HOTLink Rack Monitor

- Remote data acquisition chassis
- Companion PMC, resides in host VME crate
- 4-wire, 320 Mbps serial link
- Data collected at the remote chassis streams directly into PCI memory at the host with no host processor intervention

HRM Advantages

- Platform independent
- Operating system independent
- Compact
- Easy expansion
- Potential to do preprocessing

Hot-Link Rack Monitor (HRM)

BASE SYSTEM

OVERVIEW

The Hot-Link Rack Monitor (HRM) is a flexible data acquisition and control system composed of a remote unit (RU) and a PCI Mezzanine Card (PMC) connected by a bidirectional 320 Mbps serial data link. The RU and the PMC can be separated by up to 30m of cable. For longer cable runs, the serial link speed can be reduced to 160Mbps. The RU typically accepts two I/O Modules (IOM) and has the capability of accommodating a maximum of three.

- Variety of IOMs available: 64 channel Multiplexed ADC, 64 channel simultaneous sampling ADC, 8 channel snapshot ADC, 8 channel timer-counter, 64 channel digital I/O
- Analog Devices 2191 DSP with 64KB on-chip RAM and 64KB off-chip battery-backed SRAM
- Fly-by DMA engine routes data from IOMs to serial controller without processor intervention
- "Port D" feature allows DSP to insert data into the serial stream to the PMC
- 8 channel TeVClk decoder-timer modeled after the popular IP-177 decoder
- Data streams from RU directly to the memory on the PMC. The PMC appears as a 5MB block of PCI memory to the host system; No OS-dependent drivers.
- Operating system and platform independent
- ACNET support available
- Fiber optic option available

- Field proven in booster correctors, HINS, and NML

APPLICATIONS

- C190 and C290 MADC replacement
- IRM and SRM replacement
- General DAQ – up to 128 16 bit analog input channels in a compact 3U rack mount box

FUNCTIONAL CHARACTERISTICS

PMC: 32 bit 33MHz PCI slave using PLX9050 or PLX9052 slave interface. Memory is organized as 2,560K 16-bit words. Supports byte, word, and longword accesses. Optional battery-backup of the high 512 Kword address block.

Remote Unit: Up to three IOMs in any valid configuration. System self-configures at reset. CRC-protected settings are retained through power cycles. Front panel serial port allows firmware downloads and problem diagnosis. 10KHz (100us) maximum update rate for recurring transfers. Heartbeat counter and loopback register allows continuous monitoring of serial link integrity.

Cable: HSSDC connectors both ends. Cable 4-conductor 23ga Madison Cable TurboQuad-Gold. Controls can supply cables made to your specifications.

CONNECTORS

Front panel: Diagnostic Port 9-pin D, Serial link HSSDC

Rear Panel: ¼" Lemo – TCLK Timer Output 0 through 7, TCLK Timer Gate Output 1,3,5, and 7, TCLK In, TCLK Out, MDAT In (not supported), 10MHz In, 10MHz out, 1MHz out, External Trigger In. All signals 5V TTL. 115VAC power, IEC320. All IOM connections are through the rear panel. IOM connector types are specified on the IOM data sheets.

REMOTE UNIT PHYSICAL/ENVIRONMENTAL

Dimensions: 3 ½ in high, 17 in wide, 13 ¼ in deep

Cooling: 60mm diameter 28.5 cu ft/min fan, pulls air in from the front panel, exhausts through the rear.

Temperature: 0C to 40C, 20% to 80% RH

Power: 115 VAC nominal, 60Hz, .5A, 20mm 1.25A fuse.

PCI Memory Map

Memory Space	Starting Address	Range	Type Code
Slow Data	$00 0000	2 MB	0
Fast Data	$20 0000	2 MB	1
Snapshot Data	$40 0000	256 KB	4
Slow Data Timestamp	$46 0000	64 KB	5
Fast Data Timestamp	$47 0000	64 KB	6
Remote Registers	$48 0000	8 KB	C-F
Local Registers	$50 0000	1 MB	na

DSP

- 160Mhz ADSP-2191
- 8K or 64K boot EEPROM
- Boots from serial port for debug and development
- 128K x 16 Non-volatile SRAM, Dallas “Power-Cap”

TCLK

- Central TCLK decoding for the remote chassis
- 10K30E, expandable to 10K50E
- Timer outputs routed to each plug-in and to the DSP
- 34 pin header takes TCLK I/O to rear panel fan-out
- No active circuitry on the fan-out
- MDAT interface available but not implemented

Hot-Link

- 320 Mbps, can go to 400 Mbps
- PCB stuff option for 1x9 fiber module
- Fibre Channel-standard HSSDC connector
- TX fed at full speed by DMAC; no DSP intervention
- RX interrupts DSP

DMA Time Structure

- Initiated by FRMTICK from 2191 on-chip timer
- DMAC broadcasts /DMABGN
- DMAC queries each port in succession
- If port has data, DMAC reads up to the limit specified in the count register
- IOMs can throttle using /RDY
- DMAC goes idle until next FRMTICK after all ports are serviced

DMA Termination Conditions

- Word counter hits zero but port still has data. DMA will resume next frame.
- Neither DAV or EOD asserted. Port is busy but its buffer is temporarily empty. DMAC will check next frame.
- EOD asserted and DAV inactive. Port is finished and buffer is empty. DMAC will check next frame.

