on the Analyzer.
- Step 2 On the Tool Bar, click the  button.

Since the BusEngine and/or the Firmware are incompatible with the current Advisor software version, an error message will appear displaying your current versions and indicating what versions you need to install.



- Step 3 Click **Yes**.

The above window closes and the Analyzer Setup window opens.



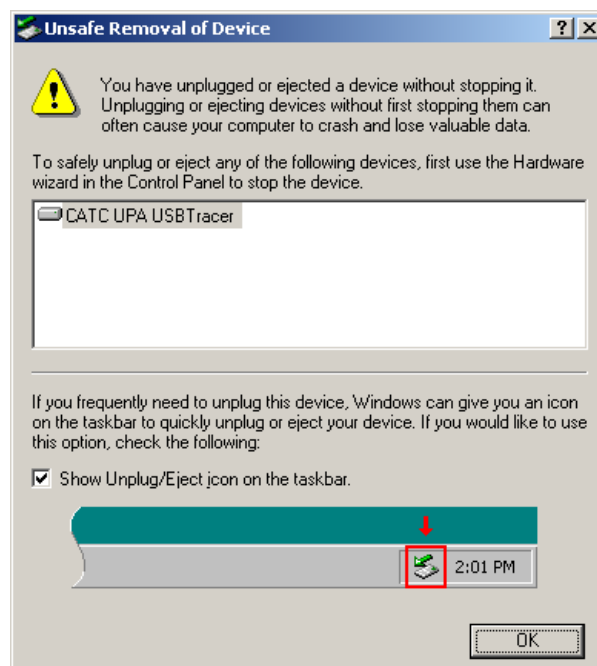
- Step 4 Click **Update BusEngine** or **Update Firmware** on the

Analyzer Setup screen.

You can select only one item at this point. If both the BusEngine and the Firmware need to be updated, the update will complete for the first item and then return to the above screen so the second update can be performed.

If you are running *Power cycle Advisor to complete the update*.

If you are running Windows 2000, the analyzer will automatically reboot and cause the following message to appear. When this message appears, click **OK**. **You do not need to power cycle the Analyzer.**

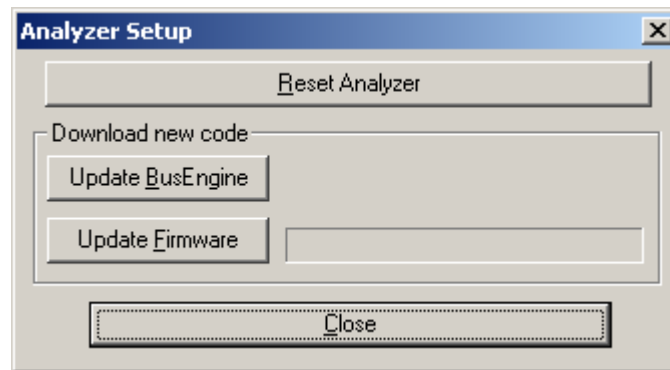


Manual Updates to BusEngine and Firmware

You can manually update the Advisor Firmware and/or BusEngine by completing the following steps:

Step 1 Select **Analyzer** under **Setup** on the Menu Bar.

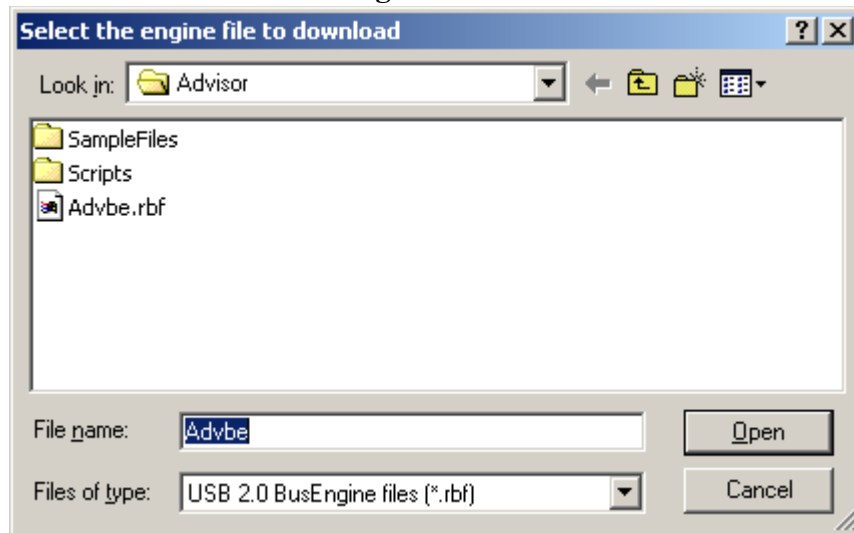
You see the **Analyzer Setup** screen:



To update the BusEngine,

Step 2 Click **Update BusEngine** on the **Analyzer Setup** screen.

You see the **Select engine file** window:



The program displays the correct file (**Advbe.rbf**) in the **File name** field. This file is used to update the analyzer alone.

Note The most current Primary BusEngine file was copied to your **\\LeCroy\\Advisor** directory when you installed the program.

Step 3 Click **Open**.

Step 4 Power cycle the analyzer.

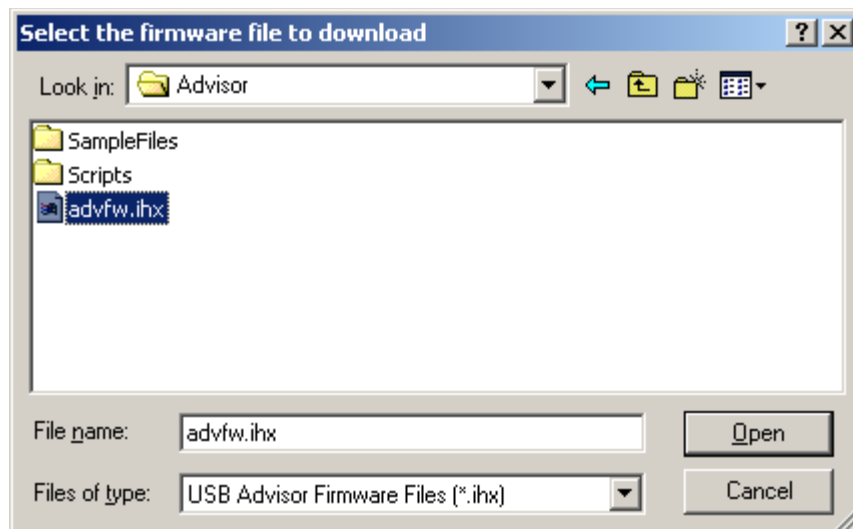
Re-initialization takes a couple of minutes.

Manually Upgrading the Firmware

To update the firmware,

Step 1 Click **Update Firmware** on the **Analyzer Setup** screen.

You see the **Select firmware file** window:



The program has already automatically searched for the correct file and displays it in the **File name** field.

Step 2 Click **Open**.

The Analyzer updates the Firmware.

Step 3 Unplug the USB cable from the back of the Analyzer box and then reinsert it so the new Firmware update can take effect.

Resetting the Analyzer

Clicking the **Reset Analyzer** button is equivalent to power cycling the Advisor Analyzer.

5. Software Overview

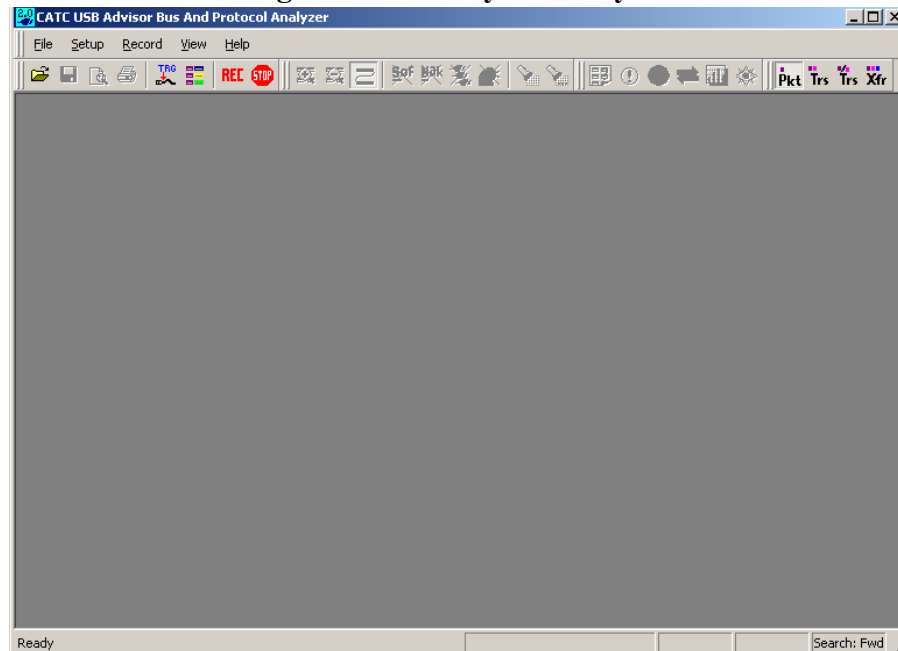
The Advisor software may be used with or without the analyzer hardware. When used without the analyzer hardware, the program functions in a Trace Viewer mode to view, analyze, and print captured protocol traffic from Advisor Analyzers. The software will also allow you to view trace files created by the LeCroy Chief, Detective, and Inspector. Opening a file created with either of these Analyzers displays a screen asking if you want to convert the old file to the new format under the name **convert.usb**.

When the program is used with the USB Advisor Analyzer attached to the computer, you can monitor and analyze the activity of your USB branch from either of the USB ports on the front of the Analyzer.

5.1 Starting the Advisor Program

To starting the USB Advisor Program:

Step 1 Click **Start > Programs > LeCroy > LeCroy Advisor**.



5.2 Tool Tips

Tool tips provide useful information about fields and buttons. In some cases, tool tips spell out acronyms used in cells, in others, they add substantial amounts of information. To display a tool tip, position the mouse pointer over an item.



5.3 The Main Display Windows

While some of the analyzer's Main Display window options are familiar, many contain options specific to the analyzer program.



Table 1: Main Display Pull-Down Windows

Menu	Function
<u>F</u>ile	
<u>O</u> pen...	Opens a file.
<u>C</u> lose	Closes the current file.
Save <u>A</u> s...	Saves all or a specified range of packets from the current file with a specified name.
<u>P</u> rint...	Prints part or all of the current traffic data file.
Print <u>P</u> review	Produces an on-screen preview before printing.
<u>P</u> rint Setup...	Sets up your current or new printer.
<u>E</u> dit Comment...	Creates or edits the Trace file comment field.
Export>>	Saves all or part of a trace to a text file or generator file.
Packets to Text (Packet View Format)	Packets to Text (Packet View Format)- Saves trace as text file.
Packets to CSV	Exports packets to CSV file (Comma Separated Value suitable for use in a spreadsheet or database)
Packets to Host Traffic Generator Text File (.utg)	Saves trace as script file that can be used by a USBTrainer Traffic Generator to generate host-side traffic.
Packets to Device Emulation Traffic Generator Text File (.utg)	Saves trace as script file that can be used by a USBTrainer Traffic Generator to generate device-side traffic.
Data	Data - Allows Transfer data to be exported as text or binary file.
Merge Trace Files	Merges two simultaneously recorded files into a single file. (This command will not work if the files were recorded at different times).
<u>I</u> mport	Imports data from a .vcd file.
Compare Endpoint Data	This command allows the user to select two endpoints of different directions with same address and verify that the data OUT/IN is identical to the data IN/OUT from the other endpoint. This command is useful when running echo-types of tests for data integrity. This command is present in the menu only when a trace file (.usb) is open.
<i>Last File</i>	Lists the last files that were opened.
<u>E</u> xit	Exits the Advisor program.

Menu	Function
Setup	
<u>D</u> isplay Options...	Provides the control of various display options such as color, formats, and filters.
<u>R</u> ecording Options...	Provides setup options for recording, triggering events and filtering events.
<u>A</u> nalyzer...	Allows you to update the BusEngine and Firmware.
Record	
<u>S</u> tart	Causes the Analyzer to begin recording USB activity.
<u>S</u> top	Causes the Analyzer to stop recording.
<u>U</u> pload Again...	Uploads a any portion of a trace. Disabled until a partial trace is uploaded.
Report	
<u>F</u> ile Information	Displays information about the recording such as the number of packets and triggering setup.
<u>E</u> rror Summary	Summarizes the errors throughout the recording. Allows for fast navigation to packet with errors.
T <u>i</u> ming <u>C</u> alculation	Calculates timing between two packets and bus utilization.
Traffic Summary	Summarizes the numbers and types of packets, transactions, split transactions, and transfers that occurred in the open trace.
<u>B</u> us Utilization	Opens a window that displays graphs of bus utilization data. Once the window is open, the Bus Utilization menu will let you access the following sub-menu options: Hide, Save, Send, Print, Full Screen, View Options, Set Range, Synchronize, Graph Areas.
Search	
G <u>o</u> to <u>T</u> rigger	Positions the display to show the first packet that follows the trigger event.
G <u>o</u> to <u>P</u> acket/ <u>T</u> ransaction/ <u>T</u> ransfer...	Positions the display to the indicated packet/transaction/transfer number.
G <u>o</u> to <u>M</u> arker»	Positions the display to the selected marked packet.
<u>G</u> o to»	Enables quick searching for specific events using a cascade of pop-up windows.
F <u>i</u> nd	Allows complex searches on multiple criteria.
F <u>i</u> nd <u>N</u> ext	Repeats the previous Find operation.
S <u>e</u> arch D <u>i</u> rection	Allows the search direction to be changed from forward to backwards or vice versa.
View	
<u>T</u> ool Bars	Displays a list of available toolbar buttons.
<u>S</u> tatus Bar	Switches display of the Status Bar on or off.
Z <u>o</u> om <u>I</u> n	Increases the size of the displayed elements.
Z <u>o</u> om <u>O</u> ut	Decreases the size of the displayed elements.
<u>W</u> rap	Wraps displayed packets within the window.
H <u>i</u> de S <u>O</u> F's	Hides Start of Frames.

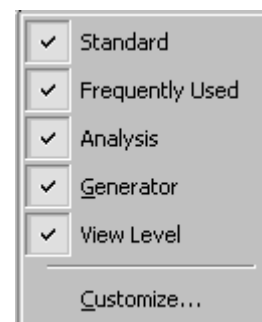
Menu	Function
Hide NAK's	Hides NAK'd Transactions.
Hide Devices	Hides packets belonging to specified devices by address and endpoint.
Hide Chirps	Hides the Chirp-K and Chirp-J Bus conditions. These are recorded only in <i>USBTracer</i> .
Packet Level	Displays Packets.
Transaction Level	Displays Transactions.
Split Transaction Level	Displays Split Transactions.
Transfer Level	Displays Transfers.
Refresh Decoding	Forces the software to re-apply decoding to transactions and transfers. This option is useful if you have applied decoding mapping which will help fully decode a sequence of transfers, as is the case with Mass Storage decoding.

Window	
<u>N</u> ew Window	Switches display of the Toolbar on or off.
<u>C</u> ascade	Displays all open windows in an overlapping arrangement.
Tile <u>H</u> orizontal	Displays all open windows in a side-by-side arrangement.
Tile <u>V</u> ertical	Displays all open windows in a top-to-bottom arrangement.
<u>A</u> rrange Icons	Arranges minimized windows at the bottom of the display.
Windows...	Displays a list of open windows.

Help	
Help	Displays online help for the current software screen.
<u>H</u> elp Topics...	Displays online help.
<u>U</u> pdate License...	Opens a dialog box for updating your LeCroy license.
<u>D</u> isplay License Information...	Displays information related to licensing.
<u>A</u> bout USB Advisor	Displays version information about USB Advisor.

5.4 View Options

You can hide, display or reset toolbars by selecting **View > Toolbars** from the menu bar.

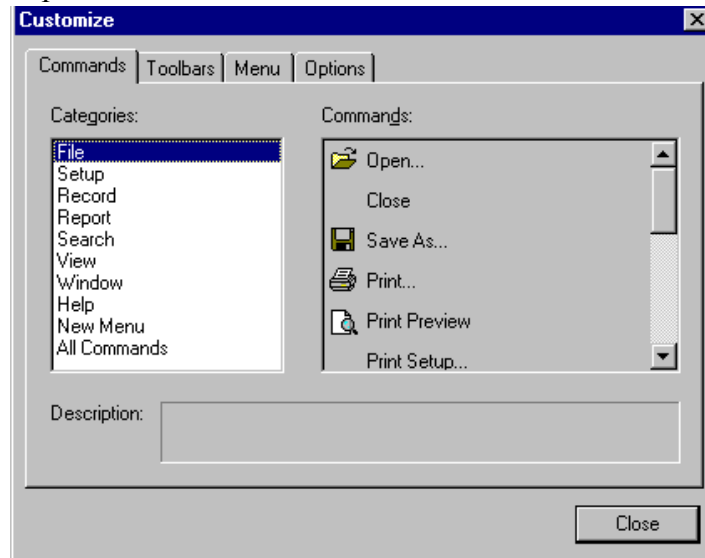


Resetting the Toolbar

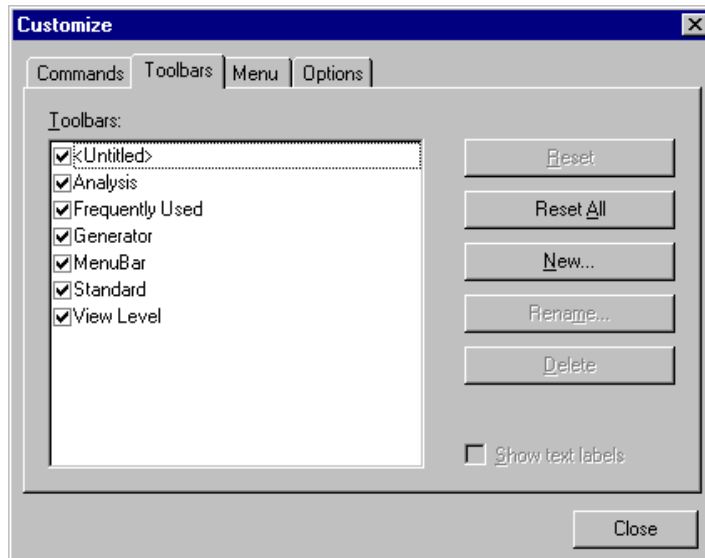
From time to time (such as following a software upgrade) it is possible for the buttons on the toolbar to not match their intended function. You can reset the toolbar by performing the following steps:

Step 1 Select **View > Toolbars** from the menu bar.

Step 2 Select **Customize** from the sub-menu. The following dialog box opens.



Step 3 Select the **Toolbars** tab. The following dialog box opens.
































Step 4 Click the **Reset All** button. The toolbar resets to the factory defaults.

Toolbar



The Tool Bar provides quick access to the most popular Advisor program functions. Tool tips briefly describe the functionality of each icon.

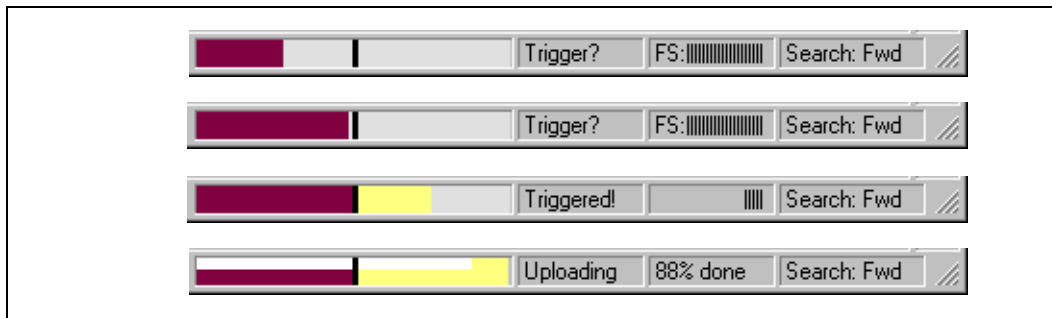
	Open file		Hide chirps
	Save As		Assign High Level Decodes
	Preview		Find
	Print...		Find Next
	Setup Record Options		File Information Report
	Setup Display Options		Error Report
	Start Recording		Timing and Bus Usage Calculations
	Stop Recording		Traffic Summary
	Zoom In		Bus Utilization
	Zoom Out		Display Packets
	Wrap		Display Transactions
	Hide SOFs		Display Split Transactions
	Starts the Trace Navigator		Display Transfers
	Partial Upload		Hide NAK'd transactions
			Hide Devices

5.5 Status Bar

The Status Bar is located at the bottom of the main display window. Depending on the current activity, the bar can be divided into as many as four segments.

Recording Progress

When you begin recording, the left-most segment of the Status Bar displays a Recording Progress Indicator:



As recording progresses, the Progress Indicator changes to reflect the recording progress graphically:

- In the Progress Indicator, a black vertical line illustrates the location of the Trigger Position you selected in Recording Options.
 - Pre-Trigger progress is displayed in the field to the left of the Trigger Position in the before-Trigger color specified in the Display Options.
 - When the Trigger Position is reached, the progress indicator wiggles as it waits for the trigger.
 - After the trigger occurs, the field to the right of the Trigger Position fills in the after-Trigger color specified in the Display Options.
 - When recording is complete, the upper half of the progress indicator fills in white, indicating the progress of the data upload to the host computer.

You should be aware of two exceptional conditions:

- If a Trigger Event occurs during the before-Trigger recording, the before-Trigger color changes to the after-Trigger color to indicate that not all the expected data was recorded pre-Trigger.

- When you click **Stop** before or after a Trigger Event, the Progress Bar adjusts accordingly to begin uploading the most recently recorded data.

The Progress Bar fills with color in proportion to the specified size and actual rate at which the hardware is writing and reading the recording memory. However, the Progress Indicator is normalized to fill the space within the Status Bar.

Recording Status


During recording, the current Recording Status is displayed in the next segment. When you activate the **Record** function, this segment flashes one of the following messages (depending on the selected Recording Options):

- Trigger?
- Triggered!
- Uploading

After recording stops,

- The flashing message changes to **Uploading data-x% done** (x% indicates the percentage completion of the data uploading process).
- The traffic data is copied to disk (overwriting any previous version of this file) using the default file name **data.usb**. If two channels of traffic are recorded, Advisor will create two files: **data.usb** and **data_classic.usb**. You can also create a file name of your choice by specifying one in the Recording Options dialog box.

To abort the upload process,

- Press **Esc** on your keyboard
- OR
- Again click  in the Tool Bar.

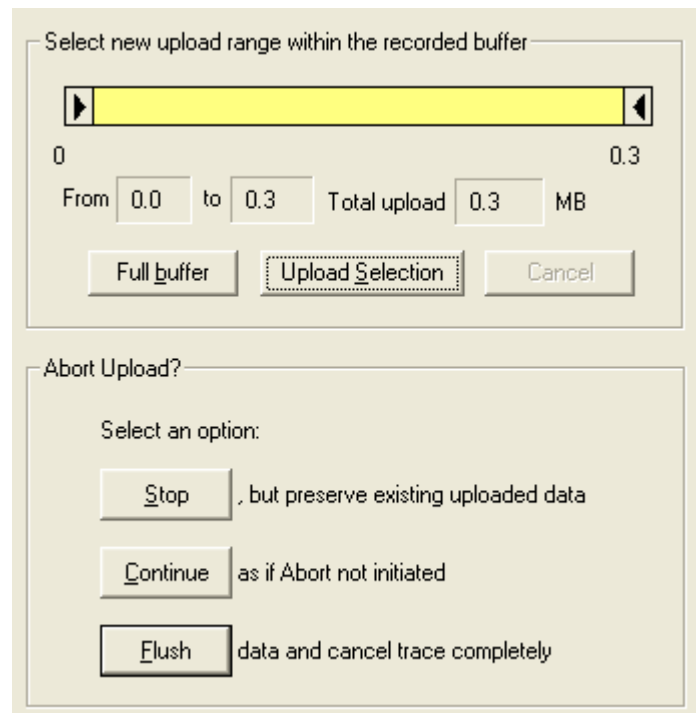
Note: While uploading is in progress, clicking the stop button again brings up a dialog that allows you to do a partial upload, flush the current file, keep what has uploaded at this point, and to continue uploading.

You are asked if you want to keep or discard the partially uploaded data.

When the data is saved, the Recorded Data file appears in the main display window and the Recording Status window is cleared.

- If the recording resulted from a Trigger Event, the first packet following the Trigger (or the packet that caused the Trigger) is initially positioned second from the top of the display.
- If the recording did not result from a Trigger Event, the display begins with the first packet in the traffic file.

