June 2004 Report of the Tevatron BPM Upgrade
wbs item 1.3.4.6.4
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Project Manager's Summary:

June was the month when the first modified EchoTek boards finally arrived. These were potentially the final version of the boards and did allow us to start working on the hardware. This is a big step and allows us to begin testing and integration with the hardware. Work to verify that the boards function correctly and are in fact the hardware that we requested will continue into July.

The timing and diagnostic boards designs were completed and early prototypes (pilot boards) were fabricated in June. Testing began and will continue into July on both boards. The front end analog band pass filters themselves turned out to be a difficult and item to procure. The RFP for filters had no responses. After the bid period closed contacts with vendors led to quotes from at least 4 vendors. None of the quotes met our specifications and discussions and clarifications with the vendors were pursued. Discussions with vendors continued into July.

Preparation for system installation continues and progressed. Work proceeded in the service buildings to move the pbar cables (old MR BPM cables) to the rack positions of the new TeV BPM electronics. The tunnel ends of the pbar cables were connected to BPMs in the tunnels whenever access was available to do so.

Work on the FCC test stands continues. A new test stand was built during June to allow for more testing given the large ramp up in testing activities. Work continues to enable the beam synch signals required for first turn and turn-by-turn measurements.

The long-awaited offline software specification was finished in June.

Work began on establishing MOUs for the long-term support of the Tevatron BPM upgrade. Two MOUs were drafted – one for the hardware and electronics the other for the software. Comments are being collected and drafts updated and this effort will continue during July.

Late in the month a task force was established to focus on a detailed understanding of the EchoTek digital receiver board. This task force is meant to fill a need for the project to have EchoTek expertise available to help test, debug, setup, explore operational modes, and operate the system.

Resources Used in June 2004:

The total number of FTE-months devoted to the project in calendar June 2004 from the Computing Division was reported to be 8.74 FTE-months with 20 people contributing. The total number of FTE-months devoted to the project from the Accelerator Division was 1.6 FTE-months with 6 people contributing. The total effort from both Divisions was 10.3 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
March, 2004	2.1	7.6	9.7
April, 2004	2.0	7.7	9.4
May, 2004	1.4	8.3	9.7
June, 2004	1.6	8.7	10.3
SUM	22.1	65.9	88.0

The effort is consistent with the wbs estimates of approximately 10-12 FTE per month during this period. The effort listed here is actual productive time worked and does not include vacation, sick leave, holidays, etc.

Purchase requisitions/procard orders placed in June, 2004:

PO	Date	Item	Est Cost
PRN49995	6/8/04	Misc electronics for Timing C pilot	$419.80
PRN49998	6/8/04	Misc. electronics for Timing C pilot	$154.72
PRN50000	6/8/04	Misc. electronics for Timing C pilot	$264.00
PRN50002	6/8/04	Misc. electronics for Filter C pilot	$75.66
PRN50027	6/9/04	Misc. electronics for Filter C pilot	$512.23
PRN50428	6/16/04	PHC1-KIT-ND KIT RES 1%	$509.85
PRN49861	6/4/04	Cables/connectors	$1,508.75
PRN49905	6/4/04	Type N Terminator/Bullet	$2,052.00
PRN50024	6/8/04	9145 Adapter SMA Male	$696.25
PRN50063	6/9/04	RP3684.424 front panel kit	$702.00
			Total $6,895.26

Milestones:

The project had two DOE milestones in June.

June 15, 2004	First modified EchoTek boards delivered
June 25, 2004	Hardware design review finished

Actual dates for these milestones are (or are projected to be):

July 19, 2004	First modified EchoTek boards delivered
July 9, 2004	Hardware design review finished

The TeV BPM project will work with the Run 2 Upgrade project managers to document and place any change required for the modified milestones.

Meetings held, Reports Given:

Meetings were held in June on the following dates:

Project Meetings: June 2, 7, 9, 16, 23

Task Force: June 28, 30

Documents:

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

Beams-doc-860-v25 Tevatron BPM Software Specifications Luciano Piccoli *et. al.* 30 Jun 2004
Beams-doc-1067-v16 Tevatron BPM Software Design Luciano Piccoli *et. al.* 23 Jun 2004

Beams-doc-1203-v0 Simulated Tevatron Closed Orbit Position Measurements in Short Gate Mode Robert K Kutschke 19 Jun 2004

Beams-doc-1165-v3 Specification for Passive Band Pass / Anti-aliasing Filter for the Tevatron BPM System Vince Pavlicek 18 Jun 2004

Beams-doc-1101-v6 Tevatron Beam Position Monitor Upgrade Offline Software Specification Robert K Kutschke 17 Jun 2004

Beams-doc-1205-v0 Tevatron BPM Upgrade Calibration Specifications: Part II Robert K Kutschke 17 Jun 2004

