



**StreamStor Amazon Express  
Real-time Disk Controller  
Installation and User Manual**

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**GOVERNING LAW.** This Agreement is governed by the laws of the State of Colorado, without giving effect to the choice of law provisions therein. By accepting this Agreement, you hereby consent to the exclusive jurisdiction of the state and federal courts sitting in the State of Colorado.

## About This Manual

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This manual is intended to serve the following purposes:

- \* to provide an overview of the StreamStor Amazon Express Real-Time Storage Controller
- \* to act as a guide for hardware installation;
- \* to act as a reference for the operator;
- \* to provide guidance on software capabilities and choices and
- \* to provide the Declaration of Conformity documentation required for the CE Mark.

It is suggested that you periodically check the Conduant web site for the most recent software updates, application notes, and technical bulletins.

If you are unable to locate the information you need, please feel free to contact us by e-mail or phone.

## About the Amazon Express Real-Time Storage Controller

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Thank you for purchasing a StreamStor Amazon Express Real-Time Storage System. Your StreamStor system is a disk-based, real-time recording system for PCI express (“PCIe”) bus computers. The StreamStor Amazon Express controller can also include an optional daughter board to provide external data interfaces for data recording and playback.

The PCIe bus is a high performance I/O bus designed for attaching peripheral devices to computer systems. It is found in computing systems from many different manufacturers and is supported by most major operating systems. By utilizing the PCIe bus instead of a proprietary bus interface, StreamStor provides an open platform recording system. PCI data acquisition cards (digital oscilloscopes, frame grabbers, telemetry interfaces, etc) are available from many manufacturers to collect data and record it to system memory in real time (as it is collected). StreamStor provides a large capacity and cost effective alternative to system memory for these applications.

The StreamStor Storage System is able to receive data over the PCIe bus directly from the data acquisition device at very high average (sustained) data rates. Virtually all of the available PCIe cards that can record data to system memory are compatible with StreamStor. Only minor software modifications are generally required to redirect data to the StreamStor Amazon Express card. This capability is often in the software provided by the manufacturers of data acquisition devices. Please contact your Conduant sales representative or technical support for more information.

StreamStor was specifically designed to record sequential data without interruption at very high data rates. This is in contrast to traditional storage systems that are designed for data processing purposes and cannot sustain these high data rates. Unlike typical computer disk storage solutions that are designed for optimum performance during random data reads and writes, StreamStor has been designed for optimum performance in sequential read and write operations. The StreamStor system has also been designed to operate without host computer intervention. This eliminates any bottlenecks or interruptions in the data stream due to heavy computer loads or delays.

The StreamStor Amazon Express card includes the capability of adding daughter (mezzanine) boards to provide different types of external interfaces such as the FPDPII interface. These daughter boards move data to/from the Amazon Express board at very high data rates with very little overhead. This provides a seamless method of interfacing to nearly any external data interface for high performance recording.

The StreamStor SDK includes the device drivers and an API (Application Programming Interface) to provide a smooth integration of StreamStor with the data acquisition device and/or analysis software. Many examples are provided with the SDK and more are available upon request.

The StreamStor system is a flexible and powerful platform for high performance recording applications. Many custom and unique capabilities are available that are beyond the scope of this documentation so please contact Conduant with your questions and special requirements.




## Components

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An Amazon Express real-time storage system generally consists of the following components:

- Amazon Express PCIe board
- Optional external interface board
- Disk drives
- Cables
- StreamStor Software Development Kit (SDK)
- User Manual(s)

Some systems are delivered from Conduant completely installed in a chassis with a PC motherboard and operating system. You can skip the installation section for these systems since all installation has been performed at the factory.

 **CAUTION:** *Please read the entire installation section before starting to install the Amazon Express hardware. This manual assumes that the user is knowledgeable and comfortable with basic computer work, including installation and safety considerations. If you are unsure as to how to proceed, please contact Conduant support.*

## Unpacking / Handling

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Carefully inspect all shipping packages for any sign of damage. In particular, look for wrinkled or bent corners, holes, or other signs of bad handling or abuse. If you notice any damage to the packaging, immediately open the boxes and inspect the contents for damage. Pay close attention to the components near the area where the packing material was damaged. Report any damage to the carrier and Conduant immediately.