The Partial Upload button is enabled when you have partially uploaded data. When you click this button, a dialog box appears that gives you options on what portion of data you want to upload again.



When the data is saved, the Recorded Data file appears in the main display window and the Recording Status window is cleared.

- If the recording resulted from a Trigger Event, the first packet following the Trigger (or the packet that caused the Trigger) is initially positioned second from the top of the display.
- If the recording did not result from a Trigger Event, the display begins with the first packet in the traffic file.

Recording Activity

During recording, the fourth segment from the left of the Status Bar displays Recording activity as a series of vertical bars.

The more vertical bars that are displayed, the greater the amount of activity being recorded. If there are no vertical bars, there is no recorded activity.

During uploading, the percent of the completed upload is displayed.

Note If packets are filtered from the recording or data are truncated, the recording activity is reduced.

Search Status


The rightmost segment displays the current search direction: **Fwd** (forward) or **Bwd** (backward).

5.6 Navigation Tools

You can zoom in and out, and wrap packets/transactions/transfers to fit within the screen using the following buttons:


Zoom In

Zoom In increases the size of the displayed elements, allowing fewer (but larger) packet fields per screen.

- Click  on the Tool Bar.


Zoom Out

Zoom Out decreases the size of the displayed elements, allowing more (but smaller) packet fields per screen.

- Click  on the Tool Bar.

Wrap

Select **Wrap** to adjust the Trace View so that packets fit onto one line. If a packet is longer than the size of the window, the horizontal scroll bar can be used to see the hidden part of the packet.

- Click  on the Tool Bar or select **Wrap** under **View** on the Menu Bar.

5.7 Advisor Analyzer Keyboard Shortcuts

Several frequently-used operations are bound to keyboard shortcuts.

Operation	Key Combination
Trace Navigation	
Find Next	F3

Search Backwards	Ctrl+B
Search Forwards	Ctrl+F
Jump to First Packet	Ctrl+Home
Jump to Last Packet	Ctrl+End
Goto Any Error	Shift+E
Goto Channel 0	Ctrl+Shift+0
Goto Channel 1	Ctrl+Shift+1
PID	
Goto ACK	Shift+A
Goto DATA0	Shift+0
Goto DATA1	Shift+1
Goto DATA2	Shift+2
Goto DATAx	Shift+D
Goto IN	Shift+I
Goto MDATA	Shift+M
Goto NAK	Shift+N
Goto NYET	Shift+Y
Goto OUT	Shift+O
Goto PING	Shift+G
Goto PRE/ERR	Shift+P
Goto SETUP	Shift+S
Goto SOF	Shift+F
Goto SPLIT	Shift+X
Goto STALL	Shift+L
Bus Conditions	
Goto Reset	Shift+T
Goto Resume	Shift+6
Goto SE0	Shift+Z
Goto SE1	Shift+7
Goto Keep-Alive	Shift+5
Goto Suspend	Shift+U

Goto Chirp	Shift+C
Goto Full Speed J	Shift+J
Goto Full Speed K	Shift+K
OTG	
Goto SRP	Ctrl+Q
Goto HNP	Shift+H
Goto VBus Voltage Change	Shift+V
Goto OTG Host A	Ctrl+Shift+A
Goto OTG Host B	Ctrl+Shift+B
Misc.	
Marker Menu	Ctrl+M
Open File	Ctrl+O
Print...	Ctrl+P
Record	Ctrl+R
Stop Recording	Ctrl+T
Open Display Options dialog	Ctrl+Shift+D
Open Recording Options dialog	Ctrl+Shift+R
Hide SOFs	Ctrl+Shift+S
Hide NAKs	Ctrl+Shift+N
Hide Chirps	Ctrl+Shift+C


6. Recording Options

Use **Recording Options** to create and change various features that control the way information is recorded by the Advisor Analyzer.

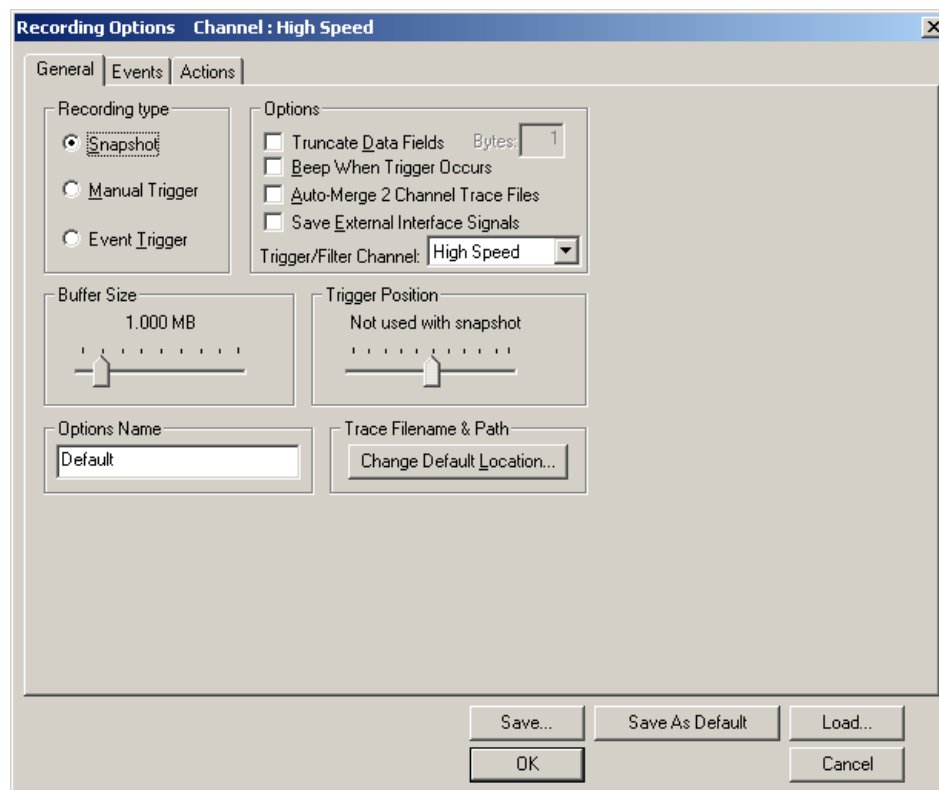
To open the **Recording Options** menu,

- Select **Recording Options** under **Setup** on the Menu Bar

OR

- Click  on the Tool Bar.

You see the **Recording Options** window:



The **Recording Options** window always opens with the **General** tab showing.

6.1 General Recording Options



The General Recording Options allow you to select or adjust the recording type, the buffer size, the amount of post-trigger recording, and the trace filename and path.

Recording Type

The **Recording Type** box presents three options that allow you to set how Advisor begins and ends a recording. The options are: *Snapshot*, *Manual Trigger*, and *Event Trigger*.





Snapshot


A Snapshot is a fixed-length recording whose size is determined by the "Buffer Size" box in the Recording Options dialog or by a manual click of the Stop button. Recording begins when  is clicked and ends when either the selected buffer size is filled or the  button is pressed.

Manual Trigger

A Manual Trigger is a recording whose trigger point is caused by pressing the trigger button on the front panel.

Recording begins when you click  on the Tool Bar. Recording continues in a circular manner within the limits set by the buffer size. Recording ends when  is clicked on the Tool Bar or after post-trigger memory has been filled following depression of the trigger button on the front panel.

Event Trigger

Recording begins when you click  on the Tool Bar.

Recording continues in a circular manner within the limits set by the buffer size until an event is detected that meets the Trigger conditions specified in the Triggering Options and the defined amount of data has been recorded after the Trigger Event.

Options

- **Truncate Data Fields:** Allows data fields to be truncated during recording in order to save Analyzer memory and allow recording of more packets. Enter a maximum data length value in the box marked "Bytes." Advisor will truncate the data to the stated value or slightly larger.

Note Truncation of data may cause incorrect transaction or transfer decoding.

- **Beep When Trigger Occurs:** The computer connected to the Advisor will beep three times when a Trigger condition is first detected.
- **Auto-Merge 2 Channel Trace Files:** Causes Advisor to merge traffic of two recording channels into a file called `data_merged.usb` (or whatever name you wish to give it). Advisor will also make two other files during this recording: `data.usb` and `data_classic.usb` (or whatever names you choose to give them). If unchecked, Advisor will just create two files: one for Classic-Speed traffic and another for Hi-Speed traffic.
- **Save External Interface Signals:** This option will cause Advisor to save signals from a Break-out board (pins *TRIG IN* - *G.P. IN*) save them as fields in the trace.
- **Trigger/Filter Channel:** Allows you to choose between Hi-Speed or Classic Speed. The selected choice tells Advisor what channel it should use to perform its triggers/filters. The last channel selected here is the one that will be used for Triggering/Filtering.

Buffer Size

You can adjust the size of the recording buffer from 0.1 megabytes to 128 megabytes.

The **Recording type** option determines how this buffer is used. Although there are 128 megabytes of physical memory in the Analyzer, the efficiency of the recording is about a 2:1 ratio of physical memory to actual USB traffic. Shorter USB packets yield a slightly less efficient recording. The non-traffic portion of physical memory is utilized for control and timing information.

Note The scale is not linear and affords more granularity in the smaller buffer sizes.

Trigger Position

You can adjust the amount of recording to be done post-Trigger or select where you want the Trigger located within the defined buffer. You can adjust the Triggering Position between 1 and 99% post-Trigger. **Trigger Position** is available only when **Manual Trigger** or **Event Trigger** is selected as **Recording type**.

As an example, if the buffer size is set to 16MB, then for the following Trigger Position settings, the amount of pre- and post-Trigger data is

- 95% post-triggering: 0.8MB pre-trigger, 15.2MB post-trigger
- 75% post-triggering: 4MB pre-trigger, 12MB post-trigger
- 50% post-triggering: 8MB pre-trigger, 8MB post-trigger
- 25% post-triggering: 12MB pre-trigger, 4MB post-trigger
- 5% post-triggering: 15.2MB pre-trigger, 0.8MB post-trigger

Note When a Trigger occurs, recording continues until the post-Trigger amount of the buffer is filled or when **Stop** is selected.

Options Name

The **Options Name** is a descriptive label of the current Recording Options settings. Options Names are associated with files that have a **.rec** suffix.

The default option name is **default**. **Default** preserves the current Recording Options settings.

The purpose of the **Options Name** box is to give you a place to preserve different Recording Options that you use on a recurrent basis. For example, if you use two or three different Recording Options configurations, you can save these configurations and load them the next time they are needed.

Because Options Names are descriptive labels and not file names, you can enter in any text you like into the box. Your labels can be very descriptive such as "Trigger on High Speed traffic when CRC errors occur."

To create a new Recording Options name,

Step 1 Enter a comment for the new file in the **Options name** field.

Step 2 Click **Save...**

*You see the **Save As** window.*

Step 3 Specify a filename (***.rec**)

Step 4 Click **Save**.

To load a Recording Options name,

Step 1 Click **Load...**

*You see the **Open** window.*

- Step 2** From the list of **.rec** files, select the one that represents your Options Name.

The options settings for that name then display.

Trace File Name & Path

Trace File Name & Path opens a **Save As** dialog box for saving your trace file. The default recording file name is **data.usb** for Low, Full, and High Speed recordings. If you are recording on both channels, then Advisor will create two files: **data.usb** for Classic Channel, and **data_classic.usb** for High-Speed Channel.

- Click **Trace File Name & Path**.

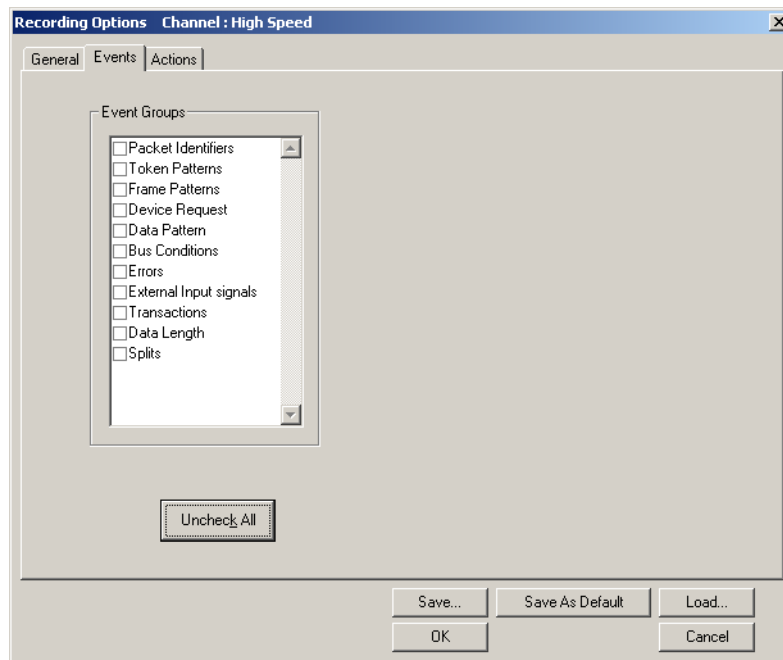
You see a **Save As...** window in which to enter the recording file name ***.usb** for all subsequent recordings.

6.2 Events Recording Options

The Event triggering and filtering options allow you to set specific parameters for each Event Group. When an Event Group is selected, a field appears that allows you to select specific conditions within the corresponding Event Group. As details are selected, other Event Group details may become "grayed out" because of limited hardware resources in the Analyzer. Information about the resources available is displayed below the Event Group details. When a detail is grayed out, it is inactive and cannot be selected. If an Event Group remains inactive, the current version of the application or BusEngine does not support it.

- Click the **Events** tab on the **Recording Options** screen.

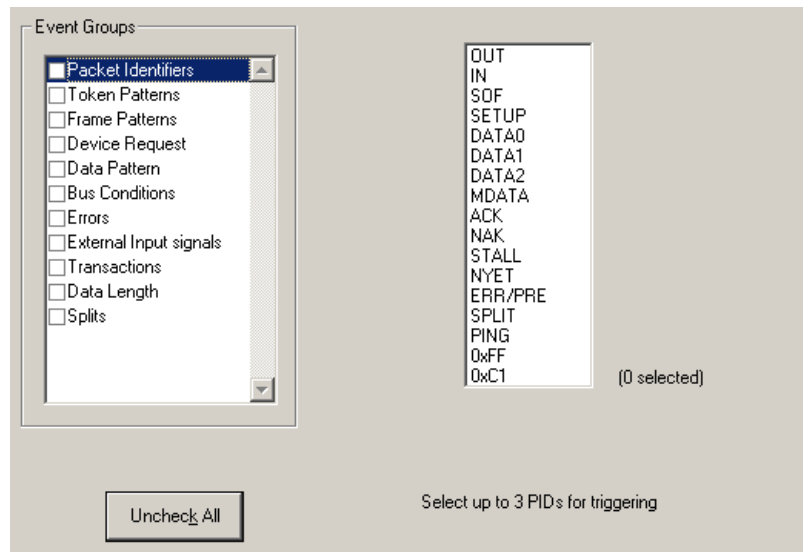
You see the **Event Groups** window:



Packet Identifiers

- Select **Packet Identifiers** under **Event Groups**.

You see the **Packet Identifiers** window:



The Packet Identifier (PID) field lists the available packet types. Select up to three packet types to use as a Recording Trigger.

Token Patterns

- Select **Token Patterns** under **Event Groups**.

You see the **Token Patterns** window:

The screenshot shows the 'Event Groups' dialog box. On the left, a list of event groups is shown with checkboxes: Packet Identifiers, Token Patterns (selected), Frame Patterns, Device Request, Data Pattern, Bus Conditions, Errors, External Input signals, Transactions, Data Length, and Splits. Below this list is an 'Uncheck All' button. On the right, there are three rows of input fields for PID, Addr, and Endp, labeled #1, #2, and #3. Each row has a dropdown menu for PID (currently set to 'Any') and empty text boxes for Addr and Endp. At the bottom right, there is a text label: 'Specify USB token events for triggering/filtering'.

Specify up to three combinations of Address/Endpoint with any of the token PIDs. They can be triggered on or filtered in/out.

Frame Patterns

- Select **Frame Patterns** under **Event Groups**.

You see the **Frame Patterns** window:

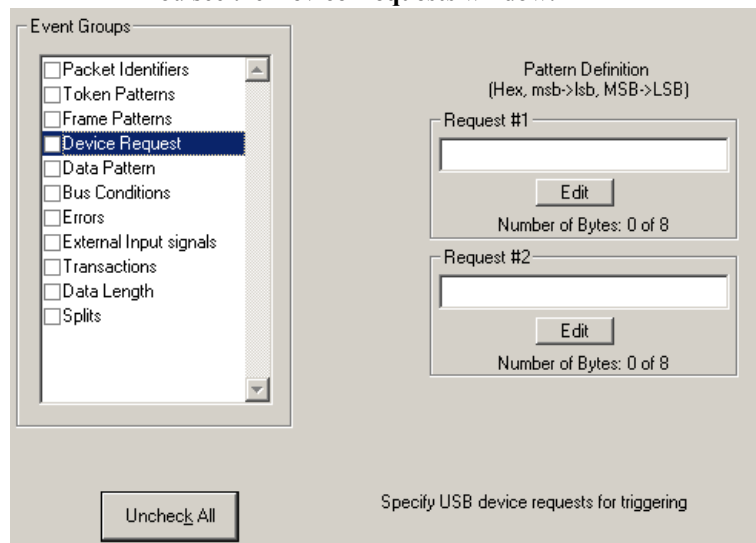
The screenshot shows the 'Event Groups' dialog box. On the left, a list of event groups is shown with checkboxes: Packet Identifiers, Token Patterns, Frame Patterns (selected), Device Request, Data Pattern, Bus Conditions, Errors, External Input signals, Transactions, Data Length, and Splits. Below this list is an 'Uncheck All' button. On the right, there is a checkbox labeled 'All Start Of Frame packets' and a text input field labeled 'Frame Number (0-7FF) :'. At the bottom right, there is a text label: 'Filter all SOFs or trigger on a frame number'.

Identify frame patterns you want either to filter out of a Trace View or to use as a Trigger. You can select either **All Start of Frame packets (SOF)** to be filtered out or specify the **Frame Number** of a frame to trigger on.

Device Requests

- Select **Device Requests** under **Event Groups**.

You see the **Device Requests** window:

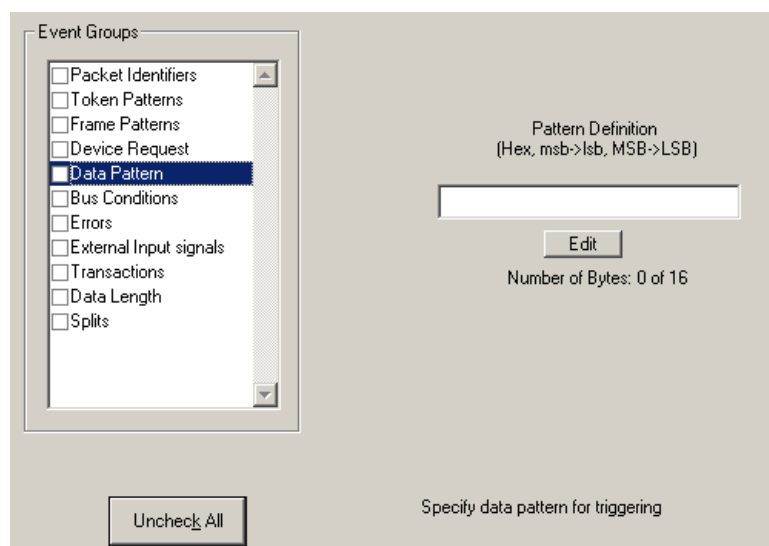


You can select one or two Device Requests for triggering or filtering.

Data Pattern

- Select **Data Pattern** under **Event Groups**.

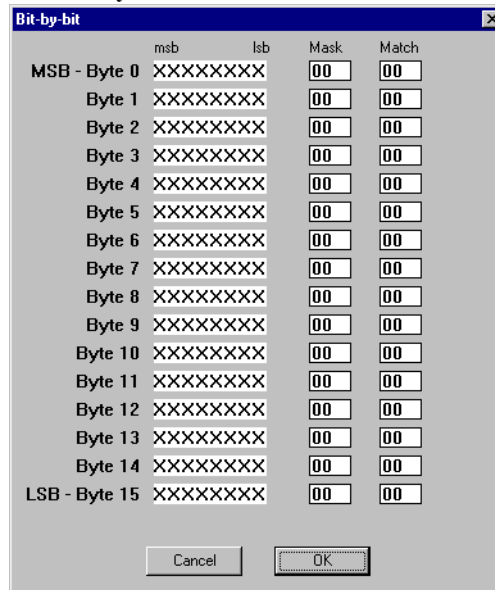
You see the **Data Pattern** window:



Enter a Data Pattern to be triggered upon or click **Edit** to open a pattern editor and enter data on a bit-by-bit basis.

- Press the **Edit** button.

You see a **Bit-by-Bit** window:



The Bit-by-bit window displays a table for editing 16 bytes. The table has four columns: 'msb', 'lsb', 'Mask', and 'Match'. The rows are labeled from 'MSB - Byte 0' to 'LSB - Byte 15'. Each row contains a text field for the byte value (initially 'XXXXXXXX'), a 'Mask' field (initially '00'), and a 'Match' field (initially '00'). At the bottom are 'Cancel' and 'OK' buttons.

	msb	lsb	Mask	Match
MSB - Byte 0	XXXXXXXX		00	00
Byte 1	XXXXXXXX		00	00
Byte 2	XXXXXXXX		00	00
Byte 3	XXXXXXXX		00	00
Byte 4	XXXXXXXX		00	00
Byte 5	XXXXXXXX		00	00
Byte 6	XXXXXXXX		00	00
Byte 7	XXXXXXXX		00	00
Byte 8	XXXXXXXX		00	00
Byte 9	XXXXXXXX		00	00
Byte 10	XXXXXXXX		00	00
Byte 11	XXXXXXXX		00	00
Byte 12	XXXXXXXX		00	00
Byte 13	XXXXXXXX		00	00
Byte 14	XXXXXXXX		00	00
LSB - Byte 15	XXXXXXXX		00	00

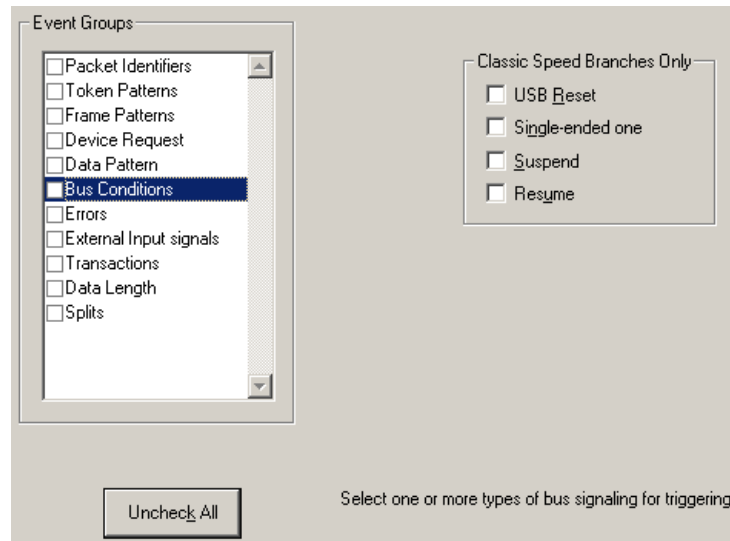
- Step 3** Click your mouse on the bits within each byte that you wish to edit and enter in the appropriate text.

The Mask and Match fields will change to reflect your changes.

Bus Conditions

- Select **Data Pattern** under **Event Groups**.

You see the **Bus Conditions** window:

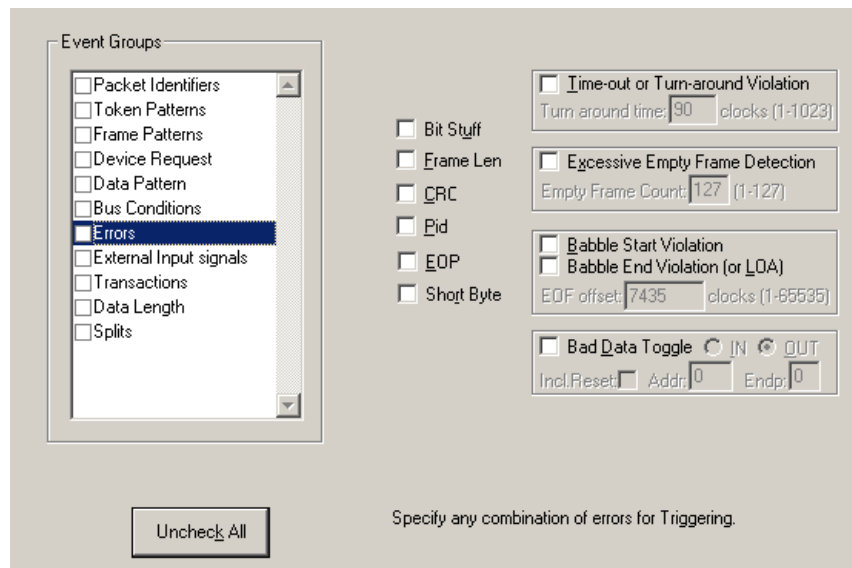


Use any combination of the listed errors as a Trigger.