System Bus

- 16 bidirectional address: to IOM from DSP, from IOM to H-L
- 16 bidirectional data: R/W to DSP, R-only to H-L
- DMA signalling: /DMABGN, /DMAC, /DAV, /EOD
- Transfer control: /RD, /WR, /RDY
- TCLK Trigger
- Utility: /RST, CLK, 1Mhz, power

Plug-ins

- System bus optimized for DMA
- 80-pin .05 AMPMODU system bus connectors
- Defined connector and mounting hole locations
- 5.8” x 7.0” overall
- Up to 3 cards per chassis
- Mix-n-match with limitations

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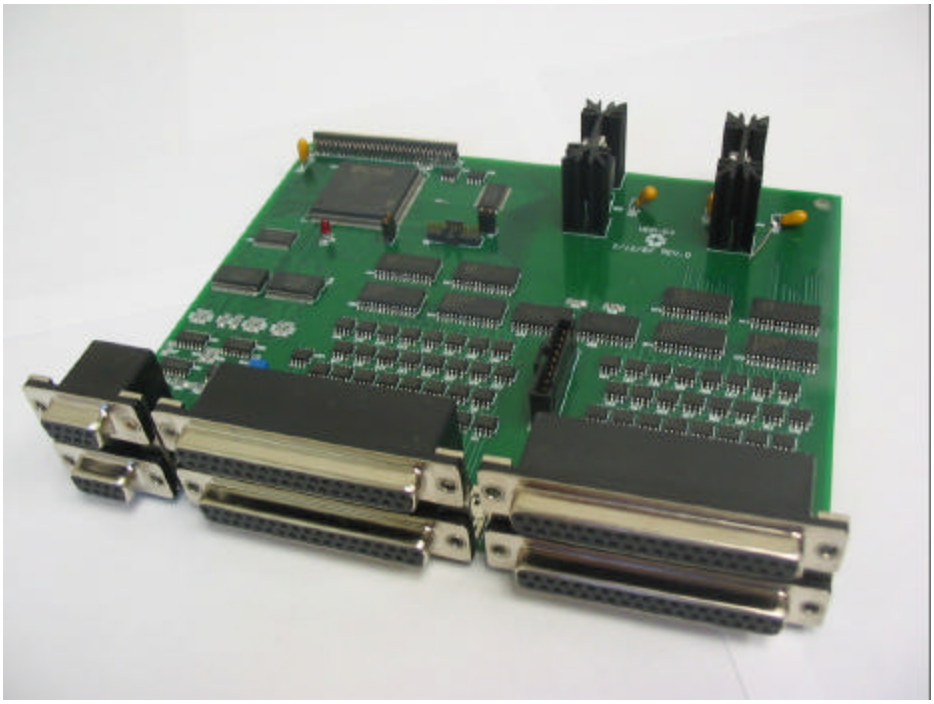
Hot-Link Rack Monitor (HRM)

64 Channel MADC



OVERVIEW

The Hot-Link Rack Monitor (HRM) 64 channel Multiplexed Analog-to-Digital Converter digitizes 64 analog inputs to 16-bit resolution and provides eight 16-bit digital-to-analog output channels.

- 10 KHz update on all analog inputs.
- Number of channels can be traded for sampling speed: 32ch@20KHz, 16ch@40KHz, 8ch@80Khz, 4ch@160KHz.
- 2 Mbyte buffer on the HRM –PMC stores the last 1.64 seconds of data for each channel
- ±10V analog input and output range
- Buffered differential analog inputs, single-ended analog outputs
- Up to two MADC64s per system for a total of 128 channels
- ADI AD976A ADCs, Burr-Brown DAC7744 DACs

