



# **Mark 5B+ VLBI Data System**

## **Safety Instructions and Specifications**



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## About This Manual

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This manual is intended to serve the following purposes:

- \* to provide an overview of the Mark 5B+ VLBI Data System
- \* to provide Product Safety instructions and documentation per the European Union Low Voltage Directive (LVD)
- \* to provide the Declaration of Conformity documentation required for the CE Mark
- \* to provide Specifications, operational, non-operational and environmental.

## About the Mark 5B+ VLBI DATA System

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Thank you for purchasing the Conduant Mark 5B+ VLBI Data System. The Mark 5B+ VLBI Data System delivers 2+ Gb/s of raw recording performance for the worldwide radio astronomy community. Developed in cooperation with MIT-Haystack, this rack mountable recorder features two swappable 8-drive modules. Using Conduant's bank mode recording capability, the Mark 5B+ can record continuously, 24x7 (requires operator intervention) by swapping full modules for empty modules as data is recorded using the Mark5 software application.

Fully configured, the Mark 5B+ supports up to 16 TB of storage per module, for a combined capacity of 32 TB. In Bank mode, the Mark 5B+ will record to a single module. When the module is full the hardware will automatically switch to an empty module in the alternate bay. Full modules can be powered down and replaced to allow recording to continue indefinitely. The Mark 5B+ includes the Mark 5B+ VSI interface board, LED board and SMA I/O panel for use in VLBI observatories and correlators worldwide.

The PCI 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. The Mark 5B+ system includes an FPDP2 interface that provides a cabled bridge to the computer PCI bus. By utilizing the PCI bus instead of a proprietary bus interface, the Mark 5B+ provides a recording system accessible from software applications running on the host computer.

The StreamStor technology used in the Mark 5B+ 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 SDK includes the device drivers and API (Application Programming Interface) to provide a smooth integration of the Mark 5B+ with the data acquisition device and/or analysis software.

For more information on the functions and layout of the Mark 5 VLBI Data System; refer to MIT Haystack Observatory website at:

<http://www.haystack.mit.edu/tech/vlbi/mark5/>

## Specifications

<b>Weight</b>	90 lbs (40.8 kg) with 16 drives installed (maximum)
<b>Size</b>	H 9" (22.9cm) x W 19" (48.3cm)x D 27.5" 69.9cm)
<b>Electrical rating</b>	100-240V~ 50/60 Hz 4A Note: AC supply variations are not to exceed $\pm 10\%$ of the rated 100-240V~ supply voltage range
<b>Environmental</b>  Note that environmental specifications will vary with disk drive selection.	<p>Operating:</p> <p>Temperature: 5C to 50C operating Shock (half sine wave): 300G/2 ms, 160G/1 ms</p> <p>Indoor Use Only</p> <p>Ordinary Protection (not protected against harmful ingress of moisture)</p> <p>Maximum Relative Humidity: 5 – 95% relative humidity, non condensing</p> <p>Non-Operating:</p> <p>Storage Temperature: -40C to 65C Transportation Temperature: -40C to 65C Shock (half sine wave): 1000G/1 ms Altitude: 0 to 2,000 meters</p>
<b>Pollution Degree</b>	2 per EN 61010-1
<b>Capacity</b>	Varies with disk model, up to 16 internal 3.5" SATA disk drives (magnetic or solid-state)
<b>Interfaces</b>	FPDP2, 10/100 Ethernet, VSI



## Components

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The Mark 5B+ storage system generally consists of the following components:

- Mark 5B+ System Chassis which contains:
  - Two hot-swappable 8 drive modules
  - 1 system drive, non-removable
  - 1 Motherboard and CPU
  - 1 CD/DVD Player
  - 1 power supply
- Amazon PCI Board
- Mark 5B+ LED panel
- FPD2P2 mezzanine board
- Drive module backplane
- Mark 5B+ I/O PCI interface board
- Mark 5B+ SMA signal bulkhead
- Cables
  - FPD2P2 interface cable
- StreamStor Software Development Kit (SDK)



**CAUTION:** Please read in their entirety the *StreamStor Amazon Real-time Disk Controller Installation User Manual* and the *StreamStor FPD2P2 Daughter Board User Manual* before removing or installing any boards. These manuals assume 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 Technical Support.

## Safety Symbols and Warnings

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### **Safety Symbols**

This section provides a description of the safety marking symbols that appear on the Mark 5B+ chassis. These symbols provide information about potentially dangerous situations.



Located on the chassis this symbol means caution, refer to the Safety Instructions and Specifications for information.



Located on the front panel this symbol indicates that the unit is in a “standby” mode or powered “on.”

### **Warnings**



#### **Caution**

Disconnect the power cord before removing chassis cover and servicing the unit.



#### **Caution**

Do not use the front handles for moving the unit. It’s recommended that two people move the unit by placing both hands under both sides of the unit. The handles are not designed to carry the full weight of the unit.

## Safety Warnings

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### **Warnings**



#### **Caution**

Located on the front panel this symbol indicates that the unit is in a “standby” mode or powered “on.” (LED will be lit when powered on).

This switch is a cycling type switch. The switch does not fully isolate or disconnect the power supplies from the unit when in the “standby” mode. AC line voltage is still present in the power supplies. The power cord should be disconnected before removing the top cover.

**Note:** Use the AC power switch on the rear of the unit to disconnect the main AC power from the system. The switch will be marked with a **I** (line) for power on and a **O** (circle) for power off.



### **Cleaning Instructions**

The unit should only be cleaned with a damp cloth - no cleaning solutions should be used.

### **Rack Mount Precautions**

If rack mounting the chassis, read and follow the instructions from the rack manufacturer.

If slide rails are to be used with the chassis, read and follow the instructions from the slide rail manufacturer.

## ***EMC Gasket Precautions***

Use caution when inserting the drive modules into the chassis as to not damage the EMC gasket (located on the chassis). See figure to the right. This gasket is required to meet Electromagnetic Compatibility Directive 2004/108/EC.



# CE Mark Declaration of Conformity

## **CE Declaration of Conformity**



(Manufacturer) Conduant Corporation

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

### Declares that the product:

Mark 5B+ VLBI High Speed Data Acquisition Unit, intended for instrument rack mounting, designed to accept two hot-swappable 8 drive modules, cord connected power supply, electrical supply input rated 100-240V~ 50-60Hz 4A.

### 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 61010-1: 2001 : Safety of Electrical Equipment for Measurement, Control and Laboratory Use  
 EN 61326-1: 2006 : Electrical Equipment for Measurement, Control and Laboratory Use

#### EMC Requirements

EN 55011: 2007 : Radiated and Conducted Emissions - Class A, Group 1  
 IEC 61000-4-2 : Electrostatic Discharge  
 IEC 61000-4-3 : Radiated RF Immunity  
 IEC 61000-4-4 : Electrical Fast Transients/Burst  
 IEC 61000-4-5 : Surge Immunity  
 IEC 61000-4-6 : Conducted RF Immunity  
 IEC 61000-4-11 : Voltage Dips, Interruptions

### 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  
 (Signed at place)

July 21,2010  
 (Date)

## Technical Support

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