EPICS Brick Workshop
by
David Kline

APS Users Meeting 2006 – Beamline Controls Workshop

EPICS Brick Workshop

- Hardware and supported modules
- Base configuration
- Application development, IOC, boot configurations
- Examples
- Status and future development

Hardware and Supported Modules

- Low-cost IOC, soft real-time, local control
- Purchased from Diamond Systems Incorporated (DSC)
  - PC104-based Athena, Pentium III Eden processor
  - 660Mhz (fan or fanless), 128MB
  - DAQ with 16 ADC @ 16bits, 4 DAC @ 12bits (-10V..10V), 24 digital IO bits, watchdog timer, 2 USB, IDE, 4 Serial, printer, VGA, mouse, keyboard, Ethernet
  - Reliable, rugged, used in military, aerospace, sea and land vehicles, oilfield, and traffic control applications
- Supported modules
  - DSC Ruby-MM-416, 4 DAC @ 16bits, 24 digital IO bits
  - DSC Emerald-MM-8P, 8 RS-232/422/485 ports
  - Sensoray Model 518, 8 channel, thermocouple, RTD, thermistor
  - OMS PC68/78 Motion Controller, MDrive, Love controllers

Enclosure

PC104 Stack

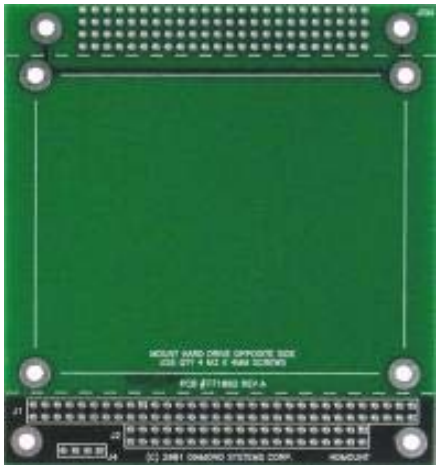
Base Configuration

- Hardware,
  - Athena 660Mhz processor board with fan, DAQ
  - AC adapter
  - Pandora enclosure (*sorry, no purple*)
  - Panel IO board
  - 40GB hard drive (~38GB available) or…
  - 2GB compact flash (~700MB available)
  - Total cost ~$1100 USD
  - Optional boards

Power Supply

Athena Board

Pandora Enclosures



Hard Drive Mount

Compact Flash Mount

Base Configuration

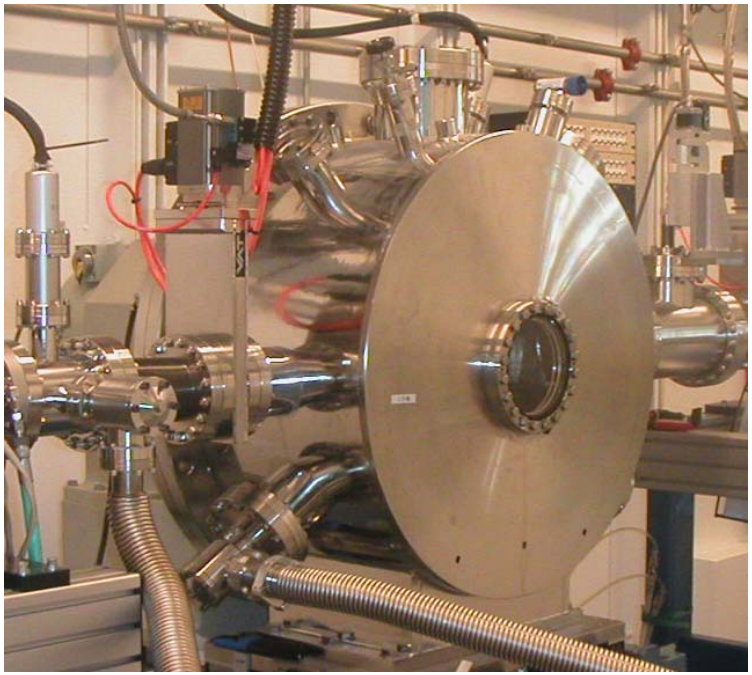
- Software,
  - Vector Linux STD 5.1, Slackware based
  - Development tools, editors, CVS, TkCVS, X11, XDMCP, IceWM, NFS
  - EPICS base 3.14.7, synApps 5.1, Probe, MEDM, IOC directories
  - EPICS support for DAQ, support modules, MEDM screens
  - Screen application (iocsh attach)
  - Total cost ~$0.0 USD