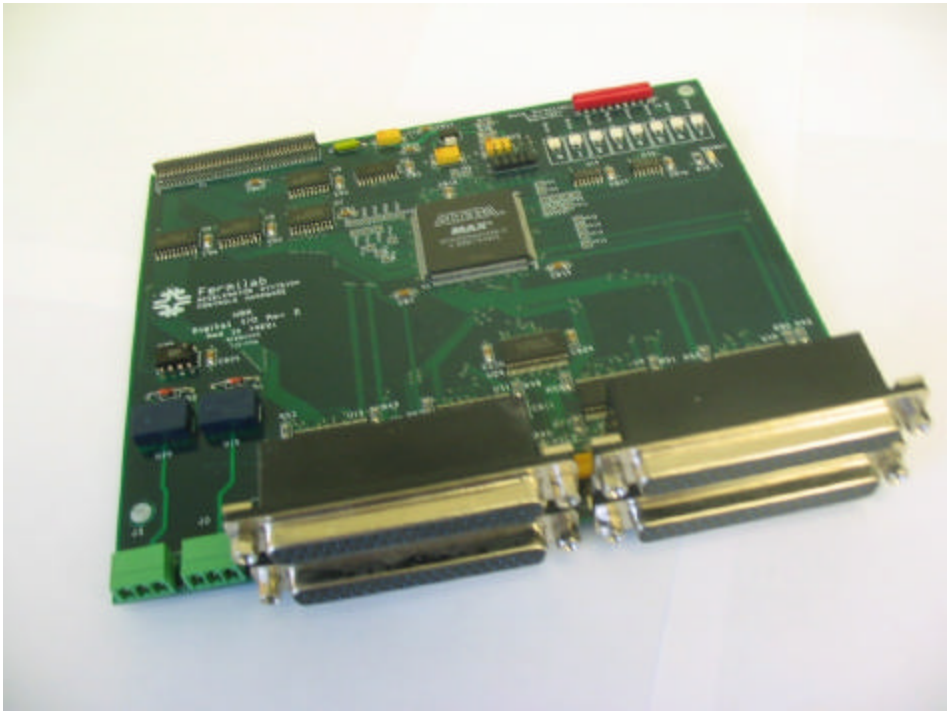
APPLICATIONS

- C190 and C290 MADC replacement
- IRM and SRM replacement
- General DAQ and control

Fermilab AD Controls

Hot-Link Rack Monitor (HRM)

DIGITAL I/O (DIGIO)



OVERVIEW

The Hot-Link Rack Monitor (HRM) Digital I/O card provides 64 bits of bidirectional I/O and two isolated Form C relay outputs. The I/O is organized as 8 ports of 8 bits each. I/O direction is established per port through a port direction register. Each port has an associated STROBE output. A DIR output on each connector is shared between the two ports on the connector and indicates the direction of a port when it is updated. It is active on the falling edge of STROBE.

- Up to three DIGIOs per system
- 5V VCC available at each I/O connector
- Altera EPM3256 FPGA can be reprogrammed for custom installations and special applications. Consult AD Controls.

APPLICATIONS

- General purpose bit and byte input and output
- State machines

HRM PMC REGISTER CONFIGURATION

Base plus module offset plus	Register
0x0,0x1	Module ID

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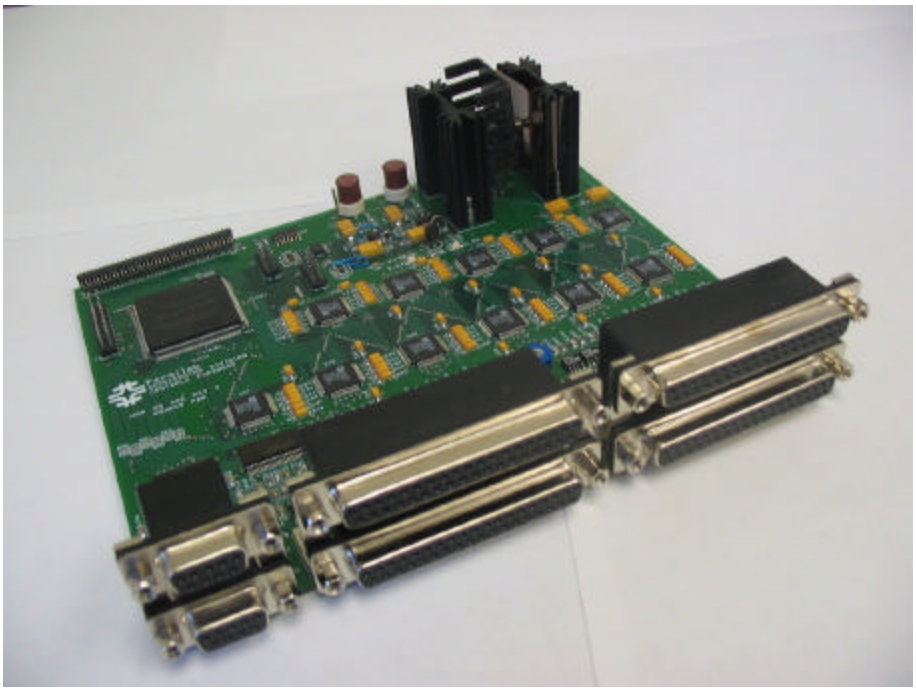
Hot-Link Rack Monitor

64 Channel Simultaneous Sampling ADC



OVERVIEW

The Hot-Link Rack Monitor Simultaneous Sampling Analog-to-Digital Converter (HSSADC) features a 16-bit converter on each of 64 analog inputs and provides eight 16-bit digital-to-analog output channels.

