

DØ Upgrade Monthly Progress Report

for the month of February, 2000

Subsystem: Master Schedule and Overview
WBS: All
Date Submitted: 3/29/00
Submitted By: Harry Weerts, Bill Freeman

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Central Preshower Module Fabrication Complete	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	5/21/98	5/21/98	0 w
	M3-Level Ø-South Installed	4/28/00	2/9/00	11.4 w
	M2-Muon End Toroids Installed on Platform	6/27/00	11/15/00	-19.6 w
	M1-Begin Shield Wall Removal/Ready to Roll-in	11/1/00	11/22/00	-3 w
	M1-Detector Rolled-in and Hooked Up	2/1/01	2/2/01	-0.2 w

Note: the full set of reportable milestones are collected and sorted by date at the end of this report.

Areas of Concern

Technical

Refer to the WBS level 3 system reports.

Schedule

The silicon detector remains the critical path item. The proposal to split the silicon support cylinder in two halves, thereby dividing the silicon detector in two independent pieces that can be installed at different times, has been adopted as the default schedule. It allows the silicon halves to be installed when the detector is in its operating position and in principle allows installation and removal in the collision hall. We monitor the schedule on a bi-weekly basis and direct resources to areas where potential delays are developing. We remain confident that we will be ready in February 2001, but unexpected new problems occur regularly and put pressure on the schedule.

Resources

NO additional resources were requested during this period.

Cost

Given the very low contingency left at the end of the CY1999, we did a bottoms-up reevaluation of the cost estimate during February of 2000. Taking into account the actual non-DoE funds available to the project and the new cost estimate, we identified a deficit in the equipment funding of order \$1M, without contingency. This was a preliminary number, which was reviewed by a large Fermilab internal committee in March.

Change Requests

None

Progress Summary

All major subsystems (Silicon, Fiber Tracker, and Muon) were in production in February. For the muon and fiber-tracker system, we are beyond the critical point and it is a matter of completing those systems so they can be installed in the detector. Emphasis in the experiment is now shifting towards installation and parts for installation are arriving regularly. The installation sequence and needs are now beginning to dominate the project. For more details see the subsystem reports.

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Subsystem: Solenoid
WBS: 3.1.1
Date Submitted: 3/22/00
Submitted By: Gene Fisk

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M1-Solenoid Delivered to Fermilab	5/12/97	5/12/97	0 w
X	M1-Solenoid Installed and Tested	9/30/98	9/30/98	0 w

Areas of Concern

Technical

The Be beam pipe, discussed in the January 2000 report, continues to be a problem. Room-temperature leak checking at Fermilab indicated the tube was not leaking. In a subsequent bake-out at Fermilab at 100 °C a leak was found and the beam tube is in the process of being returned to the vendor. The vendor qualified the beam tube with a leak check after bake-out at 300 °C, so this leak is not understood. Fermilab is in direct contact with the vendor to resolve this problem.

Schedule

The solenoid project has a small impact on the schedule in the area of testing and field measurements. At this time the Be beam tube is not a schedule problem.

Resources

Modest technician resources are required from the Beams Division to complete the Be beam tube acceptance tests.

Cost

Completion of the solenoid project is expected as soon as the Be beam tube is leak tight after bake-out.

Change Requests

None.

Progress Summary

The Be beam tube remains to be repaired, returned to Fermilab, and acceptance tested.

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Subsystem: Silicon Tracker
WBS: 1.1.1
Date Submitted: 3/6/00
Submitted By: Marcel Demarteau, Ron Lipton

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	H Half-Wedge Fabrication 20% Complete	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	10/26/99	10/20/99	0.6 w
X	9 Chip Ladder Fabrication 20% Complete	11/4/99	11/3/99	0.2 w
X	F Wedge Assemblies 20% Complete	1/24/00	1/19/00	0.4 w
X	6 Chip Ladder Fabrication 20% Complete	1/31/00	1/3/00	3.9 w
	9 Chip Ladder Fabrication 80% Complete	3/10/00	3/27/00	-2.2 w
	H Half-Wedge Fabrication 80% Complete	3/29/00	2/23/00	5 w
	6 Chip Ladder Fabrication 80% Complete	4/18/00	3/14/00	5 w
	F Wedge Assemblies 80% Complete	5/3/00	4/26/00	1 w
	M2-First Silicon Tracker Barrel/Disk Module Complete	6/19/00	1/24/00	20.8 w
	North Half-Cylinder Complete and Ready to Move to DAB	8/1/00	8/1/00	0.2 w
	North H-disks Ready to Move to DAB	8/4/00	7/3/00	4.6 w
	M3-All Silicon Tracker Barrels/Disks Complete	10/27/00	8/25/00	9 w
	South Half-Cylinder Complete and Ready to Move to DAB	10/27/00	9/18/00	6 w
	M1-Central Silicon Complete	10/27/00	9/18/00	6 w
	M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	12/19/00	9/25/00	12 w