### **Disk Drives**

Hard disk drives such as those that may have been included with your system are susceptible to damage from excess shock and careless handling. Please observe the following handling precautions:

- \* Allow the disk drives to reach room temperature BEFORE installation. This may take several hours depending on shipping conditions. Disk drive damage can occur if the system is powered while the drives are at temperature extremes.
- \* Do not drop, jar or bump the disk drives. Even setting the chassis on a hard surface too roughly can damage the recording surfaces, heads, or other mechanical components inside the disk drives.
- \* Never disconnect/connect the interface cable while power is on.

The disk drives must be installed according to the manufacturer's instructions. Please check the manufacturer's website for the latest installation information.

### **Amazon Express Board**

The StreamStor controller board is shipped in a specially designed antistatic box or bag to prevent electrostatic damage to the board. To avoid damage in handling the board, take the following precautions:

- \* Ground yourself with a grounding strap or grasp a conductive, grounded object to dissipate any static charge while handling the board.
- \* Always store the board in its antistatic package when not installed in a computer system.
- \* Inspect the board carefully before installing in the computer. Do not install a damaged board into your computer.
- \* Never touch any exposed connector pins or component leads.
- \* Avoid bending or twisting the board.

## Planning Your Installation

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The StreamStor Amazon Express controller board utilizes 4 Mini-SAS cables for connecting to the disk drives. Each of these cables carries 4 SATA interfaces. If you are connecting the controller to a backplane that supports these connectors you will need cables with the Mini-SAS connectors on both ends. If you are connecting directly to your disk drives you will need Mini-SAS to SATA breakout cables. Not all computer chassis layouts easily facilitate this type of cabling. The configuration and layout of the computer chassis will greatly affect the ease of installing the StreamStor system. Contact Conduant if you need help in choosing or designing an appropriate chassis. Extension chassis systems are also available to avoid impacting an existing computer system.

The controller board can utilize the following combinations of disk drives: 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14 or 16. Drives should be attached as indicated in Table 2. The number of drives required is related both to required performance and capacity. Prior to mounting anything in the chassis, place the disk drives and the StreamStor card on a flat, static free surface and model the routing and placement of the cables. Pay close attention to the connector keys because these may define which way the disk drives must be mounted. Avoid pinching or routing over sharp edges to prevent cable damage.

The orientation of the disk drives can greatly affect the ease of cable routing. In horizontal orientations, mounting the drive with the board facing down prevents debris from inadvertently damaging or shorting the electronics and is the preferred orientation. Generally, all drives should be mounted in the same orientation to avoid extra twists in the cables.

