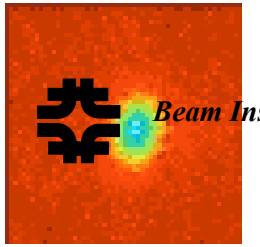

MI DCCT Computations

A brief look at the MIBEAM front-end operation and calculations for the DCCT

Tom Meyer

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MIBEAM front-end Hardware

MIBEAM front-end is a VME MOOC based front-end located at MI-30. It consists of the following hardware:

- MVME-2401 CPU card
- ICS110BL digitizer board
- PMC-UCD clock decoder
- SBS IP carrier board with an IP MDAT transmitter
- MDAT Fanout board.

ICS110BL digitizer board

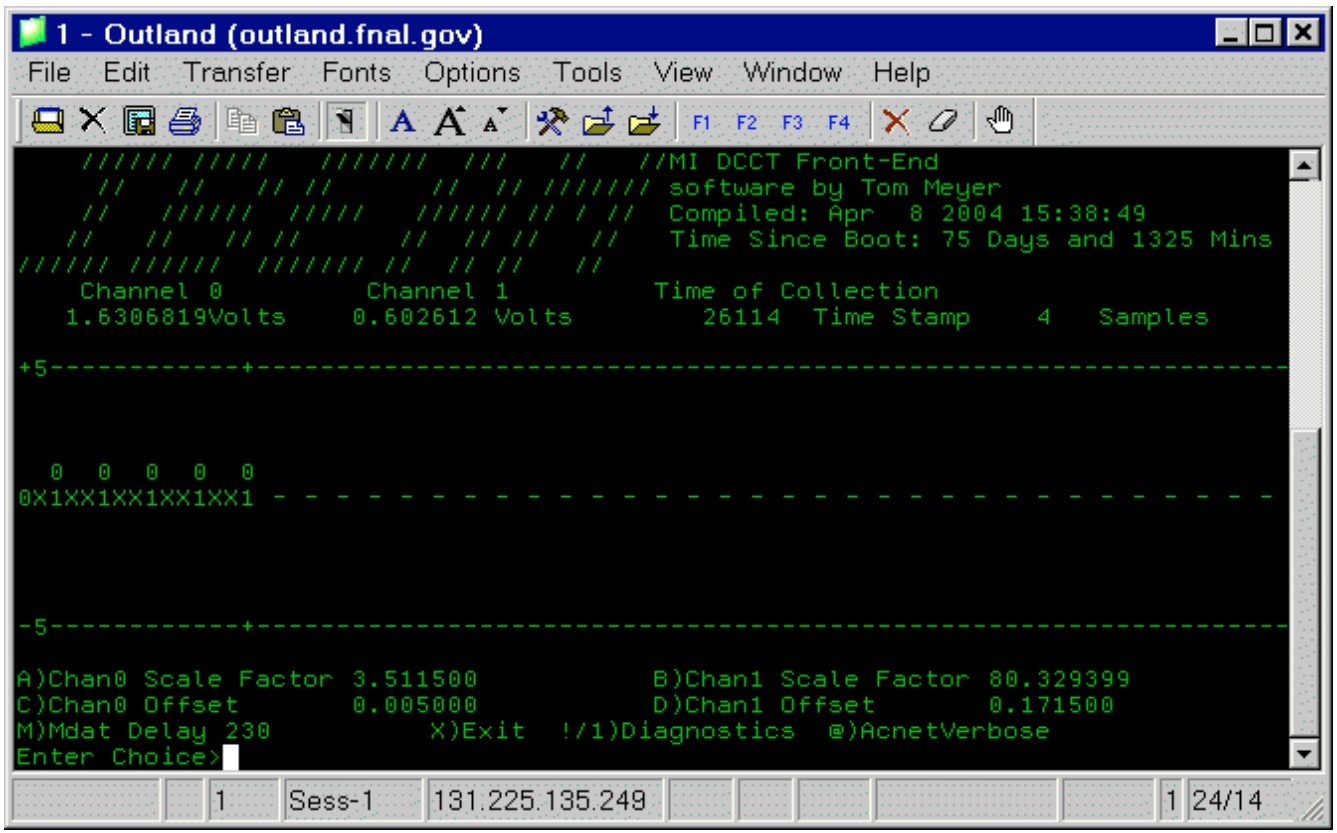
- 24 bit Sigma-Delta A/D converter (18 actual bits measured).
- 6.4 MHz sample rate.
- 50 kHz update rate with 128 sample averaging or 100 kHz update at 64 sample averaging.

Front-end timing and calculations

- Data is collected from the ADC by a task running at 2880 Hz.
- Data is averaged over 4 samples at 720 Hz, this data is stored in a buffer.
- All ACNET request are filled by returning the data stored in the buffer asynchronously with data collection.
- Scaling is done with the simple equation y = ax + b, where y is the ACNET readback, x the input from the ADC, a the scale factor and b the offset (both readable and lumberjack via ACNET).
- A running average (X:RABEAM) is calculated with the equation:
  $y_{ave} = (y_{old} * weight) + (y_{current} * (1 - weight))$ where the weight is between 1 and 0. Zero gives no averaging and 1 gives no update.
- Main devices are X:BEAM and X:BEAMS.

Calibration

- Calibration of the front-end is done via telnet to the front-end. This is done by either the engineer or programmer.



Miscellaneous

- Tevatron DCCT front-end (TBEAM) is identical in hardware and software.
- Scale Factors and Offsets have the ACNET names X:BEAMSF and X:BEAMOF where X is the machine initial, I, R or T.