Areas of Concern

Technical

- The stuffing of the high density interconnects (HDIs) at Promex is still a concern, both in terms of yield and turn-around time. Promex now quotes longer lead times for completion of projects. However, they recently finished component mounting for 45 9-chip HDIs faster than the quoted completion date. The second vendor, Silitronics, has now been qualified and they deliver HDIs with a better yield than Promex for HDIs with relatively simple mounting diagrams. We plan to send H-disk HDIs, which are relatively simple, to Silitronics for stuffing, while the more complex ones will be sent to Promex.
- Given the low yield of HDI stuffing, the supply of SVX chips is being depleted at a rapid rate. An inventory has been made of the SVX chip supply. There are currently about 1400 SVX chips available at LBL, with an additional 400 at the two stuffing companies. A total of about 4000 SVX chips is needed to complete the silicon detector. Recently 15 wafers of SVX chips were bought from UTM, the manufacturer, which should yield an additional 1200 chips. An order has been placed with UTM for additional wafers to ensure that a full complement of chips is available to complete the detector. This order is currently being held until the financial situation of the experiment is clarified.
- The baseline design of the silicon detector calls for the silicon to be mounted in a long carbon-fiber support structure. The silicon group has put forward a proposal to split the support structure in two equal halves at $z=0$. Its motivation lies in the added ability to allow the silicon detector to be removed / installed in the DØ collision hall. Benefits include a reduction in the time to service silicon after roll-in from roughly six months to perhaps two months, the ability to de-couple silicon installation from installation of ECS on the center beam, the ability to install and begin to commission a significant portion of silicon before all silicon has been completed, and better internal alignment of silicon within either of the two support cylinder halves. Disadvantages include added carbon fiber structures near $z=0$, greater coupling of silicon alignment with CFT barrel 1 stability, the need for methods to align the two cylinder halves at $z=0$, and the possible need for greater attention to low-mass cable handling during silicon installation. A finite element study has shown that the deflections at $z=0$ with a split support structure are completely within our tolerances. The alignment of the two halves of the support cylinder, however, still requires further study.
- Cosmic-ray data-taking with a limited set of ladders in a spare bulkhead set is being pursued vigorously. An asynchronous trigger has been setup and data can be taken. However, after a couple of triggers, the SVX chips puts out increased pedestal values and the data signal is lost. The system never recovers itself. When the VRB

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controller is reset, data taking is again normal. This problem is being investigated. The problem of the narrowing of clock signals when running with a set of six low-mass cables was understood. A system of six low-mass cables can be read out error-free at a level of 10^{13} .

Schedule

- The delivery of 90-degree double-sided, double-metal detectors from Micron will remain a concern for the duration of the project. Twenty sensors were delivered during the month of February, while the production schedule called for forty. The sensors received were immediately used in ladder construction. Ladder-building is paced by sensor delivery. At the end of the month of February the sputterer, used in the deposition of the metal layers, failed again, essentially stopping further processing of the sensors and putting more strain on the already tight delivery schedule. Ladder production of the 90-degree detectors is already being paced by Micron delivery. A lot of sensors are in the production process, however, and additional 6-chip ladder fixtures have been ordered to be able to accommodate a larger ladder production rate in case large numbers of sensors are received. We still have people stationed at Micron (one from Fermilab and one or two from our Czech collaborators).
- On a positive note, Micron delivered the last of their order of 125 F-wedge sensors. To complete the F-disk project, however, an additional 75 sensors need to be received from Eurisys. The contract with Eurisys called for delivery of 10 prototype detectors on December 15, 1999, followed by 35 sensors delivered January 15, 2000 and a final delivery of 30 sensors on February 21, 2000. Five prototype detectors, which did not meet our specifications, were received in mid-December 1999. The current Eurisys schedule calls for delivery of the last sensors to Fermilab by mid-July, which is very worrisome. Contact with Eurisys is being established regarding the delivery of devices.
- This month Promex has stuffed 45 9-chip HDIs that will be received at Fermilab in March. Ladder production for the 9-chip ladders has slowed during the last month. A total of about 36 9-chip ladders were produced this month, which falls short of our scheduled production rate. The arrival of the new HDIs will unfortunately not remedy the situation much because of a shortage of beryllium pieces, which are due to arrive in May. The slowdown in 9-chip ladder production has been used to restart 3-chip ladder production.
- A new prototype of the Interface Board, which forms the active link between the Sequencer and the HDI in the silicon readout chain, has been received and is currently being tested. This version of the board has incorporated a 1553 protocol, used for slow control and monitoring of the silicon detectors.
- F-wedge production has slowed during this month due to part availability. A set of 50 HDIs has been stuffed at Promex this month and production should pick up rapidly as soon as they are received at Fermilab.