Errors

- Select **Errors** under **Event Groups**.

You see the **Errors** window:



Use any combination of the listed errors as a Trigger.

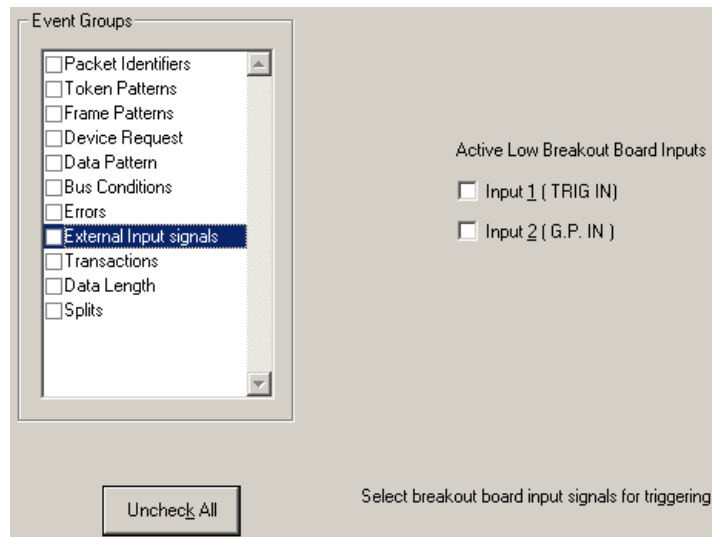
- **Bit Stuffing, Frame-Length, CRC, Pid, EOP Checkboxes** - Select one or more of these errors to set these as the basis for triggering or filtering.

- **Time-out or Turn-around Violation** - Select this checkbox and then enter in the Turn-around time in the text box. This value tells the analyzer how much time should elapse before triggering/filtering. Clocks are 60 MHz (16.66 ns).
- **Excessive Empty Frame Detection** - Select this option and enter the empty frame count in the text box. This value tells the analyzer how many frames should elapse before triggering/filtering.
- **Babble Start Violation** - Select this checkbox to trigger or filter whenever the start of a packet occurs too late in a Frame.
- **Babble End Violation (or LOA)** - Select this to trigger/filter when the end of a packet occurs too late in a Frame. Enter a value in the **EOF offset** box from 1 to 65,535 clocks to indicate the size of the offset from start of previous SOF.
- **Bad Data Toggle** - Select this checkbox to trigger or filter whenever a Data0, Data1, Data2 toggle violation occurs.
 - Select **IN** or **OUT** if you only want triggering/filtering to occur only on IN or OUT transactions.
 - Check **Incl. Reset** if you want the first toggle value after a reset to be considered “good” regardless of the value prior to that reset. If Unchecked, toggle state will be assumed to be preserved through the reset.
 - Select **Addr** and/or **Endp** to select Token Addresses and/or Endpoints.

External Input Signals

- Select **External Input Signals** under **Event Groups**.

You see the **External Input Signals** window:



This window has two checkboxes: **Input 1 (TRIG IN)** and **Input 2 (G.P. IN)**. Use any combination of the inputs as a Trigger.

Transactions

- Select **Transactions** under **Event Groups**.

You see the **Transactions** window:

The screenshot shows the 'Event Groups' window. On the left, a list of checkboxes includes 'Packet Identifiers', 'Token Patterns', 'Frame Patterns', 'Device Request', 'Data Pattern', 'Bus Conditions', 'Errors', 'External Input signals', 'Transactions' (which is checked), 'Data Length', and 'Splits'. At the bottom left is an 'Uncheck All' button. On the right, there are three transaction configuration panels. Each panel has a title ('Transaction #1', 'Transaction #2', 'Transaction #3'), a table with headers 'Token PID', 'Addr', 'Endp', and 'Handshake', and a 'Data' field with an 'Edit...' button. The 'Token PID' field in each panel has a dropdown menu with 'Any' selected.

Use any combination of the listed errors as a Trigger.

Data Length

- Select **Data Length** under **Event Groups**.

You see the **Data Length** window:

The screenshot shows the 'Data Length' configuration window. On the left, under 'Event Groups', a list of options includes Packet Identifiers, Token Patterns, Frame Patterns, Device Request, Data Pattern, Bus Conditions, Errors, External Input signals, Transactions, Data Length (which is selected and highlighted in blue), and Splits. On the right, under 'Data Length', there are four radio button options: 'Equal to' (selected), 'Not Equal to', 'Less than', and 'Greater than'. Next to these is a text input box. Below the radio buttons, it says 'Range: 0-2047 Bytes, decimal' and '(Legal USB values are 0-1024)'. At the bottom left is an 'Uncheck All' button, and at the bottom right is the text 'Trigger on specific data lengths or range.'

To trigger on data length, enter a value between 0 and 1024 in the box marked **Data Length**.

Splits

- Select **Splits** under **Event Groups**.

You see the following window.

The screenshot shows the 'Splits' configuration window. On the left, under 'Event Groups', the list of options includes Packet Identifiers, Token Patterns, Frame Patterns, Device Request, Data Pattern, Bus Conditions, Errors, External Input signals, Transactions, Data Length, and Splits (which is selected and highlighted in blue). On the right, there are several configuration sections: 'Split Type' with radio buttons for 'Start', 'Complete', and 'Don't Care' (selected); 'Endpoint Type' with a dropdown menu set to 'Any'; 'Addresses' with input boxes for 'Hub' and 'Port'; 'FS Isoch Out' with a dropdown menu set to 'Any'; 'Speed (S)' with radio buttons for 'Full', 'Low', and 'Don't Care' (selected); and 'E' with radio buttons for '0', '1', and 'Don't Care' (selected). At the bottom left is an 'Uncheck All' button, and at the bottom right is the text 'Specify USB Split events for triggering/filtering'.

Selecting Splits allows you to trigger on the attributes of a Split Packet.

6.3 Actions Recording Options

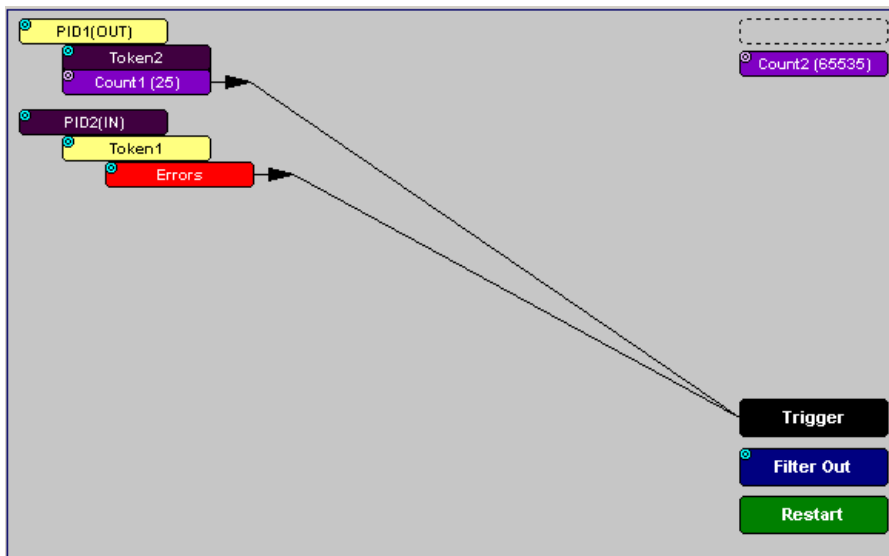
The **Actions** screen serves as a means of setting **Triggers**, **Filters (In or Out)**, and **Counts** for the events selected in the Events window.

Actions Window Layout

The Actions window displays buttons for the events selected in the **Events** window. Events buttons tell Advisor what it should look for during a recording. The number of Event buttons displayed depends on the number of Events selected in the Events window. If no Events are selected, no Event buttons are displayed.

The upper right corner of the window displays a pair of counters called **Count1** and **Count2**. Counters provide a way for setting triggers based on a passage of a certain number of events. When an event is linked to a counter, the counter attaches below that event. In the following example, Advisor is set to trigger following an In Packet Identifier, then a 25 counts of a token *or* an In Packet Identifier, then a Token, then an Error.

The lower right corner displays the **Trigger**, **Filter Out**, and **Restart** buttons. Action buttons controls the Advisor response to Event conditions.



For example, if an Error button is linked to a Trigger button, the Action button tells Advisor to trigger when the error condition occurs.

The lines that join the different buttons indicate the links between Actions and Events.

6.4 Connecting Events to Actions

To create or edit links between Event buttons, Counters, and Action buttons, you click on an Event button and then click on a Counter or Action. By clicking on an Event, you will cause an arrow to appear that connects the Event button to your mouse. When you click on a Counter or Action button, the arrow becomes anchored to the selected button.

To make an association,

Step 1 Select one or more Events from the Events window.

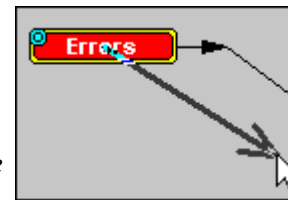
Step 2 Open the Actions window.

Step 3 Click the left mouse button on an Event button such as **Errors**.

The elastic arrow appears.

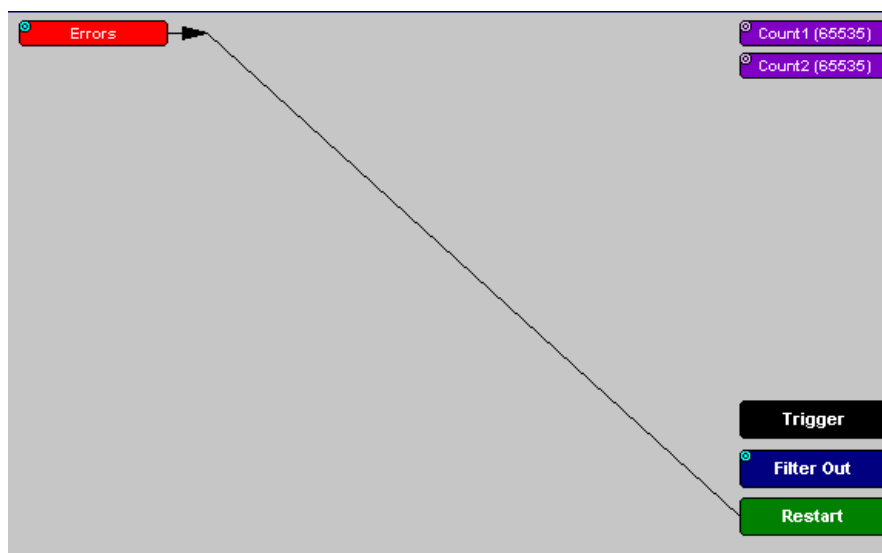
Step 4 Point your mouse at the desired Action button.

The elastic arrow will move with your mouse pointer.



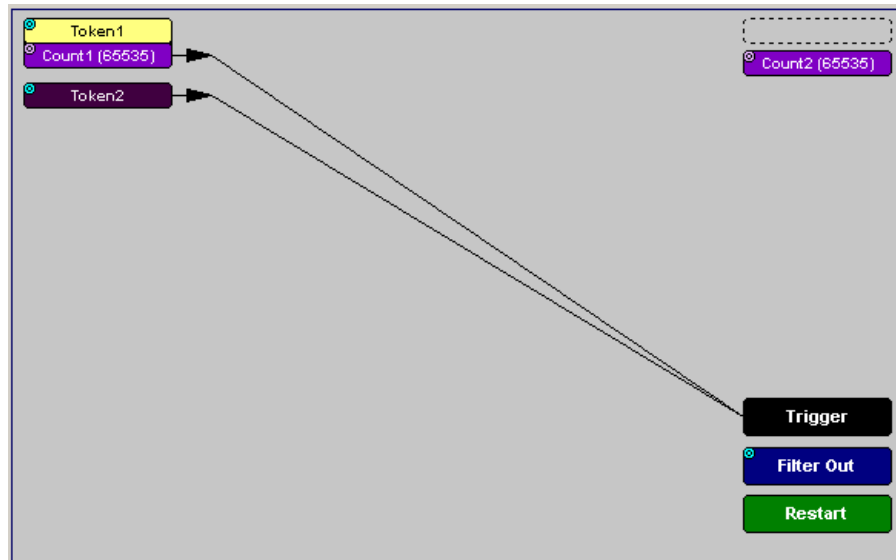
Step 5 With the pointer over an Actions button, click again the left mouse button again.

The arrow is anchored to the Action button. replaced with a black line connecting the Event button to the Action button.



6.5 Connecting Counters to Events

The center section of the Actions window displays two Counter buttons marked **Count1** and **Count2**. Counters provide a way of triggering after a number of events have passed, such as "Trigger after the 20th IN packet." Counters have blue dots in their top left



corner that provide access to pop-up menus. The menus provide the means of setting the counter value. The counter can be set between 1 and 65,535.

To connect an event to a counter,

Step 1 Open the Event window and select an Event.

Selecting an Event will cause an Event button to automatically appear in the Actions window.

Step 2 Open the Actions window.

The window will display an Event button that is connected to the Trigger button on the right via a line.

Step 3 Click the Event button.

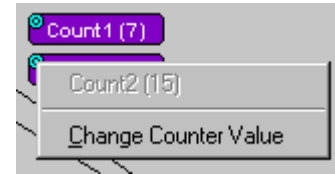
An arrow will appear that will connect the Event button to your mouse pointer.

Step 4 Click one of the two counters.

The Event will automatically connect to the Counter button and then connect to the Trigger button.

- Step 5** Click the blue dot in top left corner of your selected counter.

A pop-up menu will open. This menu lets you configure the counter.

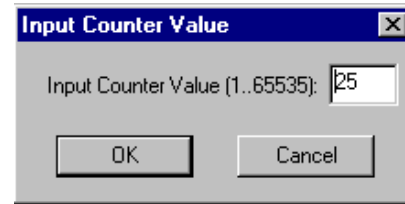


- Step 6** Choose **Change Counter Value**.

A dialog box will open.

- Step 7** Set the counter to a value of your choice, then click OK.

The dialog box will close and the Counter button will display your selection.

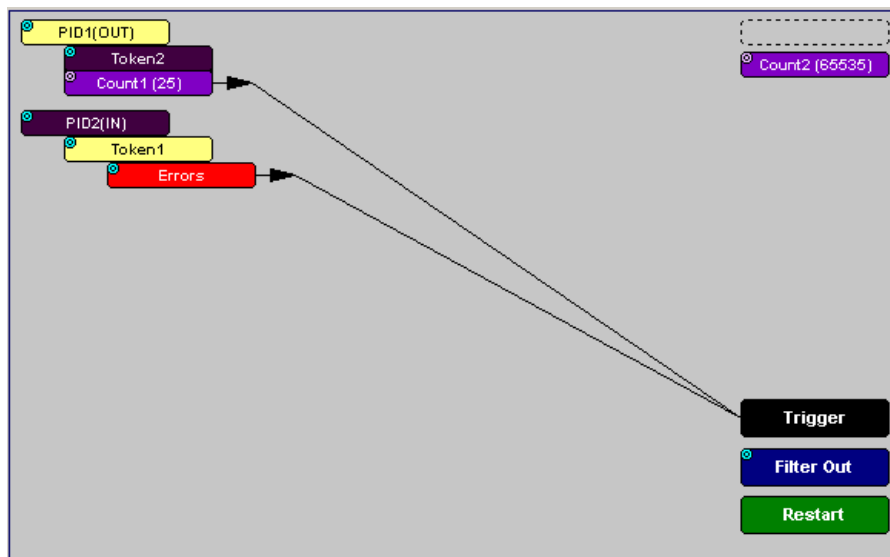


Setting Multiple Conditions with Counters

You can create multiple event conditions by linking two counters to two or more events.

Linking Two Events to Two or More Counters - If an Event is linked to **Count1** and a second event is linked to **Count2**, it creates an "or" statement. This statement reads "Trigger when Count1 OR Count2 has reached their specified values."

In this example, Advisor is set to trigger following an In Packet Identifier, then 25 counts of a token *or* an In Packet Identifier, then a Token, then an Error.



6.6 Using Action Buttons

The right section of the Actions window displays three Action buttons labeled **Trigger**, **Filter Out/In**, and **Restart**.



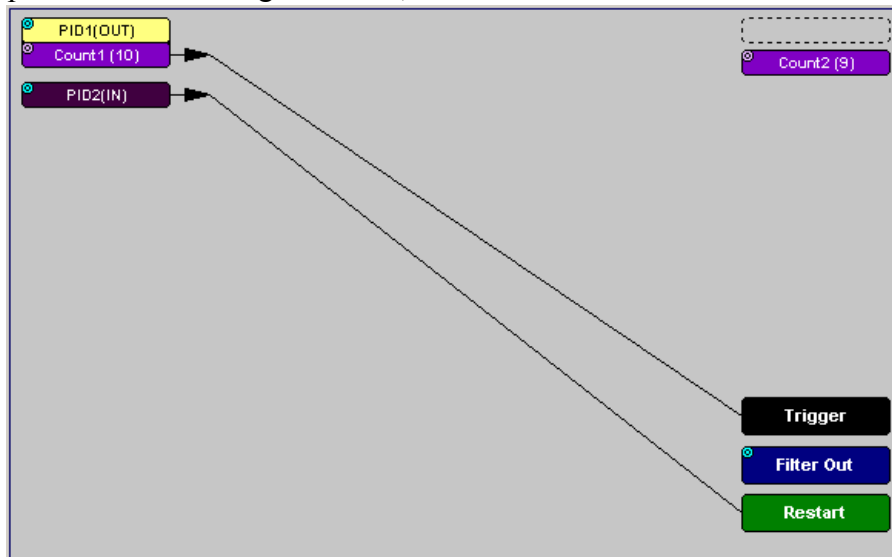
Trigger

The **Trigger** button enables event triggering.

Restart

Restart causes counters to restart counting when a certain event occurs. When Restart is used there will be at least two links on the screen: one between an Event and the Restart button, and a second between an Event, Counter and an Action button.

The screenshot below gives an example. The screen below reads "Look for IN and Out packets. When 10 OUT packets, trigger. However, if an IN packet occurs during the count, restart the count."



Filter Out/In

The **Filter In/Out** button causes events to be filtered in or out of the recording. **Filter Out/In** toggles between "**Filter Out**" and "**Filter In**".

- **Filter In** records ONLY those packets related to the specified event.
- **Filter Out** records all packets EXCEPT those related to the

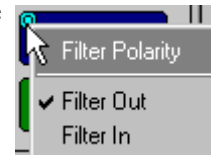
specified event.

Note Only events from the Token, Frame Event, Device Request, and Transaction Groups can be used to filter a recording.

To filter in or out Token, Frame Event, Device Request, and/or Transaction Group events from a recording,

Step 1 Click the blue dot on **Filter Out**. (Note: the button may say **Filter In** depending on the last action specified.)

You see the **Filter Out/In** menu:



Use this menu to toggle the selection between **Filter Out** and **Filter In**.

Step 2 Select "**Filter In**".


The button changes to read "Filter In."

6.7 Other Actions: External Output Signals

Most Event buttons can be configured to trigger external output signals.

If a blue dot is present in the Event button, it means that a menu is present with three options for configuring external output signalling:

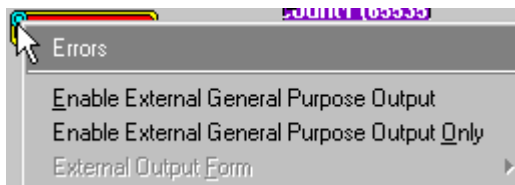
- Enable External General Purpose Output
- Enable External General Purpose Output only
- External Output Form

If you choose to enable External Output signalling, a small blue arrow  will project from the Event button. This arrow is a reminder that External Signals have been set.

To enable or disable external trigger output,

Step 1 Click the blue dot on an Event button.

A menu similar to the one below will open. Your menu may say "Disable" instead of "Enable."



Step 2 Select "**Enable External Trigger Output**" (or "**Disable**

External Trigger Output" if that is the choice presented.)

If you have chosen "**Enable External Trigger Output**", a small arrow will appear on the right side of the button. This arrow indicates that a condition has been set for creating an external output signal. Choosing "**Disable External Trigger**" will cause the arrow to disappear.



Enabling High Pulse, Low Pulse or Pulse Toggle Signal Outputs

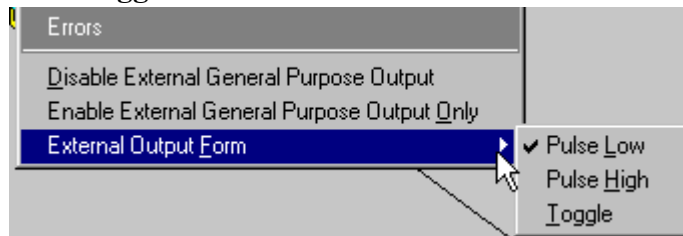
If you chose "**External Trigger Output**" in the previous steps, then an additional choice will appear in the Blue Dot Menu called "**Enable External Trigger.**" This option lets you control the output signal.

Step 1 Click the blue dot on an event button that has a small arrow attached to it like the one shown above.

A Blue Dot Menu will open. "**External Trigger Form**" should be a choice available. If it is not, you will need to choose "**Enable External Trigger**" and then reopen the menu.

Step 2 Choose "**External Trigger Form.**"

A menu will appear with choices for "**Pulse Low,**" "**Pulse High,**" and "**Toggle.**"



Step 3 Choose an option not currently selected.

The menu closes.

Step 4 Reopen the menu.

Note that your new selection is now checked.

6.8 Saving Recording Options

To complete your Recording Options settings, use the features at the bottom of the **Recording Options** screen. These features remain the same no matter which of the three Recording Options screens you are working in.


- Click **Save** to save the currently specified Recording Options for use in future recording sessions. Any file name can be specified, though use of the **.rec** is recommended; if no extension is specified, **.rec** is added by default.
- Click **Load** to load a previously saved ***.rec** file, thus restoring a previous set of Recording Options.
- The **Save as Default** function is equivalent to the **Save** function, specifying the file name **default.rec**. Whenever you start up the Analyzer, it automatically loads the **default.rec** file if one exists.
- Click **OK** to apply any changes and close this dialog box.
- Click **Cancel** to cancel any immediate changes you have made and exit the Recording Options menu.

6.9 Recording Bus Data

To start recording USB traffic once the appropriate Recording Options have been set perform the following steps. Note: If you have inserted any event triggers, be sure to select *Event Trigger* under the General tab in the Recording Options dialog box.

Step 1 Select **Start** under **Record** on the Menu Bar

OR


Click  on the Tool Bar.

Your recording session can continue until it has finished naturally or you may need to stop manually by clicking  on the Tool Bar, depending on how you set the Recording Options.

To manually stop recording,

Step 2 Select **Stop** under **Record** on the Menu Bar

OR

Click  on the Tool Bar.

Note The manual Stop Recording feature is primarily of use when recording low-speed traffic, which can take a long time to fill the recording buffer.

While uploading is still in progress, hitting the stop button will open a dialog that contains the following options:


- Partial Upload - loads only a portion of the trace.
- Flush current File
- Keep only what was uploaded so far.
- Continue uploading.

When the recording session is finished, the bus traffic is saved to the hard drive as a file named **data.usb** or whatever name you assign as the default filename.

To save a current recording for future reference,

Step 3 Select **Save As** under **File** on the Menu Bar.

OR

Click  on the Tool Bar.

You see the standard **Save As** screen.

Step 4 Give the recording a unique name and save it to the appropriate directory.

6.10 Merging Trace Files

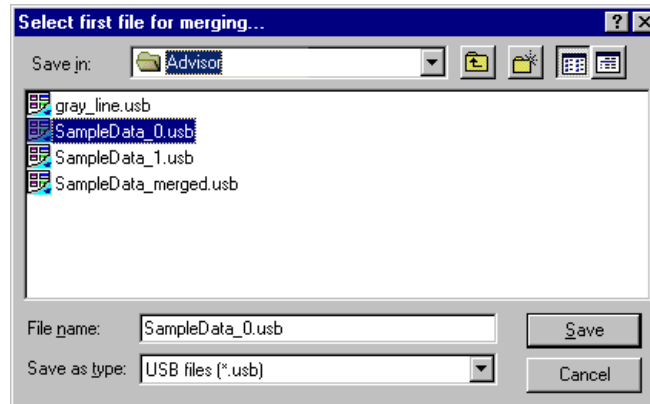
It is possible to merge a Classic-Speed trace file with a Hi-Speed trace file using the "Merge Trace File" command under the File menu. This option only works with files that were created simultaneously through a single recording session. If the files were recorded during separate recording sessions, Advisor will generate an error message and prevent the merge from completing.