Beams-doc-1202-v3 BLM Prototype Testing Vince Pavlicek *et. al.* 15 Jun 2004

Beams-doc-1200-v1 Short-gate sampling mode Jim Steimel 11 Jun 2004

Beams-doc-1197-v1 Tevatron BPM Upgrade Comparison of Long Gate Mode and Short Gate Mode Robert K Kutschke 08 Jun 2004

Beams-doc-1124-v1 Separating Pbars by Time Robert K Kutschke 08 Jun 2004

Subproject Leader Reports:

Technical Coordinator: Jim Steimel

This month saw the completion of the pre-shutdown cable pulls in the service buildings around the Tevatron. Space for the new system was verified at all service buildings, and requests are in to remove any interfering equipment at the beginning of the shutdown. Necessary cable lengths were tested and verified for bulk order. A labeling convention for the cables was agreed upon and is being tested.

The hardware setup for the simulated beam signal at the test stand was completed and tested. A new task force was organized by Vince Pavlicek to speed the progress on determining how the EchoTek modules will be configured for operation and their necessary diagnostics.

Electronics: Vince Pavlicek

For June, the electronics group received the parts and PC boards for the timing card and the filter/diagnostic card. The assembly of the modules was started and both are expected to be ready for testing the first of July. The production of the filter board was not held up by the filter purchase process. A generic layout for the filter was picked and a second layout does not have a long time penalty. Tests planned for the filter/diagnostic module are gain-bandwidth, distortion and reflection measurements. The analog band pass filter quotes that were received were reviewed and some interaction with the companies on the bid list attempted to clear up some of the technical specs and encourage non-bidders to discuss their concerns with us. The filter positions in the filter/diagnostic modules will be bypassed or filled with inexpensive generic band pass filters to expedite the testing.

The conversion of the existing recycler firmware for the timing module completed without problems. The new basic functions are now being written and the plan is that they are ready before the first timing module assembly is complete. Discussions with Margaret's sub rack software people continue to ensure that both groups are working to the same interface models.

Three new Echotek modules arrived at the end of June. The company is not done qualifying the module so these are on loan until they complete their tests and produce the pilot modules called for in the purchase order. We can perform our planned functionality tests on this module because the functions of the module design should not change.

The pilot sub racks were delayed by parts deliveries but the first sub rack should be shipped 'before the end of June'.

Front-end/DAQ software: Margaret Votava

We met with offline and online groups to discuss the calibration specifications and have added them to the specifications document. Diagnostics are still missing.

Dehong worked with Jim Steimel to change the FCC3 BPM test stand from Recycler environment to Tevatron environment (fake 52.8 MHz to 53.1 MHz). He worked on the Echotek supplied driver for the pilot boards and included Charlie's changes to the original board. The FCC test stand now uses one of the new 2400 processors with the latest version of vxworks. A second test stand is being configured to allow software development testing while the pilot boards are here. Pilot boards arrived at the end of June.

Luciano is well underway with the implementation: including the following classes and unit tests: TimeEventGenerator, AuxTimeEventGenerator, TCLKEventGenerator (based on Duane's ipucd code), DataAcquisitionTask, CircularDataBuffer (for closed orbit data), Control, ControlTask. Started code for Alarm related classes. Dehong is working interating the software structure for the new timing card, transformed ipucd.*, tsg.* and iptsg.* (for the current timing card) to the new structure; tested the TCLK decoding part; The BSYNC and MDAT part to be tested.

Implemented Test classes that have simulated closed-orbit and turn-by-turn modes. Data is read from a simple counter and stored into circular buffers (for closed orbit) and FIFO-like buffers (for turn-by-turn).

Created an ACNET wrapper class, which was used in the tests, making it possible to change modes based on the value of an ACNET variable (Z:FCCMOD).

Added a FTP wrapper class, which was tested by returning a simple counter using RETDAT (low rates) and FTPMAN (higher rates).

Online software: Brian Hendricks

During the past month, some modifications were made to the ACNET device data structures to provide more needed metadata and to deal with data packing concerns. Commitments were also received from Bob West to provide the diagnostic application and Marc Mengel to provide the calibration application.

Offline software: Rob Kutschke

Rob Kutschke wrote Beams-doc-1197, "Tevatron BPM Upgrade: Comparison of Long Gate Mode and Short Gate Mode". This document uses data from the modified Recycler Echotek boards at A14 and A15 to compare the positions measured in long gate mode and short gate mode. The proton positions agree at the level of about 50 microns. The pbar positions differ by about 500 microns. This is sufficient to meet the requirements but we are still investigating the source of the discrepancy. Rob also used the modified

Recycler Echotek board to show the resolution which can be achieved using the different methods proposed for making closed orbit measurements in short gate mode. This work was presented to the group and will be written down in Beams-doc-1203.

Due to new results from the SELEX collaboration, Rob's availability for the next months has been reduced. The offline software specs are being rewritten to specify the minimal amount work before the August shutdown and to catch up during the shutdown.