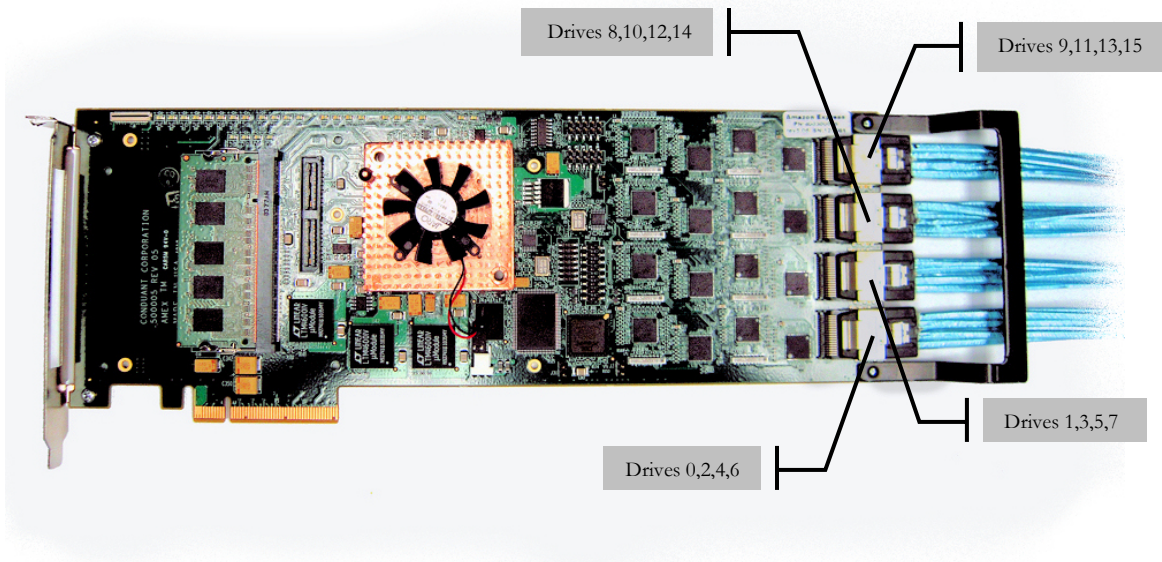
The maximum recommended length of SATA cables is 1 meter. Avoid the use of longer cables since they may cause intermittent data loss. Removable drive carriers add several connections to the SATA interface that can also cause intermittent data problems. Several removable drive carriers are known to work with StreamStor, please contact Conduant if you have special requirements for them.

All StreamStor models are upgradeable for increased storage capacity and high sustained data rates. Please contact Conduant for more information on upgrades.

### **Controller Card**

The Amazon Express StreamStor controller is a full-length universal PCIe card that meets the PCI Express specification (figure 1). Installation requires an 8 or 16 lane PCIe slot that can accommodate a full size card and has a card support guide. Note that the card will self configure to the number of active PCIe lanes up to 8 lanes. Some StreamStor mezzanine interface cards may require an adjacent slot as well. Clearance is also required for the drive cables exiting from the rear edge of the controller card. For maximum performance the card should be inserted into a slot supporting 8 PCIe lanes. Consult your system

documentation for more information. An illustration of the card is shown in Figure 1 (with no mezzanine/daughter board installed). The SATA drive connector numbering is also shown in Figure 1. The Mini-SAS breakout cable will usually have numbers on the SATA connectors indicating which of the 4 interfaces is connected to that end.



**Figure 1 - Drive Numbering**

Table 1 details the connectors to use for various drive combinations.

| # of Drives | Drives to use             |
|-------------|---------------------------|
| 1           | 0                         |
| 2           | 0, 2                      |
| 3           | 0, 2, 4                   |
| 4           | 0, 2, 4, 6                |
| 5           | 0, 2, 4, 6, 8             |
| 6           | 0, 2, 4, 6, 8, 10         |
| 7           | 0, 2, 4, 6, 8, 10, 12     |
| 8           | 0, 2, 4, 6, 8, 10, 12, 14 |
| 10          | 0-9                       |
| 12          | 0-11                      |
| 14          | 0-13                      |
| 16          | 0-15                      |

**Table 1 – Drive connector usage**

The following are general instructions for installing your StreamStor controller. You should also consult your computer user manual or technical reference for more specific instructions and warnings.

**⚠ CAUTION:** *Over-flexing the circuit board will damage the controller.*

**🔧 NOTE:** *You may find it easier to attach the drive interface cables **BEFORE** installing the controller board. Be careful to prevent damage to any components on the backside of the circuit board if you lay the card down.*

1. Turn off and unplug your computer.
2. Remove the top cover or access port to the I/O bus.
3. Remove the expansion slot cover on the back panel of the computer for the slot into which you intend to install the StreamStor controller.
4. Insert the StreamStor controller board into the chosen PCIe slot. Gently rock the board to ease it into place. It may be a tight fit but do not force the board into place. Make sure that the card support bracket lines up correctly with the support provided in the computer chassis.
5. Screw the mounting bracket to the back panel of the computer chassis.
6. Proceed to drive installation and cabling.