Application development, IOC, boot configurations

- Application development
  - Uses the 40GB hard drive
  - EPICS 3.14.7, synApps 5.1, IOC examples
  - Accounts root, epics, IOC test account
- IOC
  - Uses the 2GB compact flash
  - Target IOC, uses standard directory structure
  - Accounts root, IOC target account
- Boot
  - Development/w X
  - IOC/w X
  - IOC console/wo X
  - IOC console serial/wo X

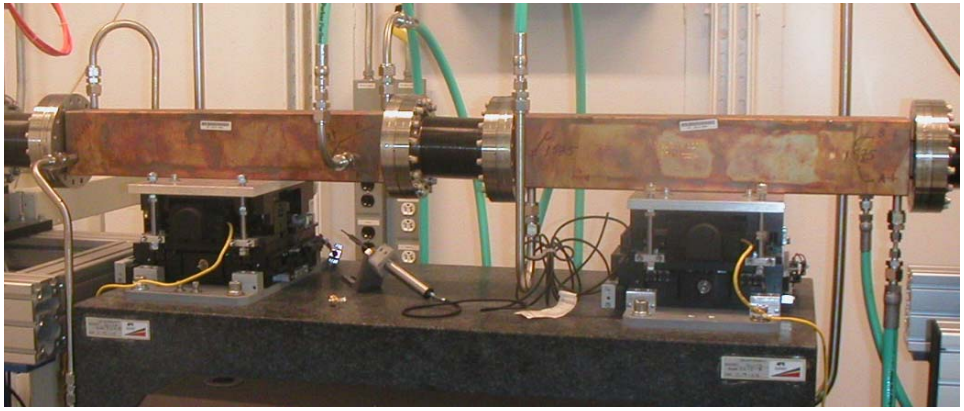
Example: 26ID Beamline Kohzu Monochromator

- Base eBrick configuration/w 40GB
- Serial to motor controller/wo encoders
- Standard EPICS support (MEDM)
- Extra capacity
  - ADC, DAC, digital IO, 2 serial ports…



Example: 26ID Beamline White Beam Slits

- Base eBrick configuration/w 40GB
- Serial to motor controller/w encoders
- Standard EPICS support (MEDM)
- Extra capacity
  - ADC, DAC, digital IO, 1 serial port…

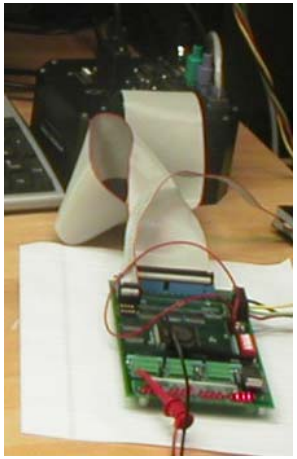


Example: 32ID USAXS_DEI Instrument

- Base eBrick configuration/w 40GB
- 19” rack mounted
- 2 DSC Ruby-MM-416
  - DACs for PZT positioners
  - Digital IO for XIA PF4 filters
  - Digital IO for Femto DLPCA current amplifiers
- Standard EPICS support (MEDM)
- Extra capacity
  - ADC, DAC, digital IO, 4 serial ports…

Status and Future Development

- Status
  - Ready for prime time
  - Nano's Kohzu
  - Nano's White-beam slits
  - USAXS_DEI instrument
  - Others sector are interested, detector pool
- Future
  - USAXS mirrors
  - 16 32bit counter Scaler module (generic digital IO)
  - GPIB board, Sensoray's sensor board
  - NFS or flash boot
  - Love controller replacement
  - 19" rack mountable, ADC, DAC, DIO to BNCs
  - DSC Athena II, 800MHz, 256MB



Scaler

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Thank You