- 10 KHz update on all analog inputs
- 80 KHz update on any 8 channels or 100Khz update on any 4 channels simultaneous with data collection at 10 KHz. Channels and speed selectable by software.
- Uses both 2 Mbyte buffers on the HRM –PMC to store the last 1.64 seconds of data for each channel
- ±10V analog input and output range
- Buffered differential analog inputs, single-ended analog outputs
- One HSSADC per system for 64 channels
- Hardware- and software-compatible with the MADC64
- ADI AD7656-1 ADCs, Burr-Brown DAC7744 DACs

APPLICATIONS

- C190 and C290 MADC replacement
- IRM and SRM replacement
- General DAQ and control

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Hot-Link Rack Monitor

8 Channel 10 MHz Snapshot ADC

PHOTOGRAPH NOT AVAILABLE

OVERVIEW

The Hot-Link Rack Monitor Snapshot ADC (SNAP) features a 14-bit, 10 MSPS converter on each of 8 single-ended analog inputs.

- Sample rate software selectable from 156 KHz to 10 MHz in x2 steps
- One-shot or autotrigger acquisition
- Variety of trigger and trigger delay modes
- Software programmable sample count from 1 to 16K per acquisition
- On-board TCLK decoder
- One Snapshot per system
- ADI AD9240 ADCs

APPLICATIONS

- High rate data acquisition

HRM PMC REGISTER CONFIGURATION

Base plus	Register
0x0, 0x1	Module ID
0x2, 0x3	Scan Control
0x4, 0x5	Timestamp Low
0x6, 0x7	Tiemstamp High

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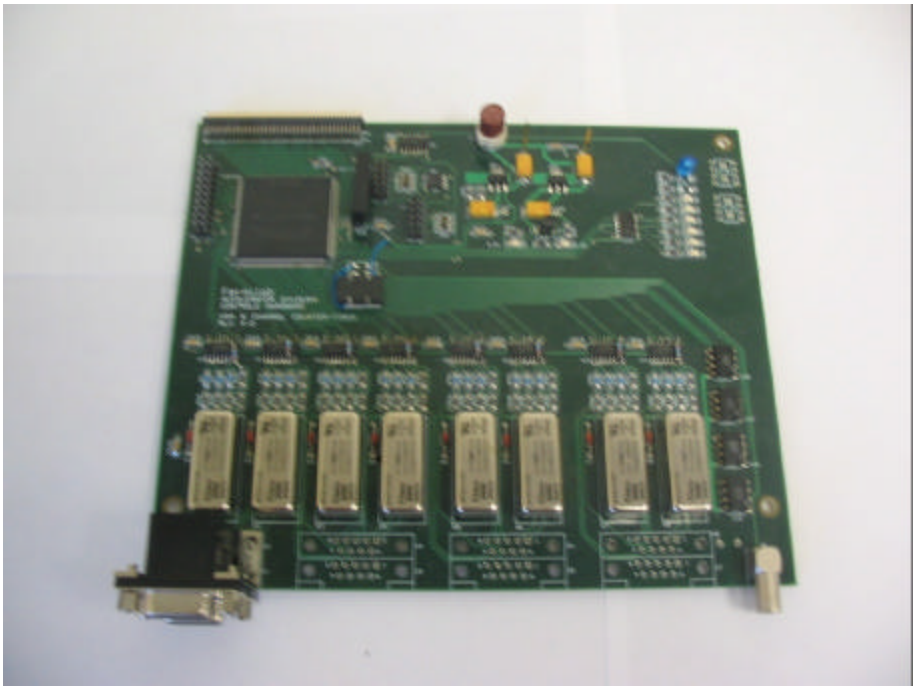
Hot-Link Rack Monitor

8 Channel Counter-Timer



Photograph not representative of final product (but it's close)

OVERVIEW

The Hot-Link Rack Monitor Counter-Timer (HRMCTM) features eight 32-bit counter channels

- Frequency, period, totalizer, and time interval measurements
- On-board TCLK decoder can replace hardware inputs
- LVDS input levels
- Relay-selectable differential or Hi-Z single-ended termination on Fin/Clk inputs
- On-board 10MHz TCXO reference
- Connector for external TTL 10MHz reference input
- Up to three HRMCTMs per system

APPLICATIONS

- Chipmunk and scarecrow accumulation
- CAMAC 333 replacement
- General purpose time measurements

HRM PMC REGISTER CONFIGURATION

Base plus	Register
0x0, 0x1	Module ID
0x2, 0x3	Global Timer Status 1
0x4, 0x5	Global Timer Status 2