Note Advisor is capable of merging High Speed and Classic Speeds traffic into a single merged file if the **Auto-Merge 2 Channel Trace Files** option is checked in the Recording Options dialog box. See page 47 for details.

To merge two trace files,

Step 1 Select
File>Merge Trace Files

A dialog box will open asking for the first source file.



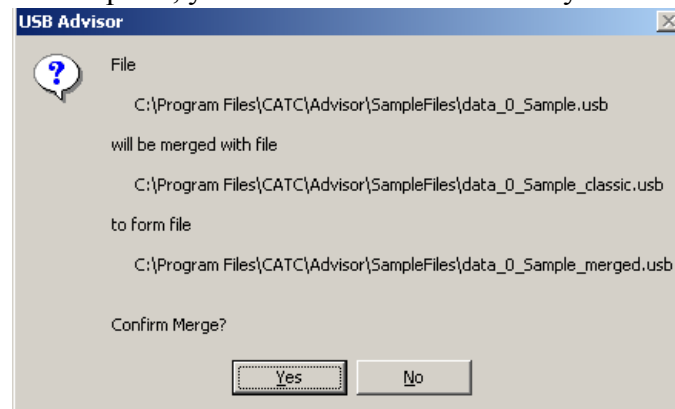
Note The **Merge Trace Files** command can be run with or without a trace file open on the screen. The merge process will ignore the open file.

Step 2 Select the first trace file to be merged, then click Save.

Note It does not matter which of the two trace files is first selected so long as both were recorded in the same session.

Step 3 Select the second trace file to be merged, then click Save.

At this point, you will be asked to confirm your choices.



Step 4 Click Yes.

At this point the two files will be merged into the new file data_merged.usb.

Note If you attempt to merge two files that were recorded in separate recording sessions, the following error message will appear:




7. Display Options

Use the **Display Options** menu to specify the way CATC Trace information is displayed.

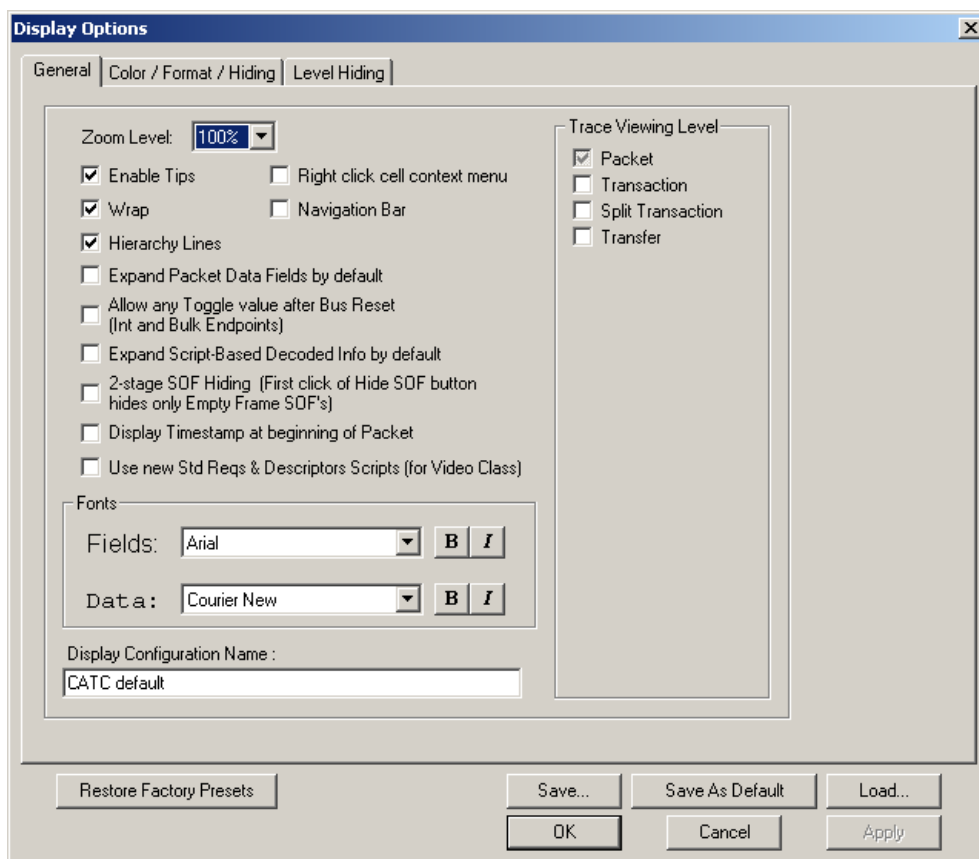
To open the **Display Options** menu,

- Select **Display Options** under **Setup** on the Menu Bar

OR

- Click  on the Tool Bar

You see the **Display Options** window:



Use the General Display Options to specify the basic appearance of a Trace View.

7.1 General Display Options

Use the General Display Options to specify the basic appearance of a Trace.

- **Zoom Level:** Adjustable in discrete increments from 10% to 200% percent.
- **Enable Tool Tips:** Select to enable tool tips with explanation text to pop up when you position your cursor over various fields in the Trace View.
- **Right click cell context menu:** This option activates the right mouse button so that when clicked it displays pop-up menus in the trace. Normally, the left mouse button is used to display context-sensitive pop-up menus.
- **Navigation Bar:** When selected, opens the Trace Navigator whenever the software is opened.
- **Wrap:** Moves long strings of trace data to the next line so you don't need to scroll sideways to view it.
- **Hierarchy Lines:** Displays lines along the left side of the trace window that show the hierarchical relationship between the Packets, Transactions, Split Transactions, and Transfers.
- **Expand Packet Data Fields by Default:** When selected packet data fields are expanded whenever the software is opened.
- **Allow any Toggle Value after Bus Reset (Int and Bulk Endpoints):** When selected any toggle value is allowed after resetting the BusEngine.
- **Expand Script-based Decoded Info by default:** Expands by default fields using script-based decoding.
- **2-stage SOF Hiding (First click of Hide SOF button hides only Empty Frame SOF's):** Modifies the behavior of the Hide SOF button. If enabled, the Hide SOF button works in two stages. Click once to hide all SOFs that begin frames with no USB traffic. Click twice to hide all SOFs.
- **Display Timestamp at beginning of Packet:** Causes the timestamp to reposition from the end of the packet to the front.
- **Use New Std Reqs and Descriptors Scripts (for Video Class):** To support decoding of the Video Class, it was necessary to re-write the mechanism by which Standard Requests and Descriptors are decoded. This is because most of the Video

configuration information is passed in the Standard GET_DESCRIPTOR (Config) descriptor bundle, along with the endpoint and interface descriptors, etc. For non-Video traffic, leave this unchecked so the existing Hid, Audio, and other descriptors get decoded by the legacy decoder files.

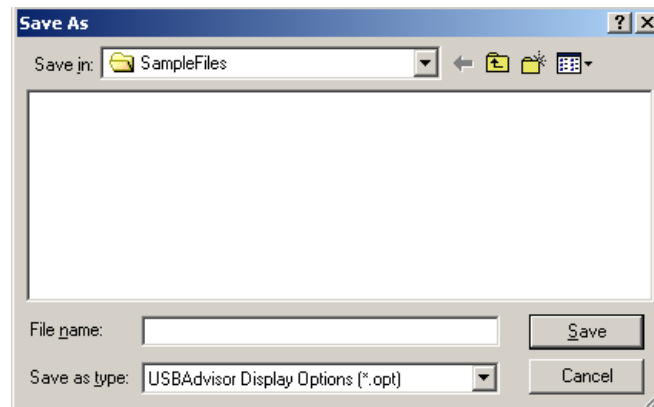
- **Trace Viewing Level:** Allows packets to be displayed as
 - Packets
 - Transactions
 - Split Transactions
 - Transfers
- **Fonts:** Lets you define the appearance of Field and Data text.
- **Display Configuration Name:** Provides a comment field that serves as a descriptive label for the current Display Options file (*.opt).

Saving Display Options for Future Use

To create a new Display Options file, follow these steps:

- Step 1** Enter a comment for the new file in the **Display Configuration Name** field.
- Step 2** Click **Save...**

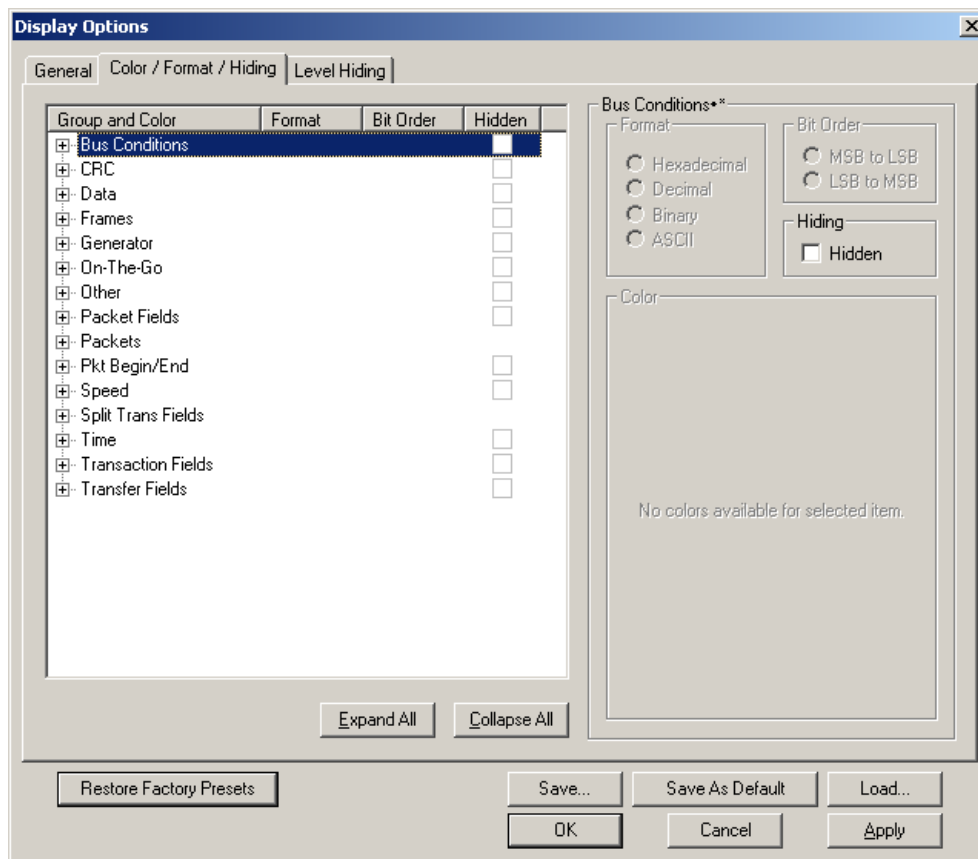
*You see the **Save As** window.*



- Step 3** Specify a filename (*.opt).
- Step 4** Click **Save**.

7.2 Color/Format/Hiding Display Options

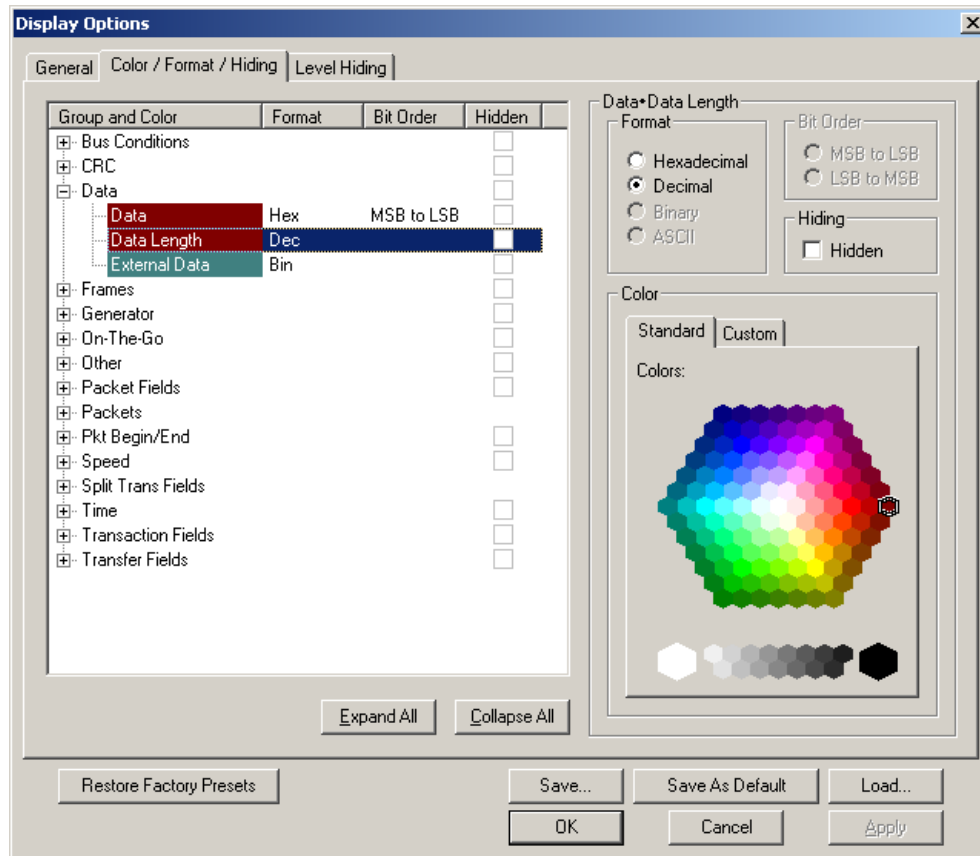
Select the Color/Format/Hiding tab in the Display Options window.



The Color/Format/Hiding Display Options window allows you to specify color fields, specify formats of trace data, and hide certain types of data.

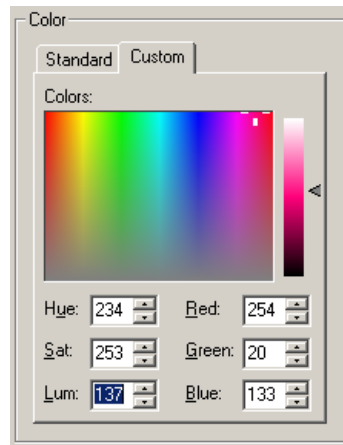
7.3 Color Display Options

To specify colors in the display, select an item in the Group and Color column and make the desired color changes in the color pallet screen.



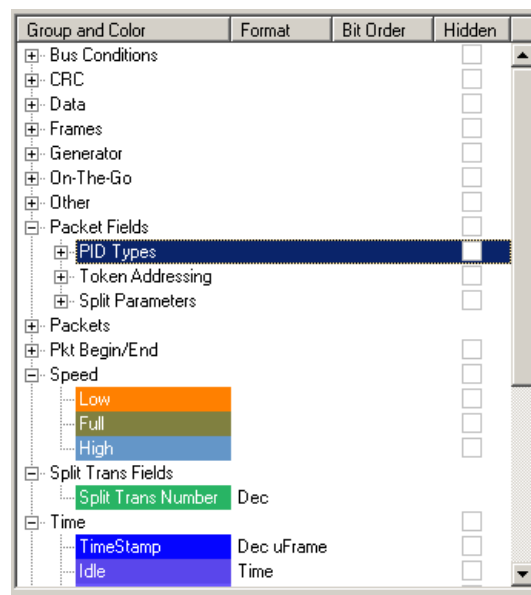
Use this menu to customize the colors associated with each field in the Trace View. You can experiment with this option to achieve the color combination best suited to a particular graphic system. A brighter color might be appropriate for a specific field that should stand out in the display (e.g. the PID Types).

You can also customize the colors by using the options in the Custom tab.

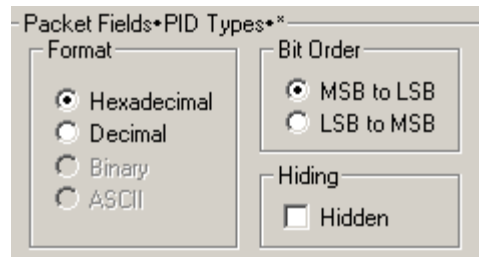


7.4 Formats Display Options

Select an item under the Group and Color column to enable the formats radio buttons in the Format section. The format types changes with respect to the item you select under the Group and Color column. For example, if you select an item under Packet Fields, you get the following:



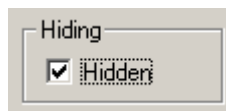
The following formats are available:



Not every format is available for every item.

7.5 Hiding Display Options

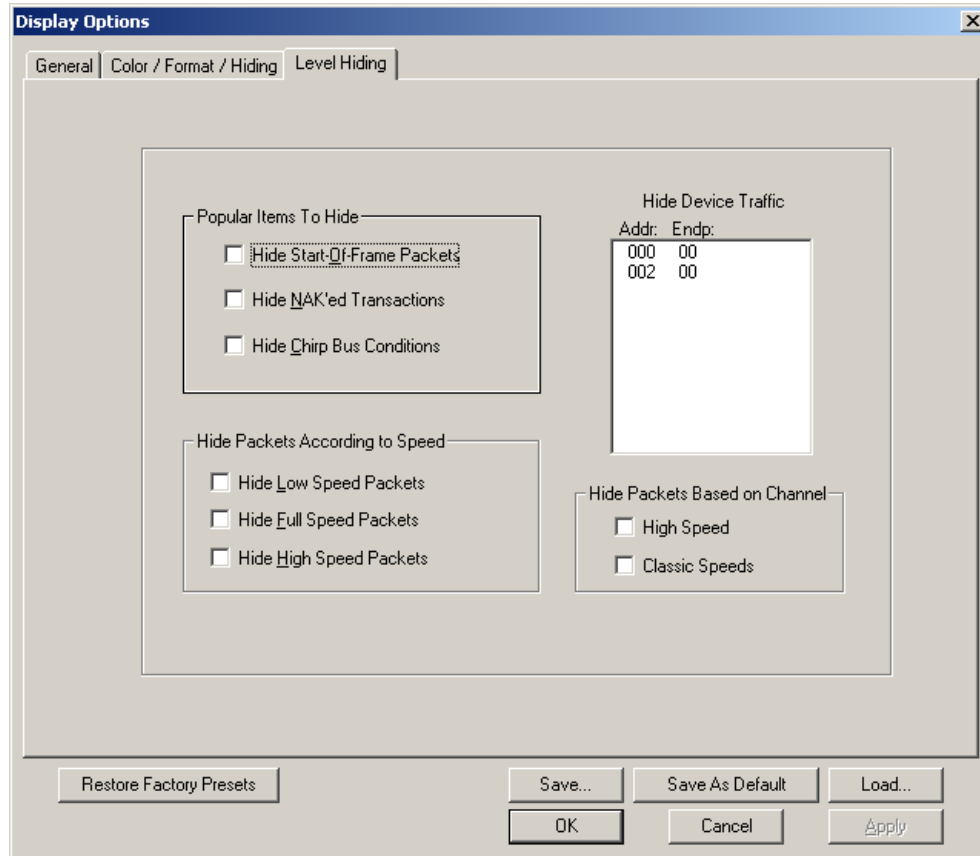
To hide one or more fields from the trace, select the appropriate item from the Group and Color column, click the Hidden checkbox, and click the Save button.



You can also hide packets and transactions from a trace, selecting the desired options from the checkboxes. You can hide SOFs, NAKs, High, Full or Low Speed packets, traffic from one or both recording channels, and Address and Endpoint.

7.6 Level Hiding Display Options

The Level Hiding tab allows you hide whole packets such as Start of Frame packets. Select the Level Hiding tab.



7.7 Saving Display Options

To complete your Display Options settings, use the features at the bottom of the **Display Options** screen. These features remain the same no matter which of the four Display Options screens you are working in.

- Click **Save** to save the currently specified Display Options for use in future sessions. Any file name can be specified, but you must use the **.opt** extension. If no extension is specified, **.opt** is added by default.
- Click **Load** to load a previously saved ***.opt** file, thus restoring a previous set of Display Options.

- The **Save as Default** function is equivalent to the **Save** function, specifying the file name **default.opt**. Whenever you start up the Analyzer, it automatically loads the **default.opt** file if one exists.
- Click **OK** to apply any changes you have made to Display Options and close this dialog box.
- Click **Cancel** to cancel any immediate changes you have made and exit the Display Options menu.
- Click **Apply** to apply your changes while keeping the Display Options window open.


8. Reading a Trace

0	Packet	Dir	H	SOF	Frame #	CRC5	Pkt Len	Idle	Time Stamp
	0	-->	S	0xA5	1156.?	0x1C	12	124.767 μ s	00000.4056 3910
0	Packet	Dir	H	SOF	Frame #	CRC5	Pkt Len	Idle	Time Stamp
	1	-->	S	0xA5	1156.?	0x1C	14	124.767 μ s	00000.4057 3908
0	Packet	Dir	H	SOF	Frame #	CRC5	Pkt Len	Idle	Time Stamp
	2	-->	S	0xA5	1156.?	0x1C	12	124.800 μ s	00000.4058 3908
0	Packet	Dir	H	SOF	Frame #	CRC5	Pkt Len	Idle	Time Stamp
	3	-->	S	0xA5	1156.?	0x1C	12	124.800 μ s	00000.4059 3908
0	Packet	Dir	H	SOF	Frame #	CRC5	Pkt Len	Idle	Time Stamp
	4	-->	S	0xA5	1156.?	0x1C	12	124.767 μ s	00000.4060 3908

8.1 Trace View Features

- The Advisor packet view display makes extensive use of color and graphics to fully document the captured traffic.
- Packets are shown on separate rows, with their individual fields both labeled and color coded.
- Packets are numbered (sequentially, as recorded), time-stamped (with a resolution of 16.67 ns), and highlighted to show the transmitted speed (low-speed, full-speed or high-speed).
- Display formats can be named and saved for later use.
- Pop-up Tool Tips annotate packet fields with detailed information about their contents.
- Data fields can be collapsed to occupy minimal space in the display (which can in turn be zoomed in and out to optimize screen utilization).
- The display software can operate independent of the hardware and so can function as a stand-alone Trace Viewer that may be freely distributed.
- High Speed SOFs display Microframes (shown below.)

0	Packet	Dir	H	SOF	Frame #	CRC5	Pkt Len	Idle	Time Stamp
	0	-->	S	0xA5	1156.?	0x1C	12	124.767 μ s	00000.4056 3910
0	Packet	Dir	H	SOF	Frame #	CRC5	Pkt Len	Idle	Time Stamp
	1	-->	S	0xA5	1156.?	0x1C	14	124.767 μ s	00000.4057 3908



Microframes

8.2 Set Marker

You can define a unique Marker for each packet.

To place a marker on a packet,

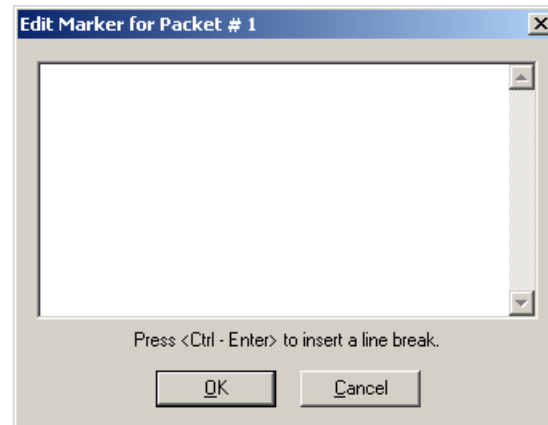
Step 1 Left-click on **Packet #** for the packet you wish to mark.

You see the **Packet** menu:

0	Packet	Dir	H	SOF	Frame #	CRC5	Pkt Len	Idle	Time Stamp
0	3				1156.?	0x1C	12	124.800 μ s	00000.4059 3908
0	4				1156.?	0x1C	12	124.767 μ s	00000.4060 3908
0	5				1156.?	0x1C	14	124.767 μ s	00000.4061 3906
0	6				1157.0	0x03	12	124.800 μ s	00000.4062 3906
0	7				1157.1	0x03	12	124.767 μ s	00000.4063 3906

Step 2 Select **Set Marker**.

You see the **Edit Marker Comment** window where you can enter a unique comment about this packet:



Step 3 Enter your comment.

Step 4 Click **OK**.

