

May 2004 Report of the Tevatron BPM Upgrade  
wbs item 1.3.4.6.4  
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June 7, 2004

**Project Manager's Summary:**

The main emphasis of the project in May was the front-end design and the preparation for delivery of the first modified EchoTek boards in June. The front-end design includes the cabling connecting the RG-8 cables (that carry the raw signals from the pickups to the service buildings) to the filter boards in the Tevatron BPM VME crates, the VME crates, the MVME processors, the timing system, the front-end board (now named the Tevatron Filter board), and all the cabling that connects these various boards. A design review was held on Friday, May 14. The review pointed out some aspects of the design that need clarification and testing or possibly modification. The design, layout, and prototyping of the boards moved forward.

As far as preparations for the first modified EchoTek boards work was done to prepare a test suite for the boards. This test suite is documented in AD doc #1114. A VME driver for the board from EchoTek was received, compiled and work proceeds to integrate it into a version that can be used first for the board tests and later for the production system.

A new version of the project wbs was created and is being rolled up into v3.0 of the Run 2 luminosity upgrade project. The big change is to properly align the EchoTek board delivery schedule into the new plan, as well as to align work in the service buildings with the shutdown that begins August 23 and to begin to commission the system when beam returns on November 22. A new set of major milestones was generated. The major milestones are:

Tev BPM: Requirements Review (Milestone)	9/22/03
Core HW technical choice review complete	12/16/03
Core electronics PO complete	3/11/04
Core electronics 1st modified board delivered	6/15/04
Electronics design review complete	6/25/04
Core electronics 1st production board available	8/13/04
First production quality crate installation begins	8/23/04
All Tev BPM crates functionally available (except for F bldg.)	11/22/04
Tev BPM Electronics commissioning complete	2/17/05
Tev BPM Upgrade Operational	3/4/05

Preparation for system installation continues and progressed nicely. The final positions for the VME crate and associated panels in the service buildings has been decided, and many of the instruments and equipment that were in those positions have been removed. Work to move the old Main Ring BPM cables to the rack that will contain the new TeV BPM VME crate has already been completed in many of the buildings. All of the antiproton ends of the BPMs associated with the A3 service building were connected in

the tunnel to the Main Ring BPM cables and were terminated in the A3 service building. No change was seen in the proton positions in the BPM position measurements. This gives confidence that all antiproton ends of the BPMs can be connected when it is convenient to do so.

Discussions of diagnostics and calibrations continue. Specific plans and decisions have been made about the diagnostics and calibrations and some of this has been documented. More is needed before we can say that the diagnostics and calibrations have been fully specified and designed.

The question of BLM connectivity through the upgraded TeV BPM system is still undecided. It seems likely that the BLM will build their own interface to the controls system and this frees the TeV BPM from this hardware and software effort. It makes sense to disconnect the two efforts given the mismatch of the timescales of the two projects.

#### **Resources Used in May 2004:**

The total number of FTE-months devoted to the project in calendar May 2004 from the Computing Division was reported to be 8.3 FTE-months with 19 people contributing. The total number of FTE-months devoted to the project from the Accelerator Division was 1.4 FTE-months with 8 people contributing. The total effort from both Divisions was 9.7 FTE-months. The following table gives the estimated or reported effort for both divisions (in FTE-months) since August of 2003.

<u>Month</u>	<u>AD Effort</u>	<u>CD Effort</u>	<u>Total Effort</u>
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
March, 2004	2.1	7.6	9.7
April, 2004	2.0	7.7	9.4
May, 2004	1.4	8.3	9.7

### **Purchase requisitions placed in May, 2004:**

Month	PO/Fermi PO	Date	Item	Est Cost
May	PO557162	5/4/04	Phase-Lock Loop	\$3,800.00
	<a href="#">PO557428</a>	5/18/04	Altera FPGA	\$18,600.00
	PRN49293	5/20/04	Cables	\$2,091.20
	PRN49294	5/21/04	Connectors	\$2,188.40
	Total			\$26,679.60

### **Milestones:**

The project had no DOE milestones in May. See the new milestone list above.

