Fast BPM data acquisition system using WindowsXP-based EPICS IOC

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Overview

- KEK Injector Linac provides four different kinds of beam
- 8 Gev e- (1 nC)/ 3.5 Gev e+ (1 nC, primary e- 7 nC) for KEKB (Continuously)
- 2.5 Gev e- (0.1 nC) for PF (Scheduled Injection 2/day)

=> ***Top-up*** *(Autumn '09)*

- 3 GeV e- (0.1 nC) for PF-AR (Scheduled Injection 2/day)

- Non-destructive Beam Position Monitor (BPM)
  - used for Beam orbit feedback/ Beam energy feedback
  - Number of BPM: 94 (four strip-line type electrode)

- *Towards KEKB continuous injection/ PF Top-up*

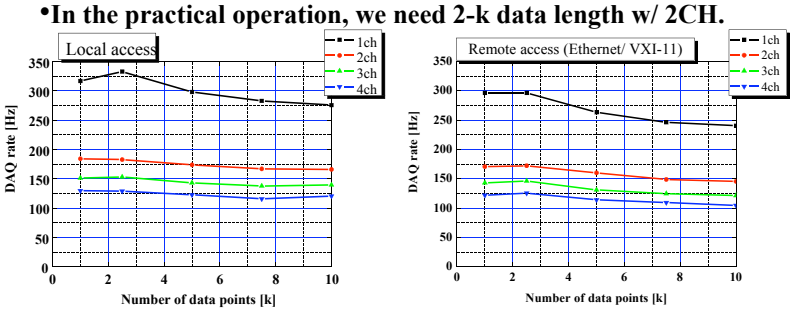
⇒ *We need BPM data acquisition of 50-Hz*

☐Former BPM DAQ system: Old digital oscilloscope/GPIB and VME. The maintenance work is very difficult since the oscilloscope is discontinued product.

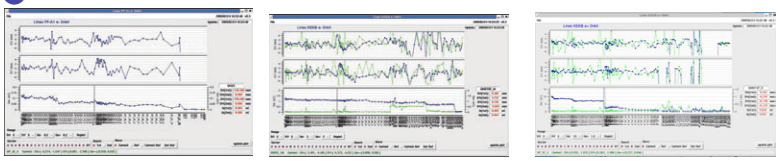
⇒ New system: Fast digital oscilloscope (Windows XP-based) w/ EPICS (Experimental Physics and Industrial Control System)

Performance test of the fast digital oscilloscope

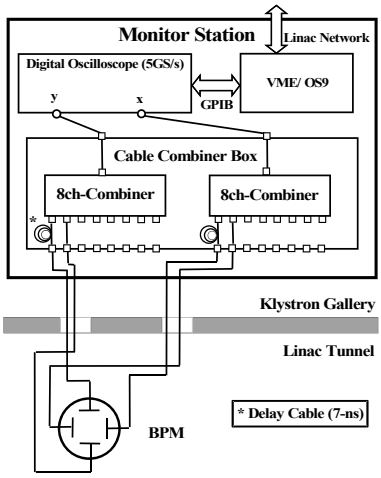
- We tested the speed of waveform acquisition (Tektronix DPO7104, 4CH, WindowsXP, Pentium4-3.4 GHz, 2 GB memory) for the local and remote access. In the local access test, the test software is running on the oscilloscope.
- The test result shows that the acquisition speed is enough for 50-Hz measurement.
- In the practical operation, we need 2-k data length w/ 2CH.



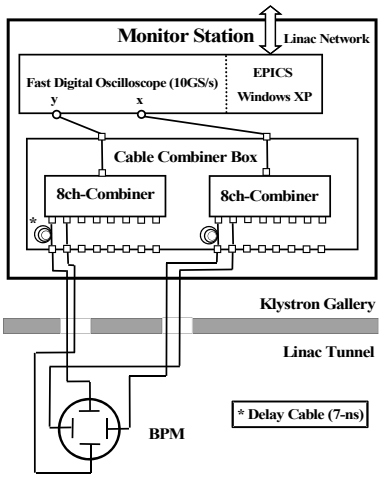
Beam Orbit panel examples

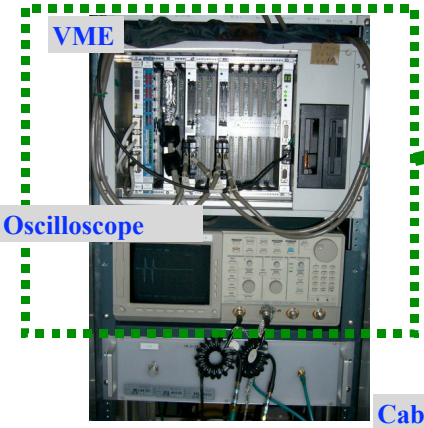


Former BPM System

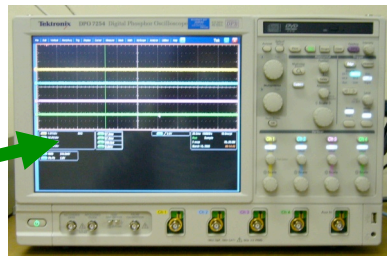


New BPM System



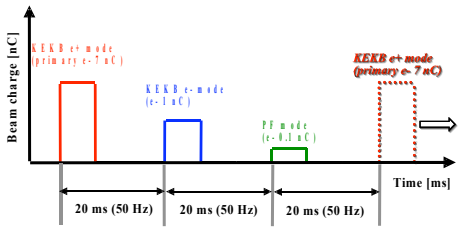


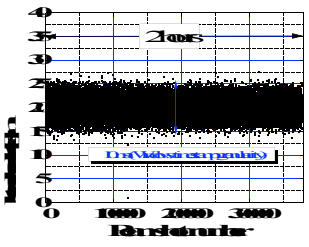
Photograph of Former System

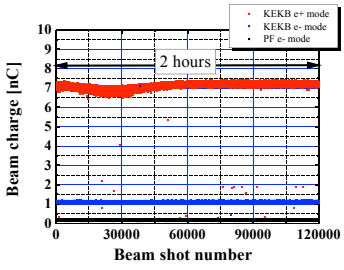


Photograph of Fast Digital Oscilloscope (Tektronix DPO7104)

Beam Test with 50 Hz repetition







Summary and planning

- The new BPM DAQ system was developed for the KEK Injector Linac.
- This system is the WindowsXP-based fast digital oscilloscope. Each of them can work as a EPICS.
- All of 23 BPM-DAQ systems have been already replaced by new one, and used for daily operation.
- They all work very stable.

- EPICS record for the averaging data is under development.
- Same system is now being prepared for the KEKB-BT.