November, 2003 Report of the Tevatron BPM Upgrade
wbs item 1.3.4.6.4
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Project Manager's Summary:

In November the project was primarily concerned with and working on the core electronics hardware. The project looked at 5 main viable options with respect to cost, schedule, effort, capabilities, and ability to meet the requirements. This process continued into December.

Work continued on the BLM prototyping effort, software and data structure specification, and analysis of data taken before the shutdown. At the end of the month a set of measurements were taken with the damper board and preparations were made to take other sets of data necessary to understand how well the proton and antiproton signals could be disentangled. Dedicated proton studies were requested in addition to these parasitic measurements.

In December the project will continue to investigate hardware solutions with a goal of a technology choice, a review, and a push toward final design of the electronics.

Resources Used in November, 2003:

The total number of FTE-months devoted to the project in calendar November 2003 in the Computing Division was reported to be 5.0 FTE-months, and 11 people contributed. This compares to 2.3 FTE-months in August, 4.1 FTE-months in September and 6.0 FTE-months in October. The drop from October to November is primarily due to the end of the cabling work in the tunnel. Estimated effort expended in the Beams Division was 1.6 FTE-months, and 6 people, in November, 2003. The total effort expended was 6.6 FTE-months.

Purchase requisitions were placed in November and the amounts are as follows:

PO 554435	$1,100	Bandpass filters

Purchase requisitions were placed in October for the work in the tunnel and for the BLM interface card. The requisitions and updated amounts are as follows:

PO 553812	$4,330	Connectors
PO 553679	$0	Connectors (order cancelled)
PO 545187	$25,000	Electrician Services

BLM prototype parts:

Pro-Card	$295	PCI2PMC Adapter
Pro-Card	$585	PCM-DIO

Tunnel/Cabling:

Pro-Card	$403	BNC Plug 39F1030
Pro-Card	$1590	Connectors

Meetings held, Reports Given:

Meetings were held in October on the following dates:

November 5, 12, 19 -- Project meetings

November 6, 10, 13, 17, 20, 24 – Hardware meetings

Documents:

The following documents were written and added to the Beams Division Document Database in November:

Jim Steimel, "Tevatron BPM Upgrade Data Registers", November 7, 2003, Doc 903-v1.

Fritz DeJongh, "Tevatron BPM Cable and Related Measurements", November 7, 2003, Doc 904-v1.

Mike Martens, Jim Steimel, Jerry Annala, "Tevatron Beam Position Monitor Upgrade Requirements", October 25, 2003, Doc 554-v4.

Margaret Votava, Luciano Piccoli, Dehong Zhang, Brian Hendricks, "Tevatron Beam Position Monitor Upgrade's Software Specifications for Data Acquisition", November 13, 2003, Doc 860-v5.

Valeria Lebedev, "Proposed BPM analog signal processing", November 14, 2003, Doc 914-v1.

Robert Kutschke, "Notes on the Frequency Content of the Tevatron BPM Signals", November 20, 2003, Doc 920-v1.

Robert Kutschke, "First Look at the Scope Data from Jim Steimel", November 24, 2003, Doc 922-v1.

Michael Martens, Fritz DeJongh, Marv Olson, "Notes on Tev BPM offset changes in November 2003", November 25, 2003, Doc 924-v1.

Robert Kutschke, "A Second Look at Jim's Scope Data", November 25, 2003, Doc 923-v2.

Subproject Leader Reports:

Requirements: Mike Martens

Since most of the focus has been on hardware design, there has not been much change related to the Tev BPM requirements. The main development has been a better understanding of turn by turn (TBT) measurements and the effects of beam dynamics on the BPM signals. This issue was raised last month, but a more complete analysis has been done by V. Lebedev and his work has been published. The analysis has been discussed and the problems understood by several of the hardware designers.

During the Tevatron 10 week shutdown measurements were made of the electrical offsets of the present BPM system and these were implemented in the BPM software during the commissioning phase.

Specifications: Jim Steimel

There was no direct progress on the specifications document this month. Instead, efforts were focused on clarifying key requirements on data buffer organization in the system and coming up with a consistant nomenclature. Also, effort was focused on providing cost/labor estimates for different hardware architecture options, to better illustrate advantages and disadvantages between our options. Next month's effort will focus on verification of proton/pbar deembedding technique, preperation for project review, and significant progress on a document describing the closed orbit measurement process in the Tevatron.

Electronics: Vince Pavlicek

During November, the electronics group participated in the hardware meeting discussions in order to understand the how the requirements defined the hardware needs. The signal processing requirements became more clear in November but the timing requirements are still not well defined and should be on the discussion agenda soon.

The electronics group started the BLM interface part of the project and specified a prototype test that would allow us to better define the scale of the task. We purchased prototype hardware, wrote basic test software and acquired a spare BLM electronics rack. The prototype hardware and software successfully communicated with and controlled the BLM hardware and achieved a data transfer rate 10,000 times faster than the data is produced. The test system was made available to the software group to assist in defining the BLM DAQ software needed for the production system.

The electronic group also participated in the testing of candidate hardware with actual BPM signals in the A1 service building.

Front-end/DAQ software: Margaret Votava

This was a short month due to Holidays and vacations. We spent time this month in understanding in more detail the interface to ACNET and the workings of the current DSR board. We've setup our own vxworks board running MOOC and have created test ACNET devices that we've been able to access through the beams server. We would very much like to move the test stand to FCC, and have not made much progress in getting the firewall issues resolved to make that happen. We've spent time understanding the ACNET devices associated with the current BPM system which was very illuminating and brought up some additional crucial items to be included in the specifications document - such as the need to periodically lock out certain data buffers from update until the older information has been readout. We have worked closely with the DSR developers in understanding the code for the existing DSR including DSP code (and programming. We have started to look at the Bill Hayne's new BLM board. It looks pretty simple from a programming standpoint.

Online software: Brian Hendricks

This month was spent attempting to better understand the structure and meaning of the present ACNET devices associated with the Tevatron BPM system. Some refinements were made to the data structures document, but more information is still needed about pertinent machine metadata to include in those structures.

Offline software: Rob Kutschke

During November Rob Kutschke continued to work on three fronts. His main effort was on analysis of damper board data and scope data. The goal is to test the principle by which the proton feedthough is subtracted from the antiproton signal. Many engineering problems were discovered and solved. This work should produce a result in the first week or two of December. He also continued to participate in the overall design effort. Finally he was able to work on the Lebedev project. This is moving ahead but more slowly than expected because more effort was put into the first two tasks than initially planned. Julia Yarba is coming up to speed to help with the analysis of the damper board and scope data and has just obtained her first result. She will eventually do more of this work, freeing Rob for his other tasks.