### **Meetings held, Reports Given:**

Meetings were held in May on the following dates:

Project Meetings: May 5, 12, 19, 20, 26

Hardware design review: May 14, 2004

### **Documents:**

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

[Beams-doc-1101-v5 Tevatron Beam Position Monitor Upgrade Offline Software Specification Robert K Kutschke](#) 28 May 2004

[Beams-doc-1172-v1 Tev BPM Diagnostics Thoughts Steve Wolbers](#) 20 May 2004

[Beams-doc-1167-v1 Tevatron Closed Orbit Beam Position Measurements in Short Gate Mode Robert K Kutschke](#) 14 May 2004

[Beams-doc-1114-v9 Test the Modified EchoTek Board Dehong Zhang et. al.](#) 12 May 2004

[Beams-doc-1116-v2 Commissioning Outline for Tevatron BPM Upgrade Jim Steimel](#) 11 May 2004

[Beams-doc-1165-v2 Specification for Passive Band Pass / Anti-aliasing Filter for the Tevatron BPM System Vince Pavlicek](#) 10 May 2004

[Beams-doc-792-v5 Minutes from the Tevatron BPM Upgrade Project Meetings](#) [Steve Wolbers](#) *et. al.* 07 May 2004

[Beams-doc-1067-v15 Tevatron BPM Software Design](#) [Luciano Piccoli](#) *et. al.* 06 May 2004

[Beams-doc-1161-v1 Tevatron BPM Upgrade Calibration Specifications](#) [Jim Steimel](#) 06 May 2004

[Beams-doc-1149-v2 The Quadratic Term in the Tevatron BPM Sum Signal](#) [Robert K Kutschke](#) 04 May 2004

[Beams-doc-1134-v1 Dependence of BPM Resolution on Time During a Store](#) [Robert K Kutschke](#) 03 May 2004

### **Subproject Leader Reports:**

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

Service building work continues. All cable TVs have been moved, and pbar cables have been pulled to the Tev BPM upgrade racks in all service buildings from A3 to D3 (excluding B0 and D0). The signals from the pbar ends of all of the BPMs in the tunnel for A3 house were connected to cables and re-terminated in the service building. There was no noticeable effect on the current proton BPM system.

A document describing the correction coefficients for the BPM system and the means for calibrating them was written. Also, we had preliminary discussions on system diagnostics organization.

The test-stand was improved by providing modules and filters for simulating synchronized beam signals.

#### **Electronics: Vince Pavlicek**

The electronics group finished the schematics for the timing card and the diagnostic card in front of the Echotek analog converter. The PC board layouts for both boards were started and both are expected to be ready for production before mid June. There were several discussions about the configuration of the diagnostic board resulting in a new capability being added at the cost of a few parts. The production of the filter board will probably be held up until the filter quotes come in to attempt to avoid a second layout because this is the only part footprint that is unknown for this board layout. The analog band pass filter specifications were review and modified and sent to purchasing for quoting. The conversion of the existing recycler firmware for the timing module

continues without problems. The basic functions should be ready before the first timing module is assembled. A meeting with Margaret's sub rack software people is planned in early June to ensure that both groups are working to the same interface models. Prototypes and engineering parts samples are being acquired and assembled for a single test channel of the diagnostic module to allow gain, distortion and reflection measurements.

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

Results from the review of the design document have now been included in the document, added a few new sections with more specific information about the Tevatron implementation, changed design diagrams (static and dynamic).

Started implementation according to the revised design, implemented most of event handling and data buffering part.

Finished preparing for the pilot board test plan document, and started to work on the driver changes necessary to test the new boards. Started work with Jim Steimel to change the test stand in FCC3 from the Recycler environment to the Tevatron environment.

#### **Online software: Brian Hendricks**

During this month, the online software specification was approved. I spent time reading and commenting on the offline software specification especially in terms of division of labor and consistency with the online specification. We also began thinking about diagnostic support, and I received a commitment from Bob West to write the diagnostic application.

#### **Offline software: Rob Kutschke**

Work continued on the offline software specifications. The document was released for comment and I have responded to most of the comments. I will respond to the remainder on my return to the lab on June 7. I also wrote Beams-doc-1167 that describes the difficulties that we will encounter with closed orbit measurements in short gate mode. The note suggests some solutions that can be investigated.