

14th Monthly Report of the MI BPM Upgrade
August, 2006
wbs item 1.1.3.2 of the Run 2 Luminosity Upgrade Project
Bob Webber, Stephen Wolbers, Bakul Banerjee
September 10, 2006

Project Definition:

The MI BPM Upgrade will replace the current BPM electronics and the data acquisition system used to transfer information between the BPMs and the Accelerator Controls Systems. As part of the project, the software used to read out, transfer, store, and analyze the BPM data will be upgraded. The goal of the project is to provide a BPM system based on modern hardware and software that gives the higher resolution and expanded functionality necessary to efficiently understand and operate the Main Injector now and for the foreseeable future including the needs for Run 2 and NUMI. Deliverables of the project include all relevant documentation, manuals, user's guides and any other written records necessary for maintaining the system.

Project Manager's Summary:

In August the project completed hardware installation and worked on commissioning the system. Much of the required functionality was verified and was found to be working reliably. Under some beam conditions or cycles individual BPMs and in some cases the BPM system was found to be functioning in a non-understood way. The project concentrated on understanding and resolving these problems. Timing for measuring protons and anti-protons was set and verified. This required some work to understand the Echotek timing and therefore took a little longer than expected. The 2.5 MHz gains were set for all beam conditions. The 53 MHz gains were studied but not yet finalized in August.

There were many modifications made during August to make the system more usable. Problems with properly rebooting systems were fixed. Unexpected position measurements and noise in many locations were investigated. In some cases these are understood but in others fixes may wait for cable replacements, extra filtering or other changes to the system. A serious problem with noise affecting the 2.5 MHz pbar FLASH measurements is being studied. Various proposed solutions are being investigated (both hardware and software) and work will continue on this issue.

Remaining functionality to be installed and tested includes alarms, diagnostic/testing capability, system self-test, and board-by-board gains (to correct for attenuation from different length cables). The goal of the project is to work steadily on these while the effort is available from the various organizations involved in the upgrade project. At the end of September the project will be formally completed. Work will continue as part of operating the new system.

A formal MOU for system operation is under draft and is being circulated.

Resources Used in August 2006:

The total time worked on the project in August 2006 from the Computing Division was 3.3 FTE-months and 12 people contributed. The time worked from the Accelerator Division was 1.6 FTE-months and 13 people contributed. The total time worked from both Divisions was 4.9 FTE-months. The following table gives the estimated or reported effort for both divisions (in FTE-months) since July, 2005.

<u>Month</u>	<u>AD Effort</u>	<u>CD Effort</u>	<u>Total Effort</u>
July, 2005	2.1	2.4	4.5
August, 2005	1.4	2.7	4.1
September, 2005	2.8	3.7	6.5
October, 2005	3.5	4.7	8.2
November, 2005	2.1	5.1	7.2
December, 2005	1.4	5.7	7.1
January, 2006	3.1	4.1	7.2
February, 2006	4.2	5.7	9.9
March, 2006	3.0	4.2	7.2
April, 2006	2.1	4.2	6.3
May, 2006	2.1	5.5	7.6
June, 2006	3.8	5.1	8.9
July, 2006	3.6	4.1	7.7
August, 2006	1.6	3.3	4.9
SUM (through July, 2006)	36.8	60.5	97.3

The effort listed here is time worked and does not include vacation, sick leave, holidays, etc.

Purchase requisitions/procard obligations through August, 2006:

A final purchase list for the MI BPM project has been generated. The total M&S costs for the MI BPM upgrade is \$822,778.70.

A breakdown of the largest purchases by subsystem is given in the table below. The final assignment of costs to each subsystem, including all small purchases, will be completed as part of the project closeout.

Echotek boards	\$504,000
Timing boards	\$ 11,250
MVME (+plug-in cards)	\$ 43,417
VME crates	\$ 77,055
Transition boards	\$ 34,292
Cables	\$ 34,414

Milestones:

1.1.3.2.1.2	MI BPM: Review (Milestone)	7/25/2005
1.1.3.2.4.2	All Combiner boxes available	10/25/2005
1.1.3.2.3.1.3.5	Transition module PO issued	3/03/2006
1.1.3.2.6	MI BPM system complete	9/25/2006

Meetings held, Reports Given:

Meetings were held in August on the following dates:

Project Meetings: August 1,8,15,22,29: Minutes are available in beams-doc-1526.

Documents:

The following documents were written and added to the Accelerator Division Document Database during August, 2006.

[1526-v6 MI BPM Meeting Notes and Minutes Steve Wolbers](#) 30 Aug 2006

[2428-v1 MI BPM alarms David P Capista](#) 30 Aug 2006

[2424-v1 Pbar Turn by Turn data from MIBPMs Robert K Kutschke](#) 29 Aug 2006

[2422-v1 Main Injector BPM signoff forms David P Capista](#) 29 Aug 2006

[2421-v1 Study of Low Frequency Noise on MIBPMs operated at 2.5 MHz Robert K Kutschke](#) 29 Aug 2006

[2420-v1 MI BPM 53MHz Gain Table Robert Dysert](#) 29 Aug 2006

[2411-v1 Measurements of Crosstalk and High Frequency Signal Suppression for the Main Injector BPM Transition Board Andrea L Saewert](#) 24 Aug 2006

[2404-v1 MIBPM Validation Studies - Part 1 Robert K Kutschke](#) 22 Aug 2006

[2391-v1 Timing Comparison of Pbars in Main Injector to Recycler and to Tevatron Steve Foulkes et. al.](#) 15 Aug 2006

[2370-v1 MI-60 BPM Noise Intensities Robert Dysert](#) 15 Aug 2006

[1951-v1 Monthly Report of the MI BPM Upgrade Project Bakul Banerjee et. al.](#) 09 Aug 2006

[2382-v1 Using MathCad to Generate a Polynomial for Computation of Beam Position from MI Extra-Wide Aperture BPM Milton Smith](#) 08 Aug 2006

[2380-v1 53MHz Gain Measurements in MI BPMs Robert Dysert](#) 08 Aug 2006

[2086-v1 Note on Position Sensitivity of the Sum Signal from a Main Injector BPM Bob Webber](#) 01 Aug 2006

[2371-v1 Note on Position Sensitivity of the Sum Signal from a Main Injector Extra-Wide Aperture BPM Bob Webber](#) 01 Aug 2006