## **Drive Configuration**

The StreamStor controller and drives must be attached using Mini-SAS cables. These cables are available in various configurations with each cable carrying 4 SATA interfaces to the drives. There is a latch on these connectors that must be pressed when extracting from the board connector. Some cables also have latches on the SATA disk drive connection. Be careful to match the connector orientation when connecting the drive to the cable and never force the connection, as this could damage the disk drive or Amazon Express board.

In general there are usually no jumpers or other settings on the disk drive to configure. Consult the documentation for your disk drive model for more information.

## **Installing the Drives**

The method used to mount the disk drives is left to you. There are many brackets available to adapt different disk drives into the chassis, please contact Conduant for more information. Be sure to follow the handling precautions described above in the unpacking/handling section when installing the hard drives.

## **Connecting Interface and Power Cables**

All SATA disk drives provide an integrated connector with both power and interface signals as shown in Figure 2. Be careful to support the StreamStor

Amazon Express card when plugging in the drive cables to avoid over-flexing the circuit board. Also, be careful to correctly orient the connector, since they are all keyed to prevent incorrect insertion.

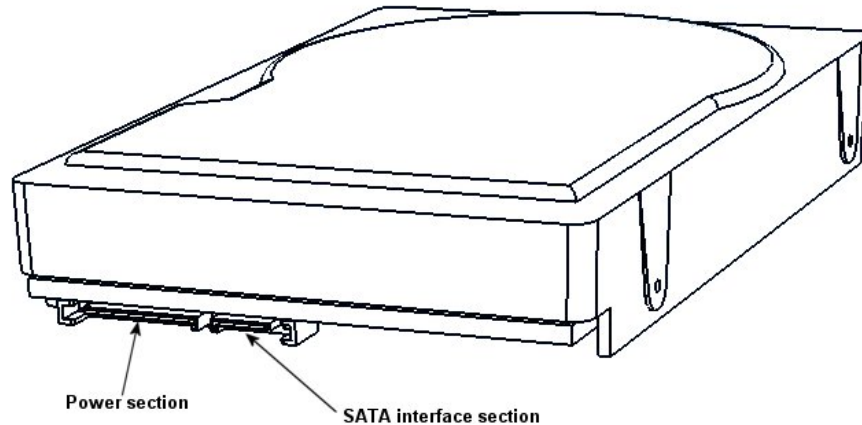


Figure 2 - SATA Drive

**⚠ CAUTION:** *The signal and power connectors are keyed to prevent incorrect insertion. Exerting excessive force with the connectors improperly aligned can cause damage. Even with the correct alignment, care should be taken to not apply excessive force or torque.*

Some SATA disk drives include a second power connector separate from the integrated SATA power/signal connector. These connectors allow the drive to be powered from the old style power cabling instead of from the integrated connector. DO NOT use both connectors to power the drive. Your installation may also utilize a backplane to make the connections to the disk drives. The SATA interface cable must then be connected to the SATA connectors on the backplane. SATA interface cables are available with either separate or integrated power and signal sections. The SATA connector on the drive is designed to allow connection of independent or integrated cables. Carefully connect and route the interface cables from the StreamStor controller to the disk drives. Refer to Table 1 to determine the correct Amazon Express connectors to use for your installation.

### **Drive auto configuration**

The StreamStor Amazon Express controller board supports auto configuration to the number of drives installed. It can support 1,2,3,4,5,6,7,8,10,12,14 and 16 drive configurations. You must connect the drives as indicated in Table 1. Always check that all drives are being recognized by the system using the `XLGetDeviceInfo` function call. The `sscfg.exe` program also reports this information after initialization.

It is recommend that user software always check for the expected number of disk drives since the Amazon Express software will always auto configure to the number of disks discovered during initialization. A cable, power or other issue may cause it to initialize without discovering all drives.

## Installing the Software

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Your StreamStor system was shipped with the Software Development Kit on CD or DVD optical disk. Install the software prior to installing the hardware if possible. On Windows systems, when ready, run the `setup.exe` program on the optical disk to start the installation process. On Linux systems, refer to the file `linux/docs/install.txt` on the optical disk.