A marked packet is indicated by a vertical red bar along the left edge of the packet # block:

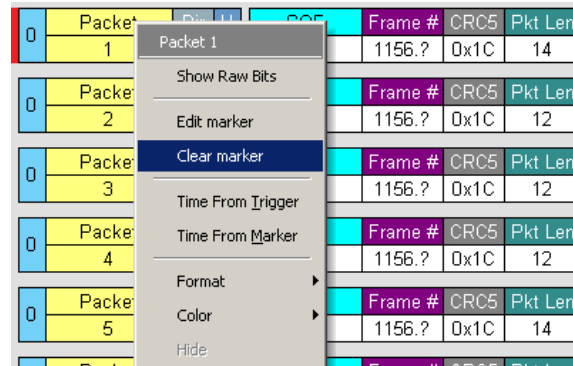
0	Packet	Dir	H	SOF	Frame #	CRC5	Pkt Len	Idle	Time Stamp
0	1	-->	S	0xA5	1156.?	0x1C	14	124.767 μ s	00000.4057 3908

8.3 Edit or Clear Marker

To clear or edit the comments associated with a packet marker,

Step 1 Left-click on **Packet #** for the chosen packet.

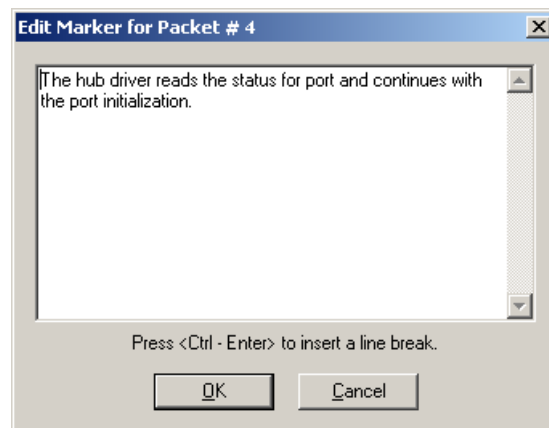
You see the **Packet** menu:



To edit the Marker Comment,

Step 2 Select **Edit Marker Comment**.

You see the **Edit marker comment** window:



Step 3 Edit the comment as desired.

Step 4 Click **OK**.

To clear a Marker,

Step 5 Click **Clear Marker**.

The vertical red Marker bar disappears.

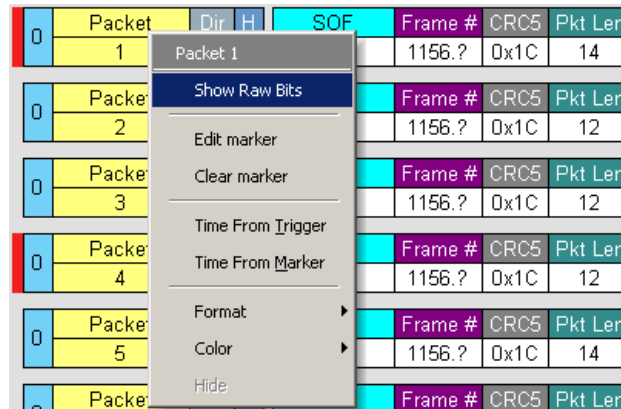
8.4 View Raw Bits

You can expand a specific packet to view the raw bits in detail.

To view the raw bits,

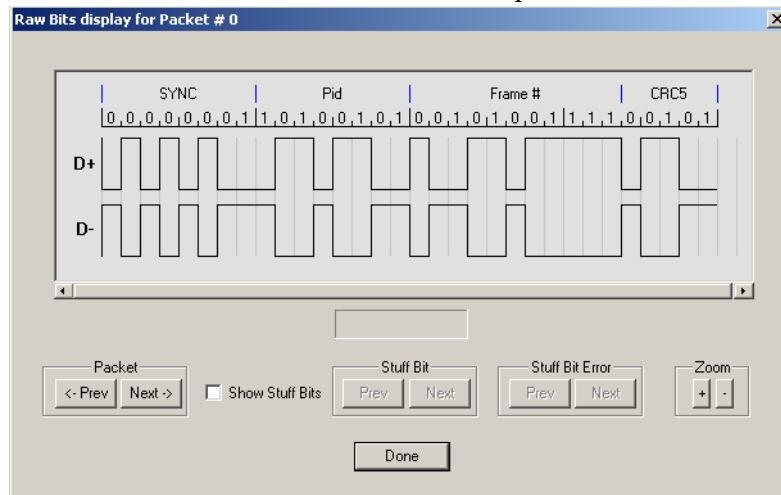
Step 1 Left-click on **Packet #** for the packet you wish to view.

You see the **Packet** menu:



Step 2 Select **Show Raw Bits**.

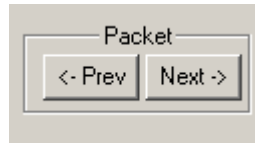
You see the Raw Bits View for that packet:



Along the top of the Raw Bits View is a linear strip of the logical bit values with corresponding field demarcations. Bit stuffing is displayed in color. Below the logical bit values is a representation of the D+/D- signaling complete with NRZ encoding. A scroll bar assists in navigation of larger packets. Two buttons under the label **Packet** are used to view previous or next packets. Two buttons under the label **Zoom** allow you to zoom in or out on packets.

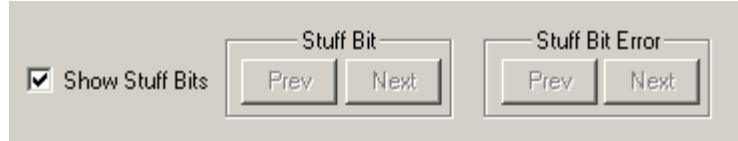
Using the Packet Buttons

The bottom left of the Raw Bits View contains buttons for navigating to different packets in the trace. Under Packet, the **Prev** and **Next** buttons allow you to show raw bits for the previous and forward packets in the trace.



Using the Stuff Bit Buttons

The bottom center of the Raw Bits View contains a checkbox and buttons for viewing Stuff Bits. Select the **Show Stuff Bits** checkbox and then click the **Prev** button to view previous stuff bits in a trace. Click the **Next** button to view show the next stuff bits in a trace. Under **Stuff Bit Error**, click the



Prev button to view previous stuff bit errors in a trace, and click Next to view stuff bits forward in a trace.

Using the Zoom Buttons

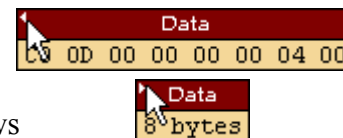
Use the buttons to view larger or smaller views of raw bits.

8.5 Expanding and Collapsing Data Fields

You can expand a Data field to view it in greater detail or collapse it when you want a more compact view.

Using the Expand/Collapse Data Field Arrows

Data Fields can be easily expanded or collapsed by clicking the small triangular arrows on the left side of the data field.



Double-Clicking to Expand/Collapse Data Fields

Data fields can also be expanded or collapsed by double-clicking anywhere in the data field.

Expanding or Collapsing All Data Fields

Expand or collapse all data fields by holding down the button for more than a second.

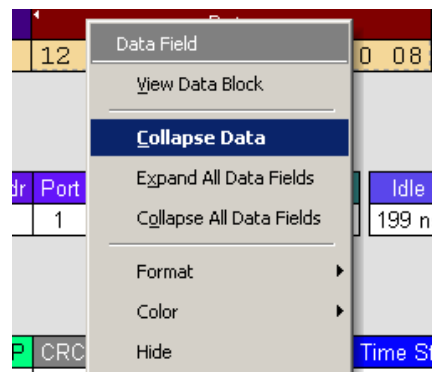
Using the Data Field Pop-up Menus

Data fields can be expanded or collapsed by clicking in a data field and selecting Expand Data or Collapse Data from the pop-up menu.

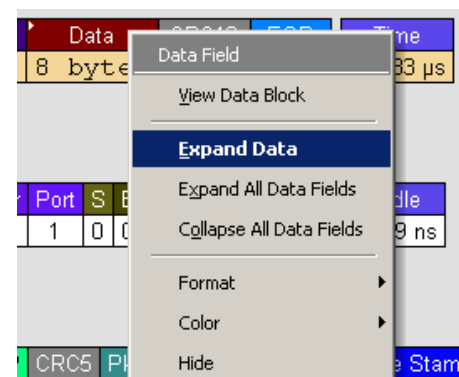
To expand and collapse data using the menu,

- Step 1** Left-click on **Data** in the Data packet you want to expand or collapse.

If your Data Trace View is currently expanded, you see the **Collapse Data** menu:



If your Data Trace View is currently collapsed, you see the **Expand Data** menu:



- Step 2** Select the desired Expand Data or Collapse Data menu item.

The Trace View is repositioned with the selected packet(s) adjusted in the format you have specified.

Expand or Collapse All Data Fields

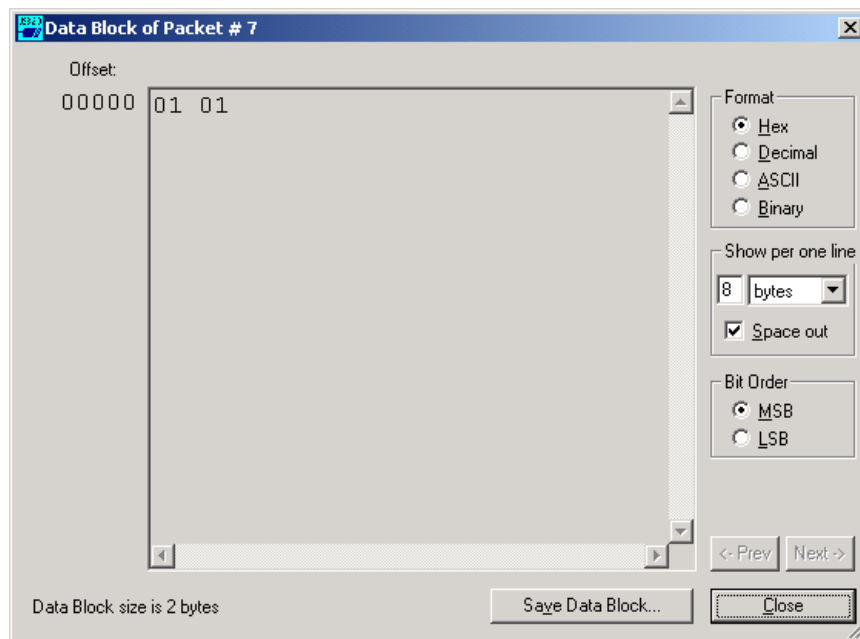
All data fields can be expanded or collapsed by selecting **Expand All Data Fields** or **Collapse All Data Fields** from the data field pop-up menus.

8.6 View Data Block

The data field pop-up menu has an option for viewing the raw bits in a data field. To view these bits,

- Step 1** Click in the data field to open the data field pop-up menu.
- Step 2** Select View Data Block.

The following dialog box will open.



The View Data Block window has options for displaying the raw bits in different formats:

Format - Lets you display data in Hex, Decimal, ASCII or Binary formats

Show Per Line - Lets you control how many bits are displayed per line

Bit Order - Most Significant Bit, Least Significant Bit

8.7 Pop-up Tool-tips


Many fields within the trace will display pop-up tool-tips when the mouse pointer is suspended over them. These tips provide added details about the field.

SETUP	ADDR	ENDP	CRC5	EOP	Idle	Time Stamp
0xEB	2	0	0x15	233 ns	183 ns	00004.2833 6330

Starts SETUP transaction to a control pipe


8.8 Hide SOF Packets

You can hide Start-of-Frame (SOF) packets that may be uninteresting in a given context from a Trace View by clicking the Hide SOF Packets button on the Tool Bar:


- Click  to hide all SOF packets.

8.9 Hide NAKs

You can hide NAKs that may be uninteresting in a given context from a Trace View by clicking the Hide NAKs button on the Tool Bar:

- Click  to hide all NAK packets.

8.10 Hide Devices

Click the  to open a tear-off window that allows you to select any address/endpoint combination that you want to hide.

8.11 Hide Chirps


Click the  to hide any Chirp-J or Chirp-K packets recorded in a USBTracer trace. Advisor does not record these signals.

8.12 Switch to Transactions View

A **Transaction** is defined in the USB specification as the delivery of service to an endpoint. This consists of a token packet, an optional data packet, and an optional handshake packet. The specific packets that make up the transaction vary based upon the transaction type.

The program default display mode is Packet View. Before you can view decoded transactions, you must switch from Packet View to Transactions View.

To select Transactions View,

Step 1 Click  to on the toolbar.

The Trace View screen is re-drawn to display Transactions.

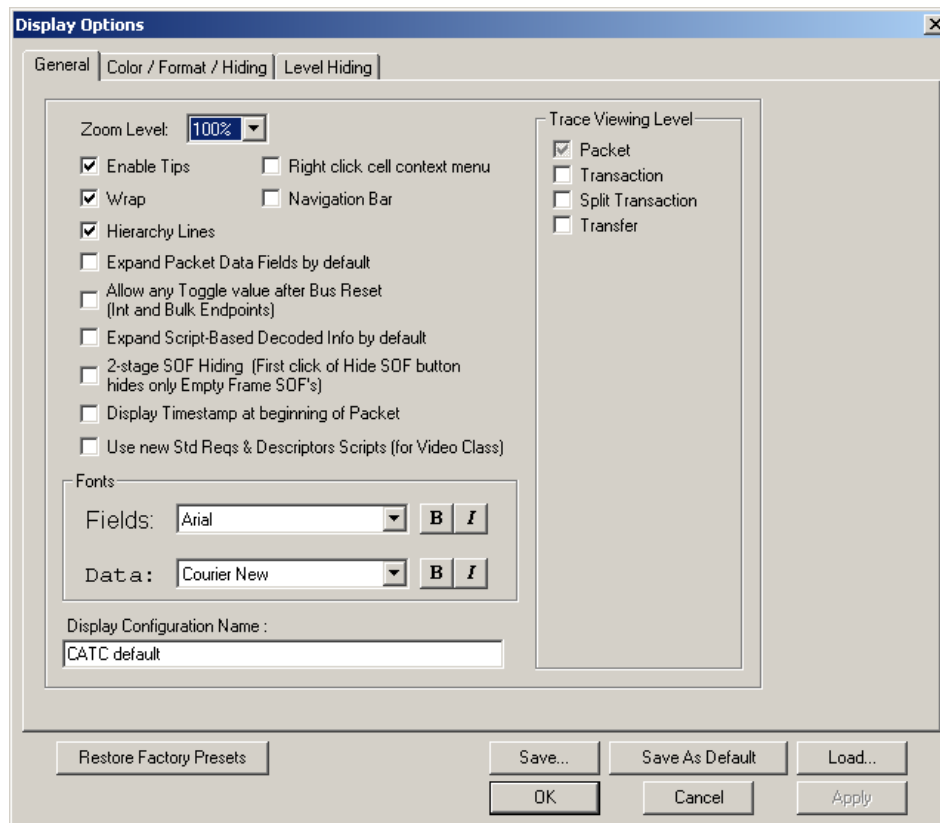
Transaction	H	CSplit	Hub Addr	Port	Speed	IN	ADDR	ENDP	NAK	Time			
7018	S	Ctrl	1	1	Full	0x96	2	0	0x5A	7.200 μs			
Transaction	H	SSplit	Hub Addr	Port	Speed	IN	ADDR	ENDP	ACK				
7019	S	Ctrl	1	1	Full	0x96	2	0	0x4B				
0	Packet	Dir	H	SPLIT	SC	Hub Addr	Port	S	E	ET	CRC5	Pkt Len	Idle
	43233	-->	S	0x1E	0	1	1	0	0	Ctrl	0x07	10	199 ns
Time Stamp													
00003.4058 3270													
0	Packet	Dir	H	IN	ADDR	ENDP	CRC5	Pkt Len	Idle	Time Stamp			
	43234	-->	S	0x96	2	0	0x15	8	400 ns	00003.4058 3292			
0	Packet	Dir	H	ACK	Pkt Len	Time	Time Stamp						
	43235	?	S	0x4B	6	550 ns	00003.4058 3324						

Note This menu selection displays a check mark next to **Show USB transactions** when you have selected it. When you want to switch back to Packet View mode, right-click anywhere in the trace window and then left-click on **Show USB transactions**.

You can also switch to Transaction View from the Menu Bar:

Step 1 Select **Display Options** under **Setup**.

You see the **Display Options General** window:



Step 2 Check **Transactions**.

Step 3 Click **OK**.

8.13 View Decoded Transactions

Once you set Display Options, the Trace View screen is re-drawn to display decoded transactions in the colors and format you selected.

Transaction	H	CSPplit	Hub Addr	Port	Speed	IN	ADDR	ENDP	NAK	Time			
7018	S	Ctrl	1	1	Full	0x96	2	0	0x5A	7.200 μs			
Transaction	H	SSplit	Hub Addr	Port	Speed	IN	ADDR	ENDP	ACK				
7019	S	Ctrl	1	1	Full	0x96	2	0	0x4B				
0	Packet	Dir	H	SPLIT	SC	Hub Addr	Port	S	E	ET	CRC5	Pkt Len	Idle
	43233	-->	S	0x1E	0	1	1	0	0	Ctrl	0x07	10	199 ns
Time Stamp													
00003.4058 3270													
0	Packet	Dir	H	IN	ADDR	ENDP	CRC5	Pkt Len	Idle	Time Stamp			
	43234	-->	S	0x96	2	0	0x15	8	400 ns	00003.4058 3292			
0	Packet	Dir	H	ACK	Pkt Len	Time	Time Stamp						
	43235	?	S	0x4B	6	550 ns	00003.4058 3324						

When you instruct the Analyzer to display USB transactions, the components of each transaction are collected from the current recording and are grouped and indented below each decoded transaction. Each row shows a transaction with a unique numeration, a label, and color-coded decoding of important data.

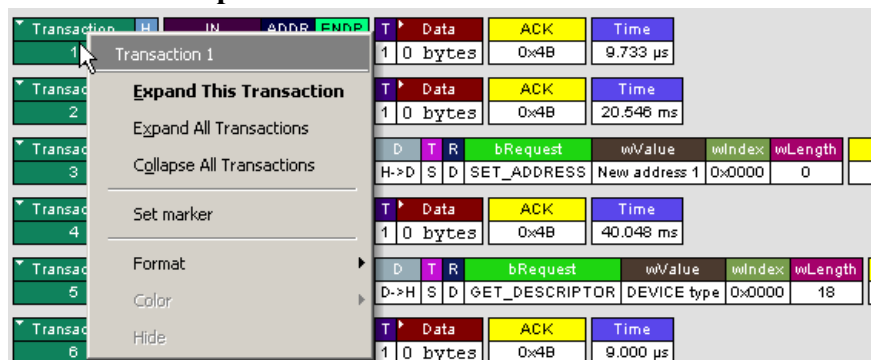
Expanded and Collapsed Transactions

You can expand a specific transaction to view its parts, which are grouped and indented below the transaction.

To expand a transaction,

Step 1 Left-click on the transaction number you wish to view.

You see the **Expand Transaction** menu:



Step 2 Select **Expand This Transaction**.

The screen displays the selected transaction in expanded format.

Note The Expand/Collapse transaction feature operates as a toggle: when one format is active, the other appears as an option on the Expand/Collapse drop-down menu.

To collapse a transaction, perform the same operation and select **Collapse This Transaction**.

Note that you can choose to expand or collapse

- **Only** the selected Transaction
- OR
- **All** Transactions.

It is not necessary to use the **Expand/Collapse Transactions** menu to shift between expanded and collapsed views of a transaction:

- Double-click in the Transaction number field to toggle back and forth between collapsed and expanded views.

8.14 Switch to Split Transaction View

To select Split Transaction View,

Step 1 Click the  button on the toolbar.

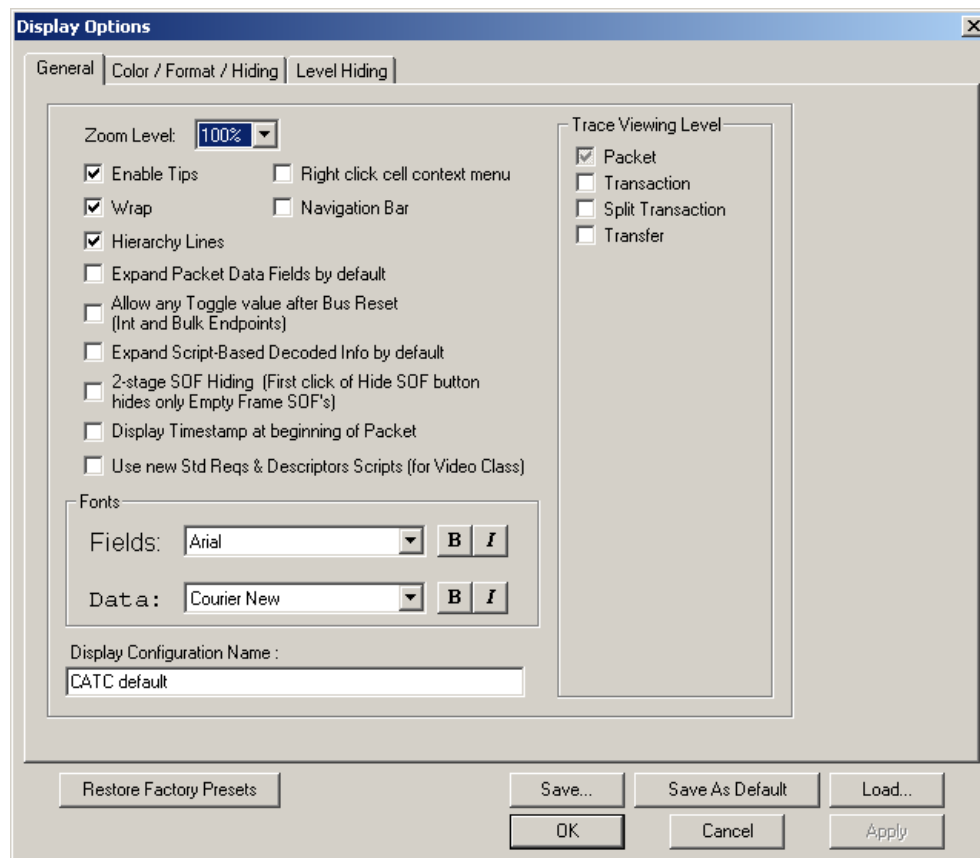
The Trace View screen is re-drawn to display Split Transactions.

Split Trans	L	IN	ADDR	ENDP	T	Data	ACK
44	H	0x96	3	0	1	12 01 00 01 00 00 00 08	0x4B

You can also switch to Split Transactions View from the Menu Bar:

Step 1 Select **Display Options** under **Setup**.

You see the **Display Options General** window:



Step 2 Check **Split Transactions**.

8.15 Switch to Transfer View

A **Transfer** is defined in the USB specification as one or more transactions between a software client and its function. USB transfers can be one of four kinds: Control, Interrupt, Bulk, and Isochronous. Advisor is capable of displaying all four types.

The default display mode is Packet View. Before you can view decoded transfers, you must switch from Packet View (or Transaction View) to Transfer View.

To select Transfer View,

Step 1 Click  on the toolbar.

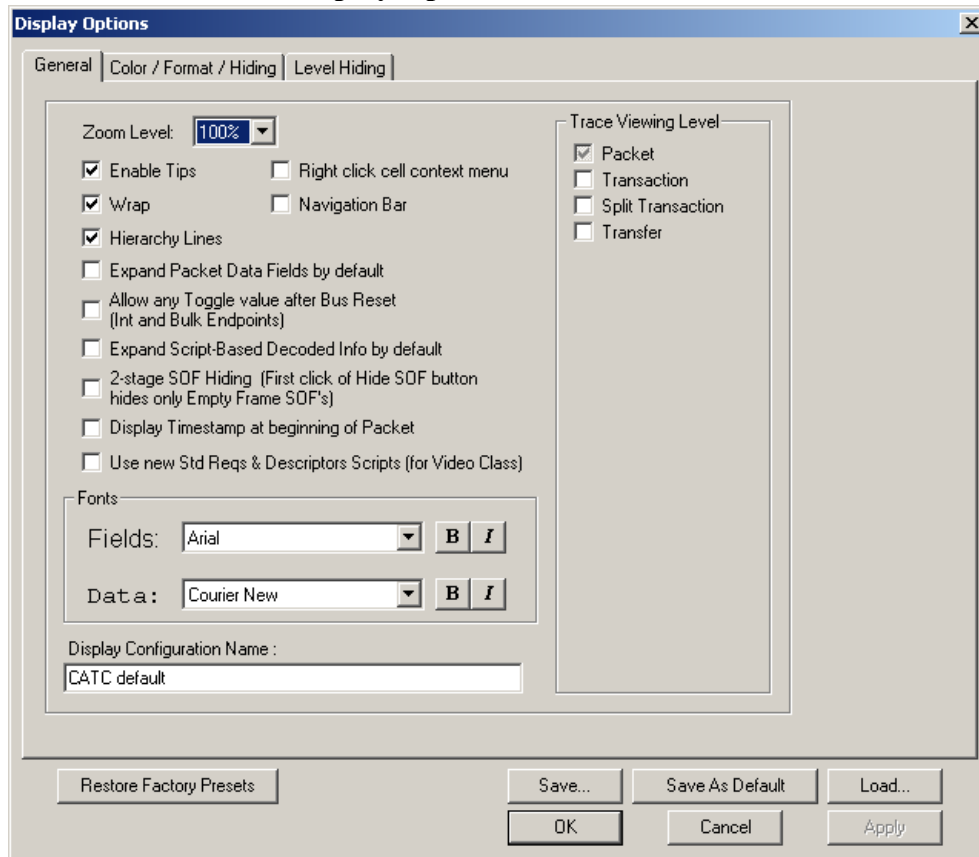
The Trace View screen is re-drawn to display Transfers.

