

February, 2004 Report of the Tevatron BPM Upgrade  
wbs item 1.3.4.6.4  
Bob Webber, Stephen Wolbers  
March 6, 2004

**Project Manager's Summary:**

In February many parallel efforts moved forward toward the eventual goal of installing and commissioning a new BPM system later in 2004. A big effort was made in February to prepare for the DOE review that occurred February 24-26, 2004. Both Bob and Steve gave talks about the Tevatron BPM upgrade.

Purchase requisitions for the receiver boards (EchoTek or equivalent), MVME processors and VME crates were signed and either were in purchasing for quote or bid or were close to that point. We expect to have the orders placed in early March with delivery dates to be determined.

Many meetings in February were devoted to the front-end software specification and this led to a "final" document that is now in review by the project. There will be additions or corrections to the document once the details of the calibration and diagnostics system is finalized.

The design of the timing and diagnostics system, along with a detailed crate layout is moving along. A first draft and discussion was held and comments from that discussion and elsewhere has been used to update the plan. A second discussion should occur soon.

Measurements continue to be made with real Tevatron beam, both with the damper board and with an EchoTek board using a filtered 53 MHz signal. The measurements using the EchoTek were used by Bob Webber to measure the resolution for closed orbit and turn-by-turn measurements. These were invaluable for getting signatures on purchase requisitions and for the DOE review. Modifications were made to the readout to allow I and Q from the EchoTek. All of this is real progress and prepares us for further tests and studies of the system.

**Resources Used in February 2004:**

The total number of FTE-months devoted to the project in calendar February 2004 in the Computing Division was reported to be 6.7 FTE-months, and 15 people contributed. Estimated effort expended in the Accelerator Division was 2.3 FTE-months, and 8 people, in February 2004. The total effort from both Divisions was 9.0 FTE-months. The following table gives the estimated or reported effort for both divisions (in FTE-months) since August of 2003.

Month	AD Effort	CD Effort	Total Effort
August, 2003	1.2	2.3	3.5
September, 2003	1.4	4.1	5.5
October, 2003	5.4	6.0	11.4
November, 2003	1.6	5.0	6.6
December, 2003	1.4	4.4	5.8
January, 2004	1.7	5.1	6.8
February, 2004	2.3	6.7	9.0

Purchase requisitions placed in February:

169863	Digital Receiver Boards	\$1,008,000
169866	MVME Processor Boards	\$118,000
169975	VME crates	\$147,000
170164	PMC cards	\$19,063.76

**Milestones:**

There was one major (DOE) milestones in February 2004:

February 13, 2004: Receiver Boards Placed

The requisition was signed and was sent out for bids on February 17, 2004.

**Meetings held, Reports Given:**

Meetings were held in February on the following dates:

February 4,11,18,23 -- Project meetings

February 5,7,9,16 -- Timing, Software Specification Meetings

February 24-26 – DOE Review

**Documents:**

The following documents were written and added to the Accelerator Division Document Database in February:

Stephen Wolbers, “TeV BPM Upgrade”, February 4, 2004, AD Doc 999-v1.

Luciano Piccoli, “Tevatron BPM Software Specifications”, February 19, 2004, AD Doc #860-v14.

Bob Webber, “Webber TeV BPM Tech Overview”, February 24, 2004, AD Doc #1038-v1.

Charles Briegel, “Echotek Drivers”, February 24, 2004, AD Doc #1041-v1.

Stephen Wolbers, “Tevatron BPM Upgrade Presentation at the DOE Review”, February 25, 2004, AD Doc #1044-v1.

Robert Kutschke, “Reading TeV BPMs with a Recycler Board”, February 26, 2004, AD Doc #1031-v5.

## **Subproject Leader Reports:**

### **Technical Coordinator: Jim Steimel**

Most of the month was spent coordinating effort on different pieces of test equipment and procedures used to better specify the final system.

All the hardware is in place for getting clock reference signals to the test system at Feynman computing center. We are waiting for a shutdown to make the final connections (scheduled for March 15).

Modifications were made to the EchoTek test system at A1, so that we could continuously log complex data from the horizontal and vertical BPMs connected to the EchoTek card. There are still some questions about the phase repeatability of different channels to work out.

Wire tests of a Tevatron BPM were completed to verify the non-linear response of the upstream ports to beam position.

Plans for beam studies are finalized and will take place once the reliability of the EchoTek system measurements are improved or understood.

### **Requirements: Mike Martens**

Many meetings and discussions were devoted to completing the Front-end/DAQ software specifications document. Input from the Tevatron group was used in order to get a software specification that is consistent with the BPM upgrade requirements and consistent with Tevatron operations.

Work also continued on gathering data from the EchoTek boards at A14 and A15, and preparing tools for performing beam based studies and the automation of data collection. This includes items such as building ACL scripts for controlling the beam position in the BPM detectors, modifying data logger lists to collect the "I & Q" data from the EchoTek boards, and writing a study proposal to measure the directionality of the pickups as a function of beam position.

### **Electronics: Vince Pavlicek**

For February, the Electronics group collected considerable information to understand the timing needs of the new BPM DA system by examining the existing Recycler BPM system operation and the requirements and the planned operation. The understanding of the timing and diagnostic needs produced a proposal for the Tevatron BPM hardware. The comments and following discussions refined the hardware design and will produce a final hardware proposal very early in March. Also a hardware specification document

was created and the first draft of that will also be public early in March. In addition to meeting attendance and the group contributed comments to the front end DA software specifications. Our BLM interface hardware designer made contact with the BLM electronics committee exchanged information and will maintain contact to ensure that the two designs track each other.

**Front-end/DAQ software: Margaret Votava**

Most of the month was spent working on the Front-end software specifications document.

**Online software: Brian Hendricks**

During this month, there were many meetings with the front end software group as well as with the Tevatron department to further refine the BPM device data structures as well as the types of data to be retrieved from the system. The first version of the online software specification was also written. This document still needs to be reviewed and expanded as further details emerge about the front end software design and expected system usage, especially concerning the areas of diagnostics and calibration.

**Offline software: Rob Kutschke**

The main effort this month was analysing data taken by the recycler echotek system in the Tevatron. Two phase instabilities were discovered. The first of these is an artifact of normal operations and is not a problem. The second is not yet understood. I met regularly with the DAQ group to discuss their specifications document.