Plug and play operating systems such as Windows will detect the StreamStor Amazon Express and attempt to configure it using the hardware plug and play wizard software. The required installation information file for plug and play installation is included on the optical disk. Make sure the plug and play wizard includes the optical disk drive in its search so that the StreamStor drivers will be properly installed. You should not cancel the plug and play wizard since this can create hardware conflicts in the system when using the StreamStor controller. Note that the `setup.exe` program must still be executed to install the StreamStor SDK onto your system.

The software installation procedure will install the device drivers, library files, example programs and all other components of the SDK onto your system.

The StreamStor SDK does not include software interfaces or drivers used for the control of data acquisition cards made by other manufacturers. However, it does include some sample programs to help in your software development efforts. Other drivers and examples may be available depending on your choice of data acquisition hardware. Contact Conduant support for more information.

Always review the **readme.html** file included with the SDK for the latest information not included in this manual. Also, check the Conduant web site periodically for additional information.

## Software Functionality

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The Amazon Express StreamStor controller supports recording and playback (or read) from the PCIe bus at up to 200 MB/s and from a daughter board interface at up to 500 MB/s. The following API commands are supported by the Amazon Express controller:

- XLRApiVersion
- XLRArmChannelForSync
- XLRAppend
- XLRBindInputChannel
- XLRBindOutputChannel
- XLRCardReset
- XLRClearChannels
- XLRClearOption
- XLRClearWriteProtect
- XLRClose
- XLRDeleteAppend
- XLRDeviceFind
- XLRedit/XLReditData
- XLERase
- XLRGetBaseAddr
- XLRGetBaseRange
- XLRGetDBInfo
- XLRGetDeviceInfo
- XLRGetDeviceStatus
- XLRGetDirectory
- XLRGetDriveInfo
- XLRGetDriveTemp
- XLRGetErrorMessage
- XLRGetLabel
- XLRGetLastError
- XLRGetLength
- XLRGetLengthPages
- XLRGetLengthLowHigh
- XLRGetMode
- XLRGetOption
- XLRGetPartitionInfo
- XLRGetPlayBufferStatus
- XLRGetPlayLength
- XLRGetRecordedChannelInfo
- XLRGetSample
- XLRGetSFPDPInterfaceStatus
- XLRGetSystemAddr
- XLRGetUserDir



- XLRGetUserDirLength
- XLRGetVersion
- XLRGetWindowAddr
- XLRGetWrapLength
- XLRNetOpen
- XLRNetCardReset
- XLROpen
- XLRPartitionCreate
- XLRPartitionDelete
- XLRPartitionResize
- XLRPartitionSelect
- XLRPlayback
- XLRPlaybackLoop
- XLRPlayTrigger
- XLRRead, XLRReadData
- XLRReadFifo
- XLRReadImmed
- XLRReadSmartThresholds
- XLRReadSmartValues
- XLRReadStatus
- XLRRecord
- XLRRecoverData
- XLRReset
- XLRSdkVersion
- XLRSelectChannel
- XLRSelfTest
- XLRSetDBMode
- XLRSetLabel
- XLRSetMode
- XLRSetOption
- XLRSetPlaybackLength
- XLRSetPortClock
- XLRSetSampleMode
- XLRSetUserDir
- XLRSetWriteProtect
- XLRStop
- XLRTruncate
- XLRWrite, XLRWriteData

The Amazon Express software does not currently support event capture or simultaneous playback while recording. See the StreamStor SDK user manual for more information.

## Daughter Boards

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The Amazon Express StreamStor controller includes the capability to add a daughter board (mezzanine) with its own connectors and electronics to provide an alternate method of transferring data into and out of StreamStor. These additional paths offer several advantages, including:

- freedom from interaction with other devices in the PCI Express fabric;
- the reduction or elimination of FIFOs that may otherwise be required to interface with PCI Express;
- full isolation of the data path from operating system and computer hardware facilitates predictable and repeatable behavior;
- better or additional control over timing and other parameters;
- higher interface utilization efficiency due to a non-arbitrated nature;
- access to interface signals without risk of crashing host computer;
- potential for dual-port operation (simultaneous transfers on both PCIe and external ports) while recording or playing back.