Note Selecting **Show USB transfers** adds a checkmark next to this menu item. If you want to return to Packet View, open the menu and reselect **Show USB transfers**. This action will remove the checkmark and return the display to Packet View.

You can also switch to Transfer View from the Menu Bar:

Step 1 Select **Display Options** under **Setup**.

You see the **Display Options General** window:



Step 2 Check **Transfers**.

Step 3 Click **OK**.

8.16 View Decoded Transfers

Once you set Display Options, the Trace View screen is re-drawn to display decoded transfers in the colors and format you selected.

Transfer	F	Control	ADDR	ENDP	bRequest	wValue
8	S	SET	2	0	SET_CONFIGURATION	New configuration 1

Transaction	F	SETUP	ADDR	ENDP	D	T	R	bRequest	wValue
1415	S	0xB4	2	0	H->D	S	D	SET_CONFIGURATION	New configuration 1

wIndex	wLength	ACK	Time
0x0000	0	0x4B	36.333 μ s

Transaction	F	IN	ADDR	ENDP	NAK
1416	S	0x96	2	0	0x5A

Packet	Dir	F	Sync	IN	ADDR	ENDP	CRC5	EOP	Idle
3030	-->	S	00000001	0x96	2	0	0x15	250 ns	283 ns

Full Speed Time Stamp
00003.3950 2134

Packet	Dir	F	Sync	NAK	EOP	Time	Time Stamp
3031	<--	S	00000001	0x5A	250 ns	11.217 μ s	00003.3950 2326

When you instruct the Analyzer to display USB transfers, the components of each transfer are collected from the current recording and are grouped below each decoded transfer. Each transfer row shows a transfer with a unique numeration, a label, and color-coded decoding of important data.

To view decoded transfers, select **Transfer Level** from the **View** menu.

Expanded and Collapsed Transfers

You can expand a specific transfer to view its parts, which are grouped and indented below the transfer.

To expand a transfer,

Step 1 Left-click on the transfer number you wish to view.

You see the **Expand Transfer** menu:

Transfer	F	Control	ADDR	ENDP	bRequest	wValue	wIndex
1					0x0D	0x0000	0x0000
2					0x09	0x0000	0x0000
3					0x0D	0x0000	0x0000
4					0x09	0x0000	0x0000
5					0x0D	0x0000	0x0000
6					0x09	0x0000	0x0000

Transfer 1	Expand This Transfer	Expand All Transfers	Collapse All Transfers	Set marker	Format	Color	Hide
------------	----------------------	----------------------	------------------------	------------	--------	-------	------

Step 2 Select **Expand This USB Transfer**.

The screen displays the selected transfer in expanded format.

Transfer	F	Control	ADDR	ENDP	bRequest	wValue
8	S	SET	2	0	SET_CONFIGURATION	New configuration 1

Transaction	F	SETUP	ADDR	ENDP	D	T	R	bRequest	wValue
1415	S	0xB4	2	0	H->D	S	D	SET_CONFIGURATION	New configuration 1

wIndex	wLength	ACK	Time
0x0000	0	0x4B	36.333 μ s

Transaction	F	IN	ADDR	ENDP	NAK	Time
1416	S	0x96	2	0	0x5A	14.417 μ s

Transaction	F	IN	ADDR	ENDP	NAK	Time
1417	S	0x96	2	0	0x5A	14.250 μ s

Transaction	F	IN	ADDR	ENDP	NAK	Time
1418	S	0x96	2	0	0x5A	14.167 μ s

Note The Expand/Collapse transfer feature operates as a toggle: when one format is active, the other appears as an option on the Expand/Collapse drop-down menu.

To collapse a transfer, perform the same operation and select **Collapse This USB Transfer**.

Note that you can choose to expand or collapse

- **Only** the selected Transfer
- OR
- **All** Transfers.

It is not necessary to use the **Expand/Collapse Transfers** menu to shift between expanded and collapsed views of a transfers:

Double-click in the Transfer number field to toggle back and forth between collapsed and expanded views.


8.17 Decoding Protocol-Specific Fields in Transactions/Transfers

When transfers or transactions are displayed, the fields in setup transactions or control, interrupt, and Bulk transfers by default do not get decoded and are shown in hexadecimal values. The exceptions are setup transactions and control transfers for standard USB device requests which are always decoded.

In order to show specific decoding for class- and vendor-specific device requests and endpoints, you have to use the decoding association mechanism that is described in Chapter 9 on decoding. When you have performed the association, you will see the protocol-specific fields of transfers and transactions decoded in the trace view.

8.18 Using the Trace Navigator

You can use the Trace Navigator to show the structure of the entire trace from different points on the Trace view. This way you can refine the trace view to a packet range in the trace that is most interesting to you. This range can be set by you to show smaller parts of the trace.

To display the Navigator bar, click  in the toolbar. You can also select the Navigation Bar checkbox in the Display Options General window to have the Navigator open whenever you open the Trace software.

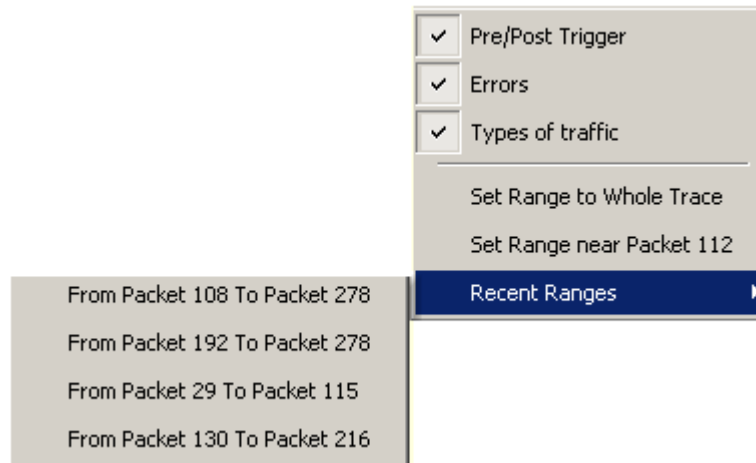
The Navigator bar can be repositioned in the trace and can be oriented horizontally or vertically, docked or undocked by dragging the parallel bars at the top or side of the Navigator bar. By default, the Navigator bar appears vertically to the right of the trace window when opened.

The Navigator bar represents different types of trace information in the order of the packets. The top of each bar corresponds to the first packet in the trace, and the bottom corresponds to the last packet. The Navigator bar is made up of three parts: Pre and Post-Trigger traffic, errors, and types of traffic.

At any time, a line in the navigator bar of one pixel in height represents a fraction of the trace data. If the Navigation bar is 400 pixels high, then each bar in this example would represent 1/400 of the trace. If the trace had 4000 packets total, each bar would represent ten packets. In the Types of Traffic portion of the navigation bar, the color of the bar would be that of the most important item in those ten packets. See "Navigator Bar Attributes" on the next pages.

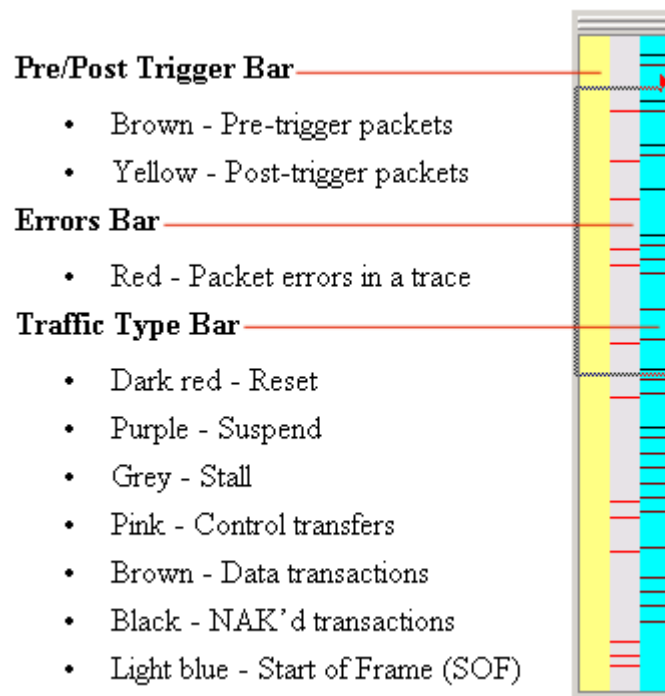


Drag the square to the top or bottom to set the size of a packet range. Drag the entire square to set the packet range to different values. A bubble appears showing the packet range while you are setting it. Right click on the Navigator to display the pop-up menu.



- Pre/Post Trigger, Errors, Types of Traffic shows or hides specific type of traffic from the Navigator.
- Set Range to Whole Trace resets packet range to the entire trace.
- Set range near Packet *number* sets the packet range near the packet where your mouse pointer is positioned in the Navigator bar.
- Recent Ranges displays a history of ranges that were previously selected.

Navigator Bar Attributes



The traffic types above are shown in order of importance. For example, if a NAK'd transaction occurred in the same sample area as a SOF, the NAK would take precedence, and the Navigator would show the black bar.

9. Decode Requests

9.1 General Options

Commands are transferred on USB using special control transfers called USB Device Requests. The Analyzer can decode Device Requests as they are defined in the USB specifications and various Device Class and Vendor specifications.

USB Request

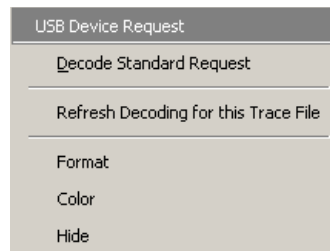
Each USB Device Request is sent using a Control Transfer. Each Control Transfer starts with a **SETUP** transaction.

To decode a USB Device Request,

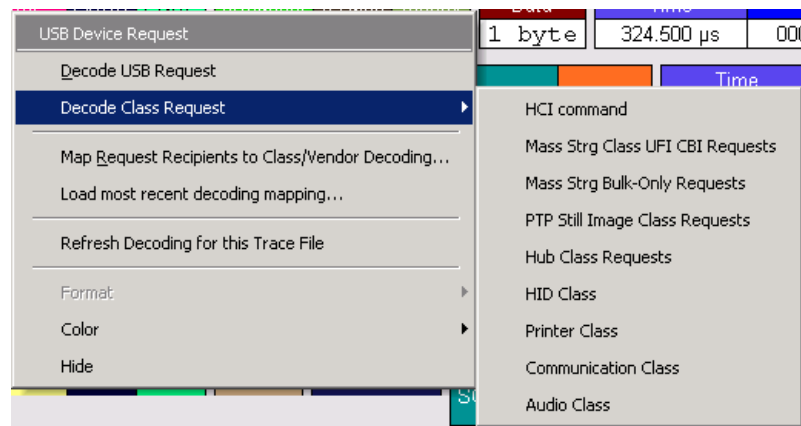
Step 1 Left-click once in the **SETUP** field of the packet that starts the Request.

Note The menu that appears when you left-click a setup field is context-sensitive and may not appear exactly as shown in the next few examples.

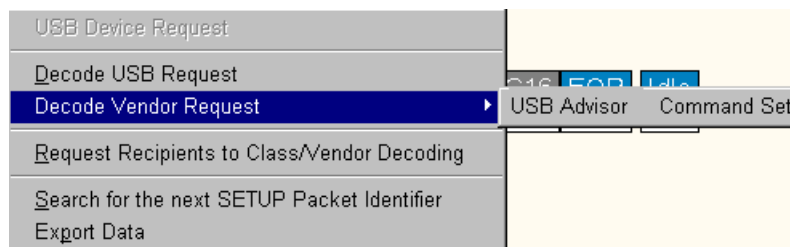
If you select **Standard Request**, you see the **Decode Standard Request** menu:



If you select **Class Request**, you see the **Decode Class Request** menu:

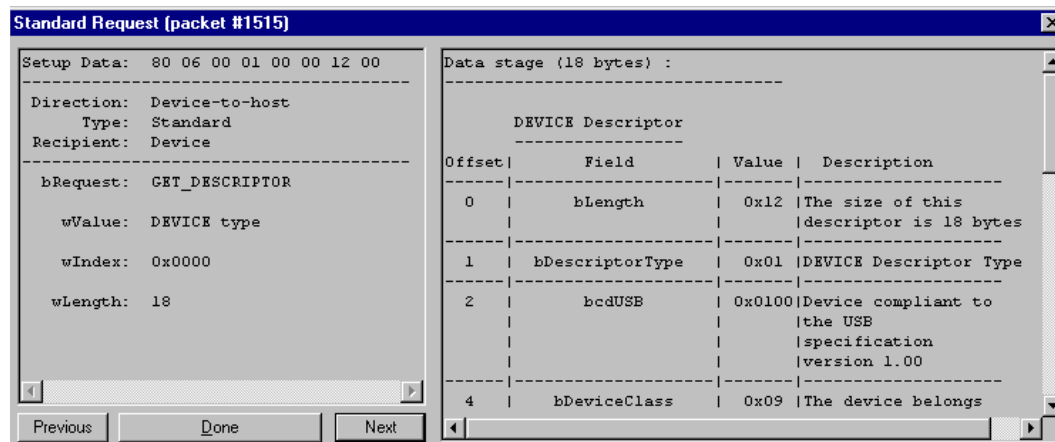


If you select **Vendor Request**, you see the **Decode Vendor Request** menu:



Decoding Standard Requests

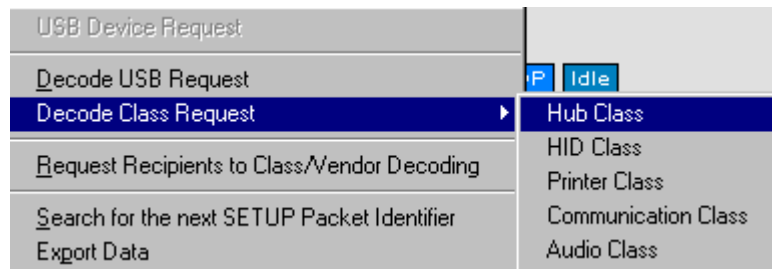
When you select **Decode Standard Request**, you see a window displaying the decoded Standard Request:



Shown here is a GET_DESCRIPTOR Standard Request.

Decoding Class Requests

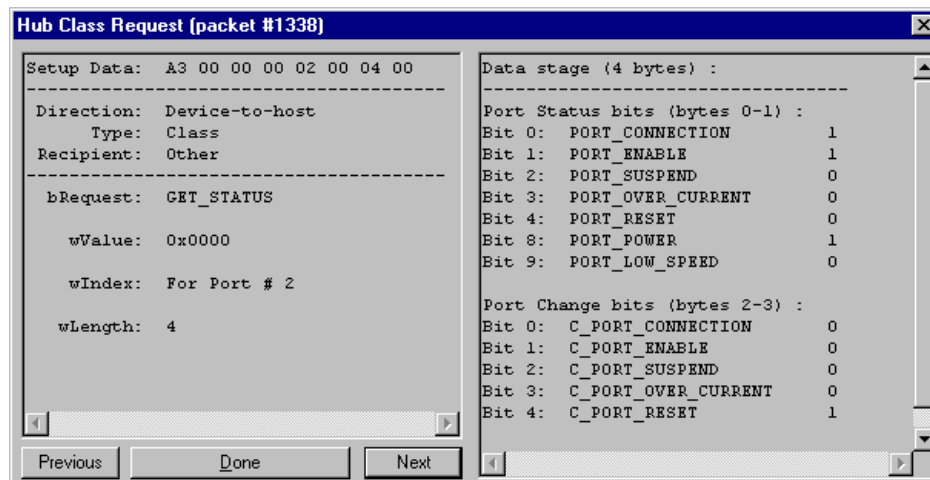
When you select **Decode Class Request**, you see the **Decode Class Request** drop-down menu:



The drop-down menu lists the Classes whose definitions are contained in the Analyzer.

Step 1 Select the Class which agrees with the Setup Address selected.

You see a Decode Request screen (similar to the one below) that provides you with definitions for the individual fields of the Request and the returned data:

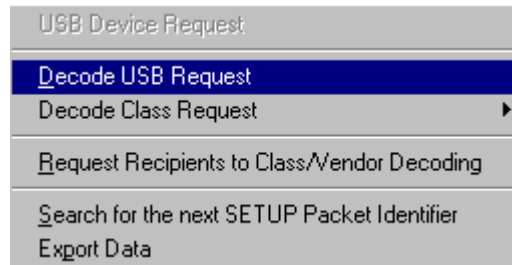


Shown here is a sample **GET_STATUS** Hub Class Request.

Decoding Vendor Requests

Decoding a Vendor Request is the same as decoding a Class Request except that you use Vendor Request definitions rather than Class Request definitions.

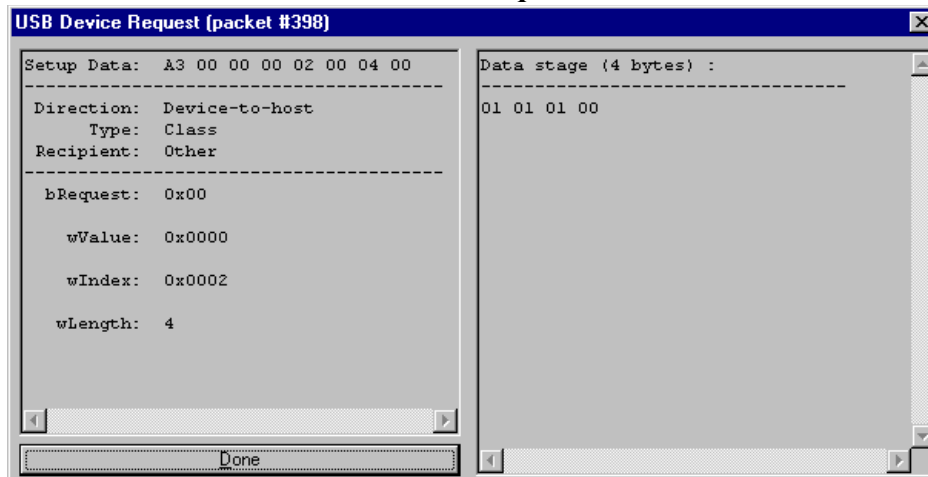
Decoding USB Requests



When your Decoding request does not belong to any of the defined Decoding groups (Standard, Class, or Vendor),

- Select **Decode USB Request** from the Request menu.

You see the **USB Decode Request** screen.



This screen provides definitions for the individual fields of the Request and the returned data.

Class and Vendor Definition Files

LeCroy analyzers use script files to decode class and vendor requests. These script files are read when the application is initialized.

LeCroy supports three types of class and vendor decoding files: .REQ files, .DSC files, and .DEC files.

.REQ Files and .DSC Files - Represent the old method of decoding. **.REQ** stands for Requests and **.DSC** stands for Descriptors. These files have fixed definitional structures and were developed originally for some of LeCroy's earlier USB analyzers.

.REQ and .DSC files can be found in the Legacy directory below the application directory. Files for the following requests and classes are provided:

- **Standard Requests** (standard.req) (Not used with Video Class decoding)
- **Hub Class** (hub.req) (No longer used: replaced by Script Decoder version .dec files)
- **HID Class** (hid.req)
- **Printer Class** (printer.req)
- **Communications Class** (communication.req)
- **Audio Class** (audio.req)
- **Bluetooth USB HCI commands and events** (bluetooth.req) (No longer used: replaced by Script Decoder version .dec files)
- The Analyzer also includes a sample of a **Vendor Request definition file** (vendor.req).

To add your own **.req** file for a Class or Vendor Request,

Step 1 Use Notepad to create and edit your own Request Definition file (for example, my_vendor_commands.req).

Note To learn to write such a file, review the Request (.req) files provided by LeCroy.

Step 2 Add the name of your Request file to the request.lst file.

Step 3 Click **Setup**. The decoding menu in the Class/Vendor List appears.

.DEC Files - Represents the new method of decoding. This method is more powerful than the old and uses a C-like language. .DEC stands for "decoder" and describes both Class and Vendor requests.

.DEC files are found in the Scripts directory under the application directory. Each **.dec** file stores an endpoint or request decode. When the application starts, these files are loaded dynamically. Subdirectories are supported.

The following **.dec** files are provided:

- Bluetooth HCI
- Hubs
- Mass Storage
- Still Image/PTP
- Video

If desired, you can create your own **.dec** file for a Class or Vendor Request.

For more information on the format of these Script Decoder files and the Script Decoding language, read the ***Script Decoder Manual***.

Note If Video is selected, the Display Options need to be set to "Use new Std Reqs & Descriptors Scripts (for Video Class)" for video. The file **VideoCurrentEntityIdMap_EditMe.inc** in the VideoClass directory will also need to be edited. You will be assigning entity IDs to corresponding Control types. The instructions are in that file.

9.2 Class/Vendor Decoding Options

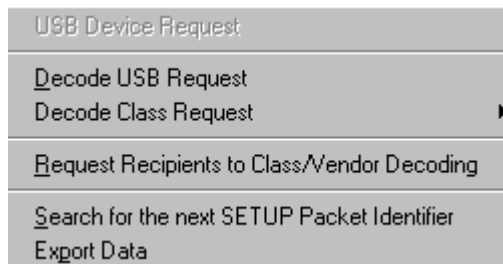
This interface allows you to permanently assign a class or vendor decoding for an address and/or endpoint or interface in a Trace file. Once assigned, the decoding occurs automatically when you choose to display transactions. You see the Decode Class menu for whichever Class type you have selected.

Request Recipient to Class/Vendor Decoding

To assign a decoding group to a request recipient,

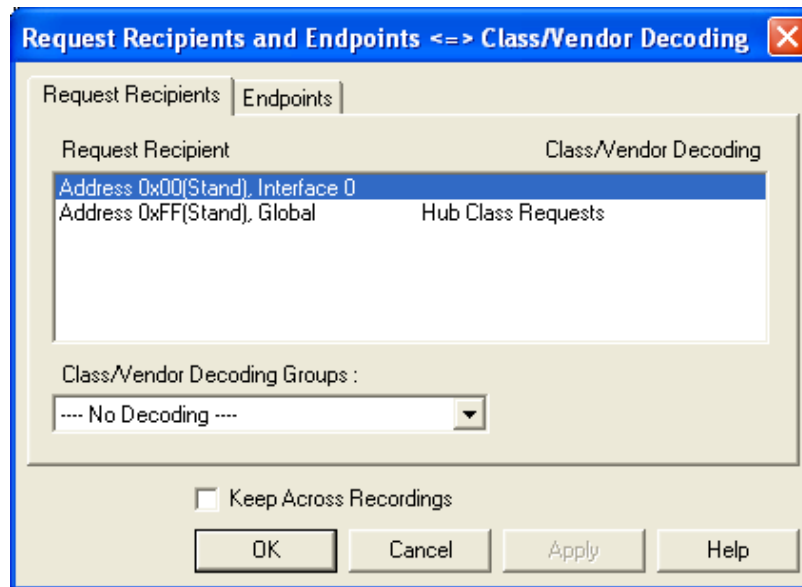
Step 1 Left-click once in the packet's **SETUP** field.

You see the **Decode Request** menu:



Step 2 Select Request Recipient to Class/Vendor Decoding.

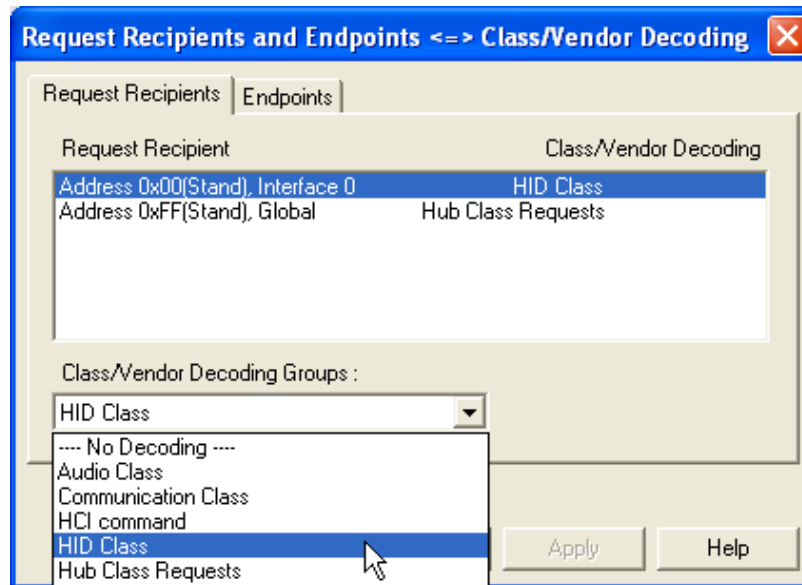
You see the **Request Recipient** window:



The **Request Recipient** field shows all the USB Class and Vendor Request Recipients found in the Trace file. Displayed on the right are the names of Class/Vendor decoding groups currently assigned to recipients. If no decoding is assigned for a recipient, nothing is displayed next to the address.

To select a recipient for which to assign or modify its Class/Vendor decoding,

- Step 1** Display the **Class/Vendor Decoding Groups** drop-down menu.



The drop-down menu lists the defined Class/Vendor request decoding groups.

- Step 2** In the **Request Recipient** field, highlight a Recipient.
- Step 3** From the **Class/Vendor Decoding Groups** drop-down menu, select the decoding group you want to assign to the highlighted Recipient

OR

Select **No Decoding** if you do not want any specific decoding.

- Step 4** Repeat the previous step for any additional recipients you would like to map.
- Step 5** Click **OK**.

Class/Vendor Endpoint Decoding

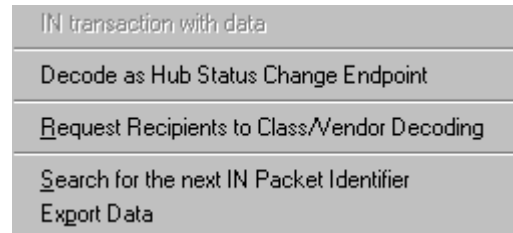
Some usb endpoints can transfer formatted data that is defined in various device class or vendor specifications.

Advisor provides the same decoding capabilities for data sent on endpoints as for device requests. You can define decoding for endpoints by adding Endpoint Data construct to your .req file (see examples in hub.req and bluetooth.req.)

To assign a Class/Vendor Endpoint decoding,

Step 1 Left-click once in the packet's **IN** or **OUT** field.

You see the following menu.

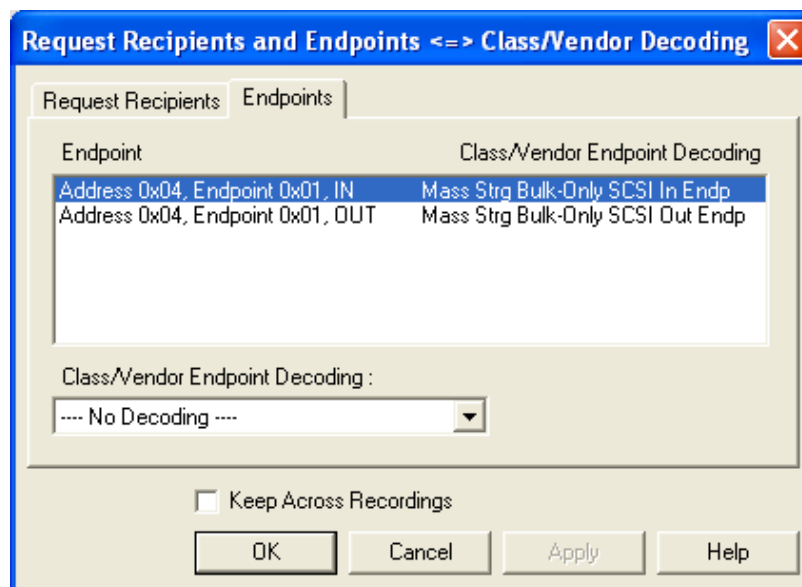


Step 2 Select **Request Recipient to Class/Vendor Decoding**

You see the Request Recipients and Endpoints dialog box.

Step 3 Click on the tab marked **Endpoints**.

You see the **Endpoints** dialog box.

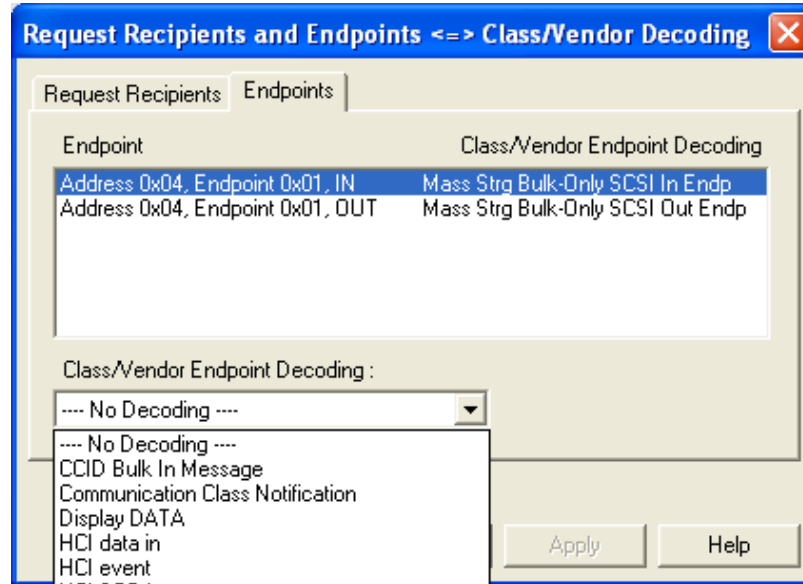


The **Endpoint** field shows all the Endpoints found in the Trace file. Displayed on the right are the names of Class/Vendor Decoding that are currently assigned to Endpoints.

To select an endpoint for assigning or modifying its Class/Vendor decoding,

Step 1 Display the **Class/Vendor Decoding Groups** drop-down menu

You see the Class/Vendor Endpoint Decoding drop down menu.



Step 2 In the **Endpoint** field, highlight an address, Endpoint, and Field.

Step 3 From the **Class/Vendor Endpoint Decoding** drop-down menu, select the type of decoding you want

OR

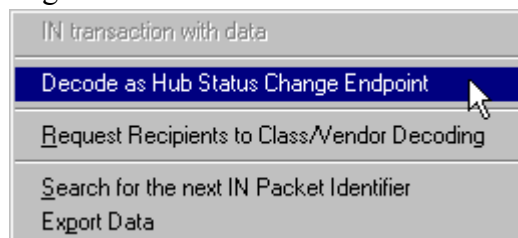
Select **No Decoding** if you don't want any specific decoding.

Step 4 Repeat the previous step for any additional endpoints you would like to map.

Step 5 Click **OK**.

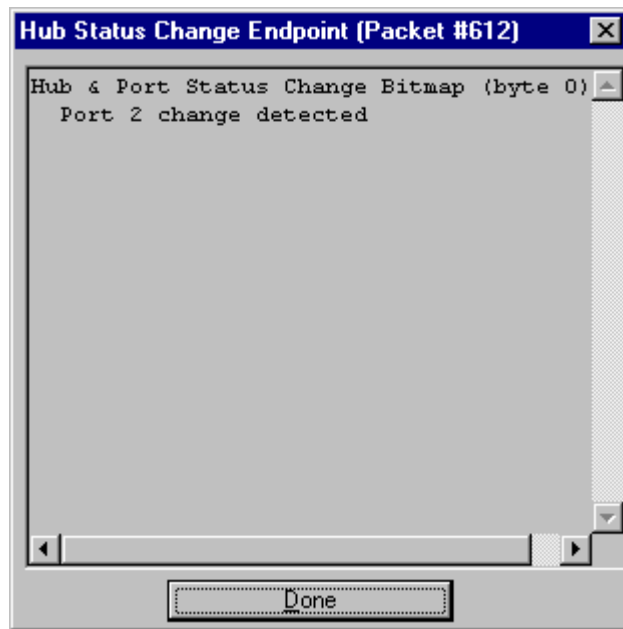
To decode

Step 1 Left-click the field marked **IN** or **OUT**. You will see the following or similar menu:



Step 2 Select Decode as Hub Status Change Endpoint

A text box will open that will display the Hub Status Change Endpoint.



10. Other Features

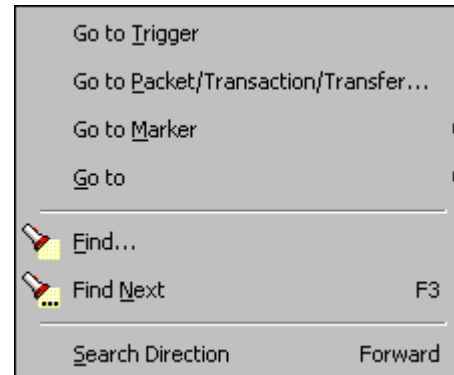
10.1 Search

The Search feature provides several options for searching through recorded traffic, allowing you to find specific packets based on triggering status, packet number, marking, or content.

To view the Search options,

- Click **Search** in the Menu bar.

You see the Search drop-down menu:



Go to Trigger

Note **Go to Trigger** is enabled only when a trigger has created the traffic file.

To display a Trigger Event,

- Select **Go to Trigger** under **Search** on the Menu Bar.

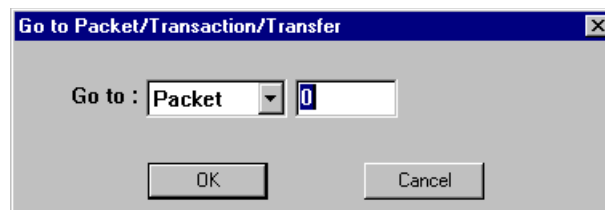
The Trace View is repositioned to the first packet following the Trigger event. This packet will be at the top of the screen.

Go to Packet/Transaction/Transfer...

To display a specific packet,

- Step 1** From the menu bar, select the command **Search > Go to Packet/Transaction/Transfer**

You see the **Go to Packet** window:



- Step 2** Select the desired viewing level (packet, transaction etc.) from the drop-down menu next to the words **Go to**.

Step 3 Enter the number of the packet you want to display.

Step 4 Click **OK**.

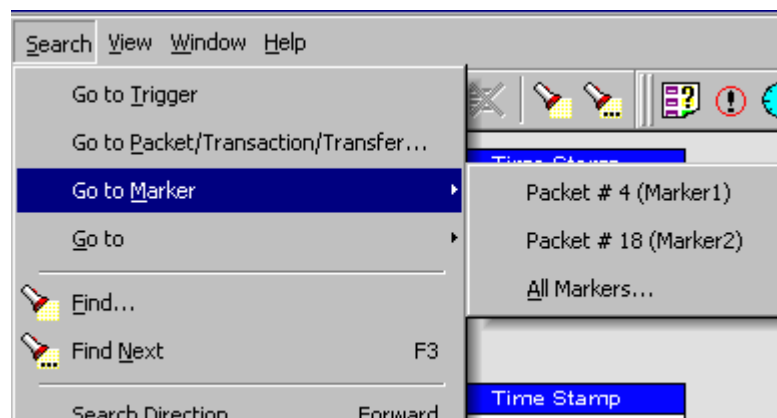
The Trace View is repositioned with the selected packet at the top of your screen.

Go to Marker

To instruct the Analyzer to display a marked packet,

Step 1 Select **Go to Marker** under **Search** on the Menu Bar.

You see a drop-down menu listing the marked packets in that Trace View:



Step 2 Select the desired packet from the displayed list.

The Trace View is repositioned with the selected packet at the top of your screen.

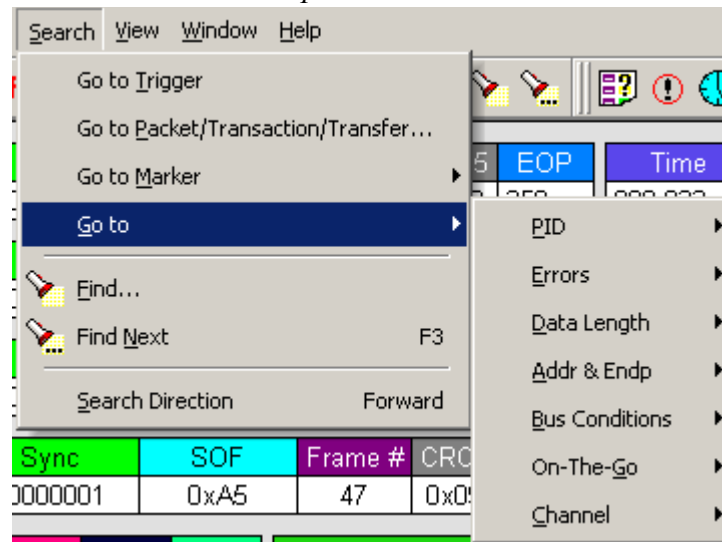
Note The **Go to Marker** feature functions in conjunction with the **Set Marker** feature. The comments within the parentheses following each marked packet are added or edited with the **Set Marker** feature. Please refer to **Set Marker** in **Reading a Trace**.

Go To

The **Go To** feature takes you directly to an event in a Trace.

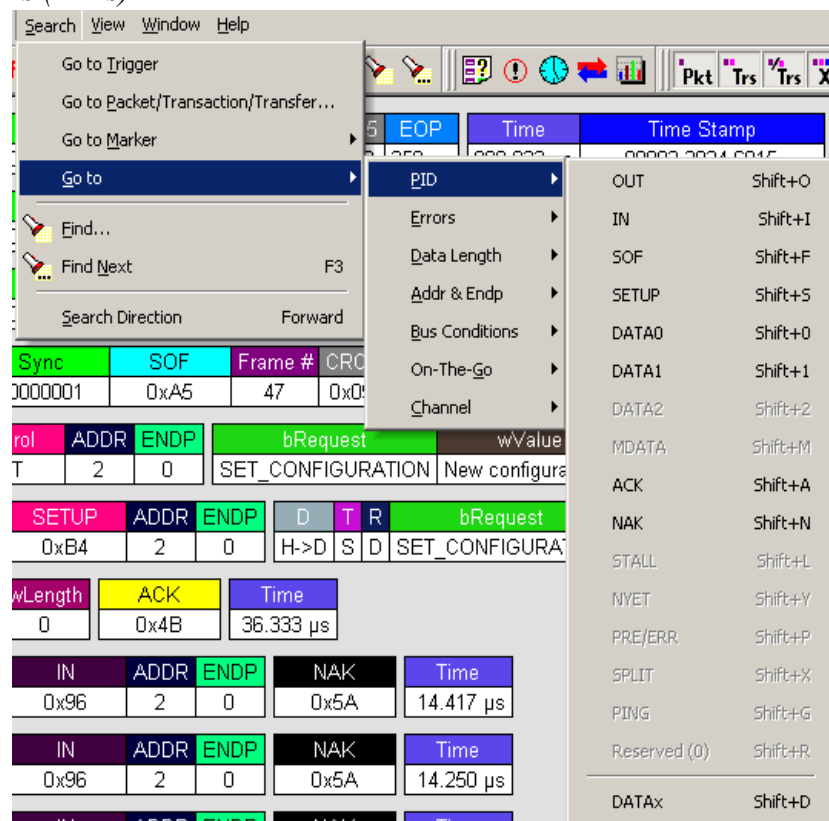
Step 1 Select **Go To** under **Search** on the Menu Bar.

You see the **Go To** drop-down menu:



Step 2 Select the event you want to go to and enter the necessary information.

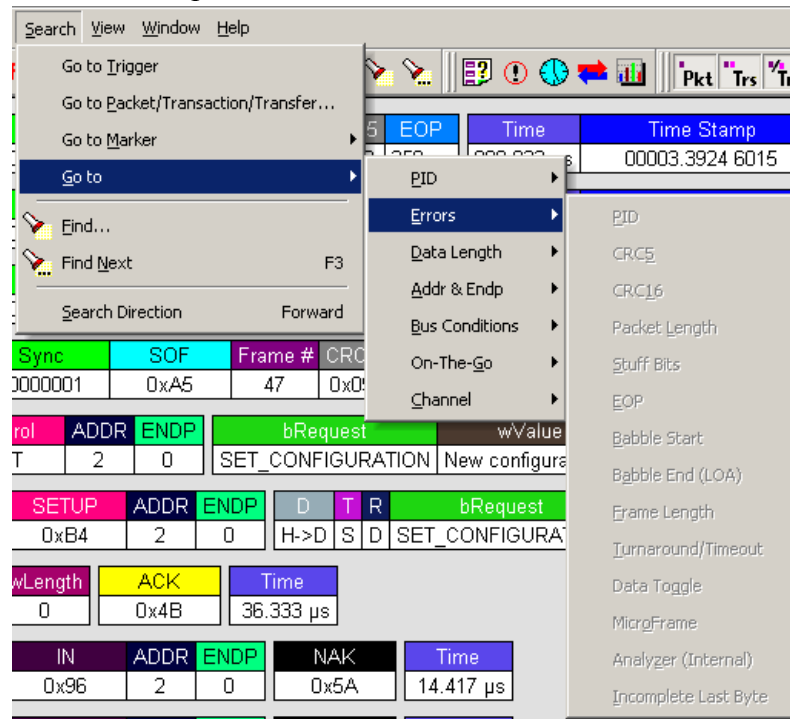
Packet IDs (PIDs)



Select the type of packet you want to go to.

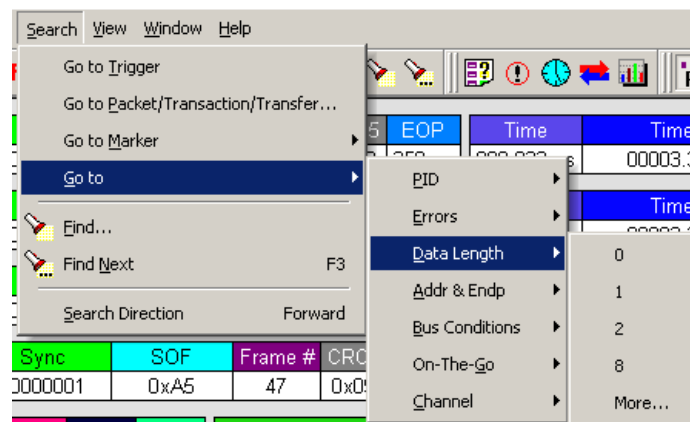
Errors

The Errors menu allows you to search for five different types of error: PID, CRC5, CRC16, Packet Length, and Stuff Bits. Menu items will appear in bold if they are present in the trace or grayed out if not present in the trace as shown in the example below.



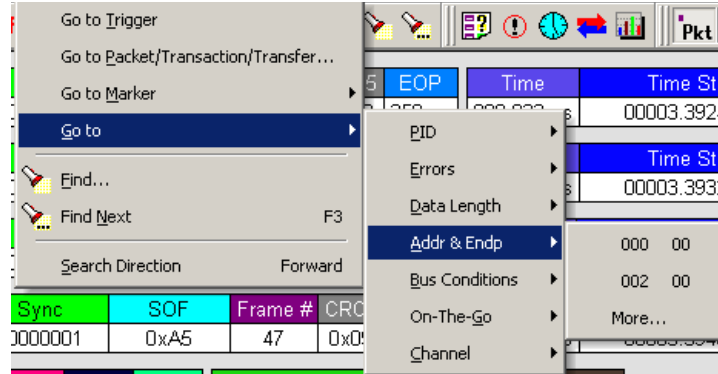
Data Length

Allows you to search for data packets of particular lengths. Lengths are displayed in Bytes in a drop down menu as shown below. Selecting a length will cause the display to move to the next instance of that packet length.



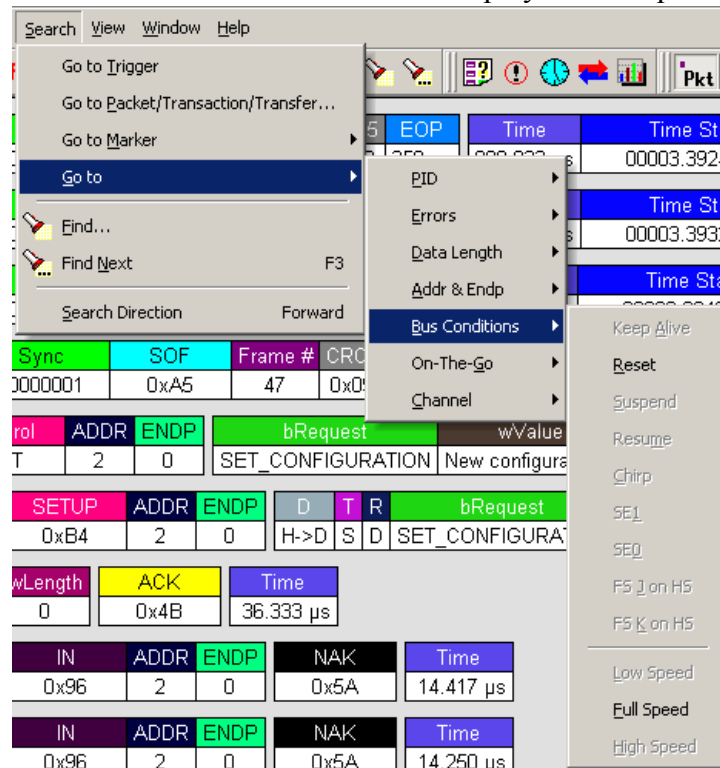
Addr & Endp

The Addr & Endp feature allows you to search for the next packet which contains a particular address and endpoint. All available address endpoint combinations will be displayed in the pull down menu.



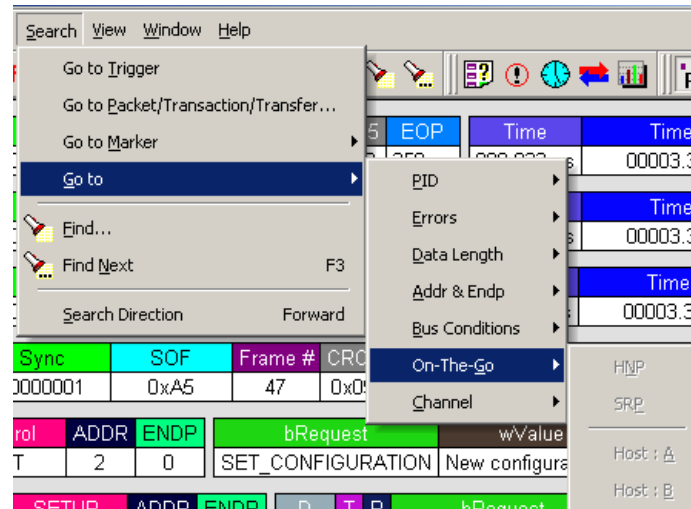
Bus Conditions

Allows you to search by bus conditions such as traffic speed, reset, and suspend. All available bus conditions are displayed in the pull down menu.

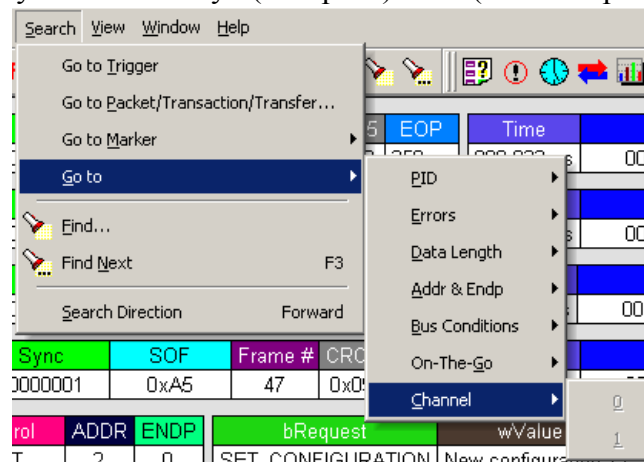


On-The-Go

Allows you to search for USB On-The-Go conditions. USB On-The-Go conditions are listed in the drop-down menu.

*Channel*

Allows you to search by 0(Hi-Speed) and 1(Classic-Speed).

**Find**

Find allows searches to be conducted on an open trace using one or more criteria. You can search by packet, transactions, split transaction, transfer, by packet type and by fields within packets.

Find is run by selecting **Search > Find** or by clicking  on the toolbar.

Searches can combine criteria using the options **Intersection** and **Union**.


Intersection creates AND statements such as "Find all packets with *x* and *y*." **Union** creates OR statements such as "Find all packets with *x* OR *y*."

You can also perform searches whereby packets or events are excluded from a trace. The **Exclusion** allows searches to be conducted.