If an optional daughter board is ordered with your Amazon Express board, it will be preinstalled and ready to use. The `XLRSetDBMode` function in the API is used to program the behavior of the daughter boards and the modes and options are unique to the specific type of daughter board installed. Please refer to the programming manual provided for your specific daughter board. The daughter board manuals use the naming convention “DBxxxxx.pdf” where “xxxxx” is the interface type implemented by the daughter board (e.g. DBFPDP2.pdf). Manuals are in your StreamStor installation directory under “docs” as well as on the optical disk delivered with your system.

# CE Mark Declaration of Conformity

## **Declaration of Conformity**



(Manufacturer) Conduant Corporation  
(Address) 1501 South Sunset Street, Suite C  
Longmont, CO 80501 USA

### declares that the product:

Storage Controller Board, model StreamStor Amazon Express, used in PCIe Chassis, electrical supply input rated 12Vdc 2.1A.

### conforms to the following Directives:

1. Low Voltage Directive 2006/95/EC
2. Electromagnetic Compatibility Directive 2004/108/EC

### using the following primary standards:

EN 60950-1 2nd Edition : Safety of Electrical Equipment for Information Technology Equipment

EN 55024: 2010 : Immunity Standard for Information Technology Equipment

#### EMC Requirements:

EN 55022: 2006 : Radiated and Conducted Emissions - Class A  
+A1 :2007

EN 61000-4-2 : Electrostatic Discharge

EN 61000-4-3 : Radiated RF Immunity

EN 61000-4-4 : Electrical Fast Transients/Burst

EN 61000-4-5 : Surge Immunity

EN 61000-4-6 : Conducted RF Immunity

EN 61000-4-8 : Power Frequency H Field Immunity

EN 61000-4-11 : Voltage Dips, Interruptions

EN 61000-3-2 : AC Harmonic Emissions

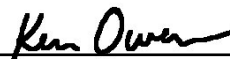
EN 61000-3-3 : AC Short and Long Term Flicker

### and complies with the relevant Essential Health and Safety Requirements.

I, undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards and is therefore eligible to carry the CE Marking.

Ken Owens  
(Name)

President/CEO  
(Position)

  
(Signature)

Longmont, Colorado

September 14, 2011 (Date)



## Technical Support

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Conduant wants to be sure that your Amazon Express StreamStor system works correctly and stays working correctly. In the event, however, that you are unable to get your new system to work properly, or if a working system ceases to function, we will do all that we can to get your system back online.

Solving the problem is largely a matter of data collection and steps that must be taken one at a time. In order for us to better serve you, we ask that you take the time to perform the following steps prior to calling us. This way, you can provide us with the most meaningful information possible that will help us solve the problem.

*Is the problem one that obviously requires replacement parts due to physical damage to the system? If yes, then please gather the information described below and report the problem to tech support, by phone or through the Conduant web site.*

*Have you confirmed that no cabling has been inadvertently disconnected or damaged while working around the equipment?*

*Is the StreamStor card properly seated in the PCIe slot?*

*Do all the systems have good power connections and voltages?*

*Does the confidence test in `sscfg.exe` (on Windows) or `ssopen/sstest` (on Linux) run OK?*

*Has the software installation been corrupted? Try re-installing software.*

*Have you checked the Conduant web site for technical bulletins?*

*Have you recently installed a new Linux kernel or compiler or a new Windows Service Pack?*

If the above steps did not resolve the problem, then please initiate a trouble ticket on the support section of the Conduant website at [www.conduant.com](http://www.conduant.com). Please provide as much information about your system and the problem as possible. We will do all that we can to resolve the problem as quickly as possible.

### **Contacting Technical Support**

E-mail: [support@conduant.com](mailto:support@conduant.com)

Web: [www.conduant.com](http://www.conduant.com)

Mail: Conduant Corporation  
Technical Support  
1501 South Sunset Street, Suite C  
Longmont, CO 80501