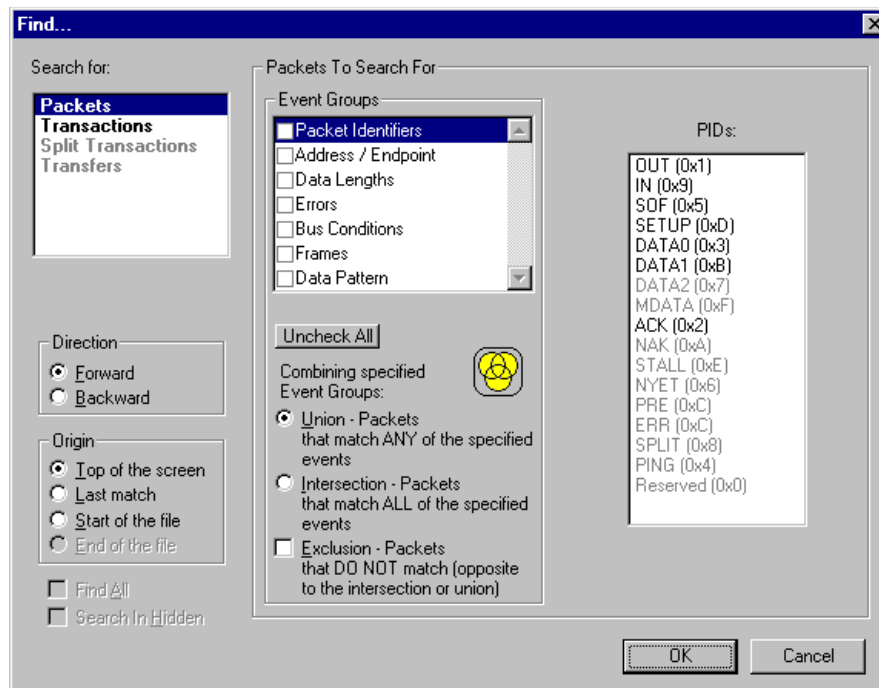
To perform a search,

Step 1 Select **Find...** under **Search** on the Menu Bar

OR

Click  in the Tool Bar.

You see the **User-Defined Find Events** screen:



Step 2 Select **Packet**, **Transaction**, **Split Transaction**, or **Transfer** from the top left list box.

Your choice will affect the options presented in the Events Group box.

Step 3 Select one or more events from the **Events Group** box.

Step 4 Select one of the following options:

- **Union:** Find all packets matching ANY of the specified events.



- **Intersection:** Find all packets matching ALL of the specified events.



- **Exclusion:** Exclude packets matching any of the specified events.

Exclusion works with the other two options: Select **Union AND Exclusion** (=Exclude packets with ANY of the following fields) or **Intersection AND Exclusion** (=Exclude packets with ALL of the following fields.)



Step 5 If desired, set the search **Direction** and **Origin**.

Step 6 Click **OK**.


After the search finishes, the packets meeting the search criteria will display.

Find Next

To apply the previous **Find** parameters to the next search,

- Select **Find Next** under **Search** on the Menu Bar

OR

Click  on the Tool Bar.

Search Direction

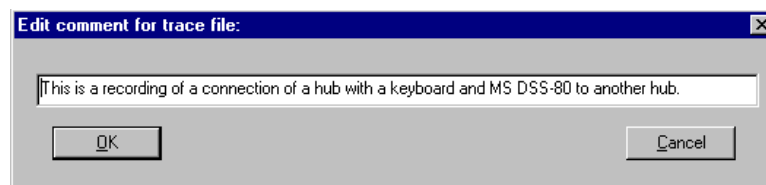
Toggles the search forward or backwards. The current direction is indicated in the menu.

10.2 Edit Comment

You can create, view, or edit the 100-character comment field associated with each Trace file. These comments will be visible in the Windows Explorer if the "Comments" attribute is included in the Details view.

Step 1 Select **Edit Comment** under **File** on the Menu Bar.

*You see the **Edit comment for Trace file** window:*

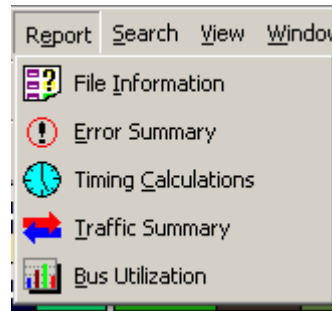


Step 2 Create, view, or edit the comment.

Step 3 Click **OK**.

10.3 Reports

The Report menu provides several reports to assist you in analyzing USB traffic recorded by the Analyzer.




File Information

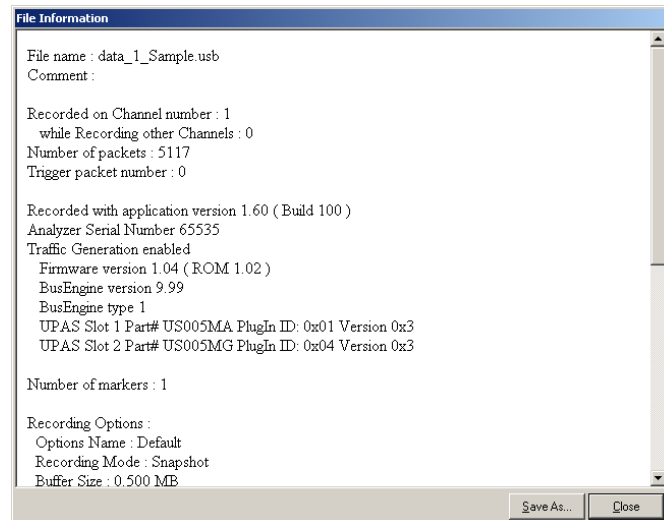
To display a File Information report,

- Select **File Information** under **Report** in the Menu Bar

OR

Click  in the Tool Bar.

You see the File Information screen:




The File Information report provides information about how the recording was made, what the buffer settings were, the license number of the analyzer that created the file, what the trigger options were, the user's license information, and what version of all the Analyzer hardware was used to make the recording.

Error Summary

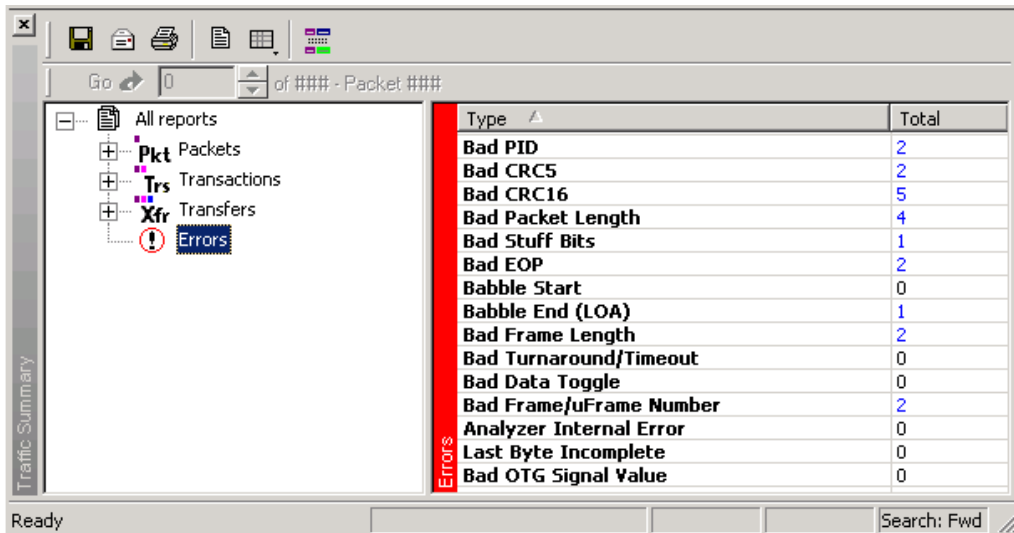
The Error Summary details all errors analyzed throughout the recording.

- Select **Error Summary** under **Report** in the Menu Bar

OR

Click  in the Tool Bar.

You see the File Information screen:



Type	Total
Bad PID	2
Bad CRC5	2
Bad CRC16	5
Bad Packet Length	4
Bad Stuff Bits	1
Bad EOP	2
Babble Start	0
Babble End (LOA)	1
Bad Frame Length	2
Bad Turnaround/Timeout	0
Bad Data Toggle	0
Bad Frame/uFrame Number	2
Analyzer Internal Error	0
Last Byte Incomplete	0
Bad OTG Signal Value	0

Navigate to an error within the recording by clicking the number of the packet containing the error.


Use the arrows to cycle through each occurrence of a particular error.

Timing Calculations

The Timing Calculator is used to measure timing between any two packets.

- Select **Timing Calculations** under **Report** in the Menu Bar

OR

Click  in the Tool Bar.

You see the Timing and Bus Usage Calculator screen:

Timing and Bus Usage calculator

From packet: To packet:

TOTAL TIME:

Bus Utilization

	Time Usage	Bandwidth
<input checked="" type="checkbox"/> <u>G</u> lobal	0.171 %	0.819 Mb/s
<input checked="" type="checkbox"/> <u>L</u> ow Speed	0.000 %	0.000 Mb/s
<input checked="" type="checkbox"/> <u>F</u> ull Speed	0.000 %	0.000 Mb/s
<input checked="" type="checkbox"/> <u>H</u> igh Speed	0.171 %	0.819 Mb/s
<input checked="" type="checkbox"/> <u>T</u> ransactions High Speed:	0.000 %	0.000 Mb/s
<input type="checkbox"/> with Idle Classic Speeds:	0.000 %	0.000 Mb/s
<input checked="" type="checkbox"/> <u>D</u> evelopers no Idle:		
Addr , Endp with Idle:		
<input type="text" value="001 0"/> data Only:		
<input type="checkbox"/> <u>A</u> cknowledged		

Traffic Summary


Traffic Summary summarizes the numbers and types of packets, transactions etc. that occurred in the open trace.

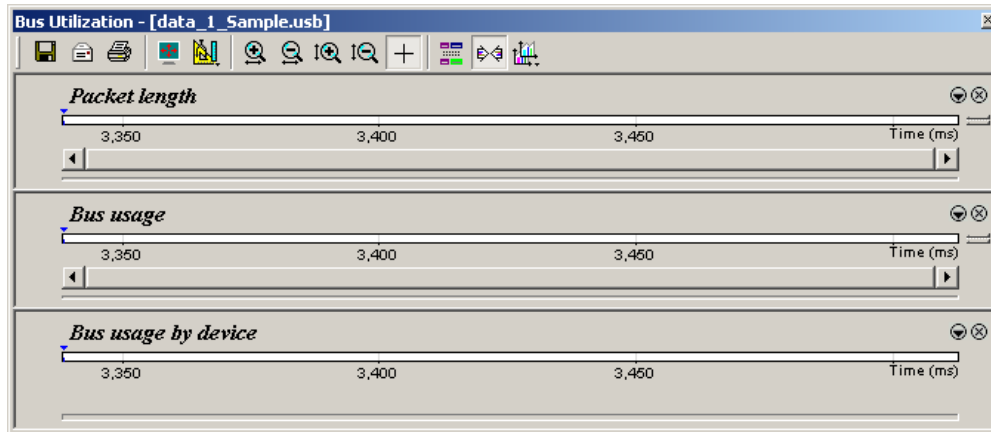
To run **Traffic Summary**, select **Report > Traffic Summary** or click the button marked . You will be prompted to specify a range of packets, then be shown the following window:

[illegible]

Bus Utilization

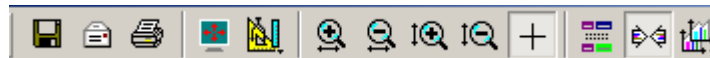
The **Bus Utilization** window displays information on bandwidth use for the two recording channels.

To open the Bus Utilization window, select **Report > Bus Utilization** or click the button marked . A window opens three graphing areas:













Bus Utilization Buttons

The Bus Utilization window has a row of buttons for changing the format of the displayed data and for exporting data:



The buttons have the following functions:

	Save As - Saves the graphs as a bitmap file (*.bmp)		Vertical zoom in
	Email - Creates an email with a *.bmp file attachment of the graphs		Vertical zoom out
	Print		Click and Drag zoom - Click diagonally to select and zoom in on part of the graph
	Full Screen		Select Range
	View Settings - opens a sub-menu with options for formatting the display. See "View Settings Menu" below.		Sync and Graph areas - If two or more graphs are displayed, this button will synchronize the graphs to one another. Once synchronized, the positioning slider of one graph will move the other graphs



Horizontal zoom in




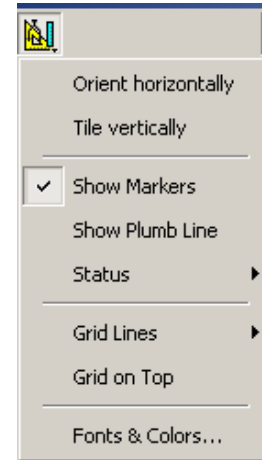
Graph Areas - Presents options for displaying additional graphs of data lengths, packet lengths, and percentage of bus utilized.



Horizontal zoom out

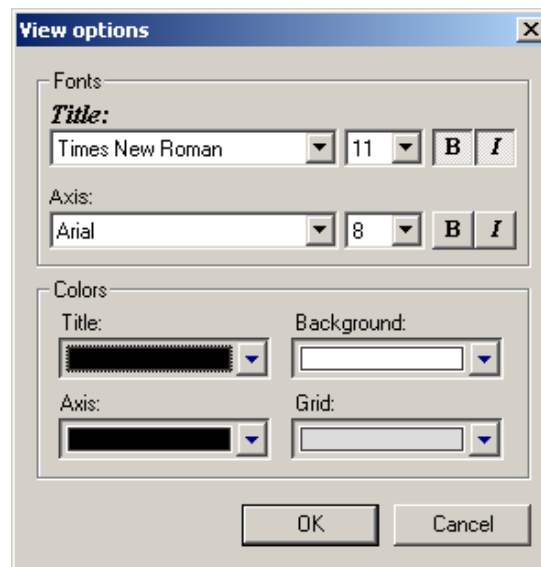
View Settings Menu

Clicking the View settings button  causes a menu to open with options for formatting the display.




- **Orient Horizontally** - changes the orientation of bus usage to horizontal. After selecting this option, the menu will say "Orient Vertically."
- **Tile Vertically** - tiles the two graphs vertically (i.e., side by side).
- **Show Markers** - Places "tick" marks along the x axis of each graph.
- **Show Plumb Line** - Displays a vertical line that connects your cursor to the horizontal axis. As the mouse is moved, the status bar will show the packet and time frame to which the cursor is pointing.
- **Status** - Opens a sub-menu with the following options:
 - Bar - Displays a status bar at bottom of graph.
 - Tooltip - Causes a tooltip to appear if you position your mouse pointer over part of the graph and leave it there for a couple of seconds.
 - None - Turns off tooltips and the status bar.
- **Grid Lines** - Opens a sub-menu with the following options:
 - Both - Displays both X and Y axis gridlines
 - X Axis - Displays X axis gridlines
 - Y Axis - Display Y axis gridlines
 - None - Turns off gridlines
- **Grid on Top** - Moves the grid lines above the graph.

- **Fonts and Colors** - Opens a dialog box for setting the colors and fonts used in the graphs:

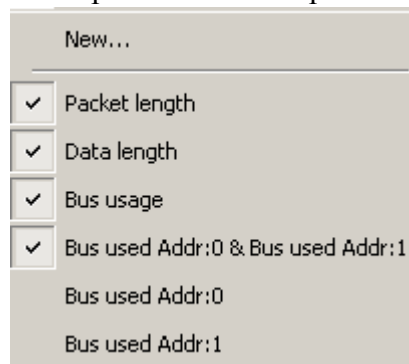


Graph Areas Menu

The Graph Areas menu allows you to view different information in the Bus Utilization window.

Step 1 Click the  button.

The Graph Areas menu opens.

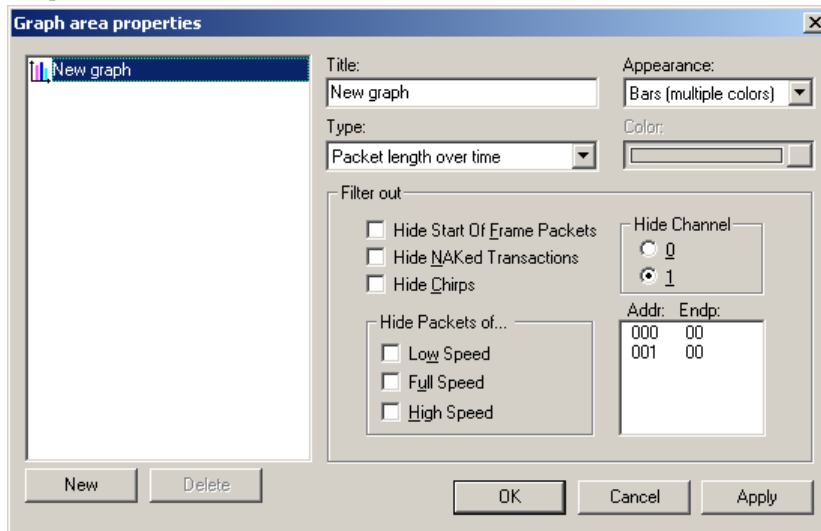


Step 2 Select the data you want to appear in the Graph Areas window.

To make change the properties in the Bus Utilizations graph, follow these steps:

Step 1 In the **Graph Areas** menu, select what you want your graph to display.

Step 2 Click **OK**.



Or

To make a new graph, click **New**.

How to Contact LeCroy

Type of Service	Contact
Call for technical support...	US and Canada: 1 (800) 909-2282
	Worldwide: 1 (408) 727-6600
Fax your questions...	Worldwide: 1 (408) 727-6622
Write a letter...	LeCroy Customer Support 3385 Scott Blvd. Santa Clara, CA 95054
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.catc.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.

You can reach LeCroy Technical Support at 800-909-7112 or via email at support@catc.com. You may also refer to the LeCroy 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.

Index

A

- Advisor connection 19
- Allow any toggle value 72
- Analyzer
 - front panel 17
 - PC requirements 23
 - rear panel 18
 - resetting 32
 - setup 18
- Automatic updates 29
- Auto-merge 2 channel trace files 47

B

- Beep when trigger occurs 47
- Bits, raw 84
- Blue dot menus 64
- Breakout board 21, 22
- Buffer size 47
- Bus conditions 53, 117
- Bus data, recording 66
- Bus utilization 124
- BusEngine updates 27
- Buttons
 - actions in recording options 63
 - Bus utilization 124
 - detach device 17
 - filter 63
 - restart 63
 - toolbar 38
 - trigger 17

C

- Cables
 - cable connector 21
 - USB 22
- Channel 118
- Chirps, hide 88

Class

- and vendor decoding 106
- request 103
- Classic speed 18
- Clear marker 83
- Collapse. See also Expand
 - collapsing data fields 85
 - packet data fields 72
 - transactions 91
 - transfers 95
- Color/Format/Hiding 74
- Colors 75, 126
- Comment, editing 120
- Components 1, 17
- Connections
 - cable connector 21
 - connect counters to events 61
 - connect events to actions 60
 - connection architecture 19
 - connector pin-out 21
 - to a PC 22
- Contents of package 17
- Counters, connecting to events 61

D

- Data
 - data length 58, 116
 - data pattern 52
 - expand/collapse fields 85
 - in/out connector 21
 - truncate data fields 46
 - viewing data block 87
- Decoding
 - decode requests 101
 - decoded transactions 90
 - decoded transfers 95
 - decoding fields 96
 - endpoint 108
 - options 106
 - requests 102
- Default settings 13
- Description of product 1
- Detach device button 17
- Device requests 52

Direction of search 120
Display configuration name 73
Display Options
 colors 75
 formats 76
 general 72
 hiding fields in a trace 77
 hiding whole packets 78
 saving 78
Drivers, loading 24

E

Editing
 edit comment 120
 edit marker 83
Electrical source 20
Enable tool tips 72
Endpoint decoding 108
Error summary 122
Errors 54, 116
Events
 connecting to actions 60
 recording options 49
 trigger recording 46
Exclusion search 119, 120
Expand. See also Collapse
 expanding data fields 85
 packet data fields 72
 transactions 91
 transfers 95
External
 input signals 55
 interface breakout board 21, 22
 output signals 64

F

Features
 product 2
 trace 14
Files
 auto-merge 2 channel 47
 file information 121
 file information report 121
 file menu 34

 filename for trace 49
 merging trace files 67
Filter out/in button 63
Find 118
Find Next 120
Firmware updates 27, 28
Fonts 73, 126
Formats in display options 76
Frame patterns 51
Front panel 17

G

General
 general display options 72
 general recording options 46
 product description 1
Go to
 Go to 114
 Go to Marker 114
 Go to Trigger 113
 Packet/Transaction/Transfer 113
Graph areas menu 126
Grid lines 125

H

Hardware setup 20
Help menu 36
Hide Chirps 88
Hiding
 fields in a trace 77
 NAKs 88
 packets in a trace 78
 SOF packets 88
High speed 18
Host computer requirements 23
Hot keys 42

I

Installation
 basic 11
 detailed 17
 software 24
Intersection search 118, 120

K

Keyboard shortcuts 42

L

LED lights 17

Linking events 62

Loading USB Drivers 24

M

Manual

- trigger button 17

- trigger recording 46

- updates 30

Markers

- editing and clearing 83

- setting 82

- show 125

Menus

- blue dots in events 64

- graph areas 126

- menu bar 34

- view settings 125

Merging trace files 47, 67

N

NAKs, hiding 88

Navigation

- navigation Bar 72

- navigation tools 42

- trace navigator 97

O

On-The-Go 118

Options name 48

Orient horizontally 125

Output signals 64

P

Package contents 17

Packets

- hiding 78, 88

- packet identifiers 50

- packet IDs (PIDs) 115

- Packet/Transaction/Transfer 113

- view features 14

Packing list 17

Partial Upload 38, 40, 41

Patterns, token 50

Percentage of pre/post triggering 47

Pin-out description 21

Plumb line 125

Popup tool tips 88

Port for testing 23

Position of trigger 47

Power source 20

Product

- description 1

- features 2

Progress of recording 39

Protocol-specific fields 96

Prototype rework area 22

R

Raw bits, viewing 84

Rear panel 18

Record menu 35

Recording

- activity 41

- Bus data 66

- progress of 39

- status of 40

- type of 46

- USB traffic 26

Recording Options

- actions 59

- default settings 13

- events 49

- general 46

- options name 48

- saving 65

Report menu 35

Reports 121

Requests

- decode 101

- device 52

- request recipient 106

Requirements for PC 23

Resetting

- the Analyzer 32

- the toolbar 37
- Restart button 63
- Rework area, prototype 22
- Right click cell context menu 72

S

- Saving
 - display options 78
 - recording options 65
- Search
 - exclusion search 119
 - search direction 120
 - search menu 35
 - Searching 113
 - status 41
 - union 118
- Setting
 - colors 75
 - fonts 73
 - marker 82
 - trigger conditions 60
- Setup
 - hardware 20
 - menu 35
 - system 18
- Shortcut keys 42
- Show
 - markers 125
 - plumb line 125
- Signals
 - external input 55
 - output 64
- Snapshot recording 46
- SOF packets, hiding 88
- Software
 - installation 24
 - revisions 27
 - startup 25, 33
 - updates 28
- Speeds 18
- Split transactions 92
- Splits 58
- Standard decoding request 102
- Starting the software 25, 33

- Status
 - recording 40
 - search 41
 - status bar 39

System

- components 1, 17
- setup 18

T

- Test ports 23
- Tile vertically 125
- Timing calculations 122
- Token patterns 50
- Tool tips 33, 88
- Toolbar
 - buttons 38
 - resetting 37
- Trace
 - filename and path 49
 - first recording 14
 - hiding fields 77
 - hiding packets 78
 - merging files 67
 - mergingfiles 47
 - navigator 97
 - reading 81
 - recording 12, 26
 - view features 14, 81
 - viewing level 72
 - viewing raw bits 84
- Traffic
 - recording 12
 - summary 123
- Transactions 57, 90, 92
- Transfers
 - decoded 95
 - decoding fields 96
 - expand/collapse 95
 - transfer view 93
- Trigger
 - and filter channel 47
 - button 17, 63
 - position 47
 - pre/post trigger percentage 47

- setting conditions 60

- Truncate data fields 46

U

- Union search 118

- Updates

- automatic 29

- firmware 28

- manual 30

- software 28

- Upload, partial 38, 40, 41

- USB

- cables 22

- loading drivers 24

- On-The-Go 118

- recording traffic 12

- request 101, 104

- test ports 23

V

- Vendor

- request 102

- View

- data block 87

- menu 35

- options 36

- raw bits 84

- settings menu 125

W

- Window menu 36

- Wrap 42

Z

- Zoom in/out 42

- Zoom level 72