Resources

There has been some more influx of physicist manpower over the course of the last month. Most of the new people are working on debugging and testing of ladders and wedges, since that is a most time consuming effort where we are falling behind. The testing and repair group is in the process of being reorganized to make the operation more effective. Technicians are available for detector repair work from 6am until 7pm, 5 days per week.

While all aspects of ladder and wedge production are ramping up, work will start to assemble barrels and disks. Barrel and disk assembly requires special skills from the technical support crew. There is not enough technical support to sustain all activities at the same level and resources will have to be reallocated. This will certainly adversely impact areas of production.

Cost

Because of the low yield in mounting components of the flexible read-out circuits, we were forced to purchase additional parts. The original 20% spares were not sufficient, especially for parts used in the early phase of production. All orders for replacement parts were placed but were put on hold by the Particle Physics Division office due to budget uncertainties. This delay in ordering parts will translate nearly linearly into a delay in schedule. There is a remaining worry that the cost for the low-mass cable will increase since the vendor, Allied Signal, works on a cost recovery basis.

Change Requests

None

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Progress Summary

All detector types are in production. Because of vendor problems, however, production for all detector types will lag. All vendor problems are being pursued aggressively. An additional delay was introduced over the course of the last month due to budgetary uncertainties.

- The 6-chip ladder production is still paced by Micron sensor delivery. Sensor processing has been set back by two failures of the sputterer used in depositing the metal layers on the sensors.
- All F-wedge sensors ordered from Micron were received. The delivery schedule of F-wedge sensors from Eurisys is a concern. F-wedges have been mounted on cooling rings and procedures are being developed.
- Production of 3-chip ladders has re-commenced.
- H half-wedge production is well understood and is proceeding adequately. The procedure for building full wedges has started, and ten mechanical full wedges have been assembled. Mounting of these H-wedges on cooling rings began.
- The team to test and repair ladders and wedges has been strengthened. The repair process is better understood, although problems remain. HDI and ladder burn-in systems are working well and are being used routinely by shift personnel. Another test station was added for debugging and testing devices.
- The low yield of HDI stuffing remains a problem.
- The 12-ladder test team is in place and has installed and measured mechanical ladders in barrels.
- The read-out system has observed cosmic rays, but the readout loses the signal after few events are recorded.

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Subsystem: Fiber Tracker and VLPCs
WBS: 1.1.2
Date Submitted: 3/5/00
Submitted By: Alan D. Bross

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	<i>Detector</i>			
X	M2 - Assembly Design Complete	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	9/2/99	9/2/99	0 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	11/5/99	11/12/99	-0.9 w
X	M2-Fiber Tracker Assembly Begun	2/1/00	12/6/99	6.2 w
	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	3/2/00	1/28/00	5 w
	M3-Fiber Tracker Ribbon Fabrication Complete	3/6/00	3/6/00	0 w
	Waveguide Production 50% Complete	3/16/00	1/29/00	6.8 w
	M3-Fiber Tracker Ribbon Mounting Complete	5/3/00	4/20/00	1.9 w
	M2-Fiber Tracker Assembly Complete	5/17/00	5/4/00	1.9 w
	M3-Waveguide Production Complete	8/2/00	6/5/00	8.4 w
	<i>VLPCs</i>			
X	M2-VLPC Production 50% Complete	8/31/97	8/31/97	0 w
	M3-VLPC Cassette Assembly 50% Complete	6/5/00	4/12/00	7.4 w
	M3-VLPC Cryo System Operational	7/7/00	6/12/00	3.6 w
	M3-VLPC Cassette Assembly Complete	10/13/00	8/22/00	7.4 w

Areas of Concern

Technical

- Production deliveries of VLPC cassette flex circuits remain a concern.
- Although waveguide production has started, not all the steps necessary to complete a waveguide are in production. Work continues on the curved-connector end of the waveguides.

Schedule

None

Resources

None

Cost

None

Change Requests

None

Progress Summary

- Mounting complete on cylinders 8,7,6,5.
- Cylinder 8 in nesting machine.
- Production Cassettes 1-3 complete and under test.

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Subsystem: Forward Preshower
WBS: 1.1.4
Date Submitted: 3/7/00
Submitted By: Abid Patwa

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Forward Preshower Module Fabrication Begun	11/4/98	11/4/98	0 w
X	M3-1st Forward Preshower Detector Complete	2/24/00	1/12/00	6.2 w
	Module Fabrication and Testing Complete	3/31/00	12/10/99	14 w
	M3-2nd Forward Preshower Detector Complete	4/7/00	3/8/00	4.4 w

Areas of Concern

Technical

None

Schedule

Given the small difference in the completion dates of the north and south detectors, both will be delivered and subsequently installed together at DØ. This allows the FPS group at BNL to concentrate all efforts on the on-time completion of the north detector.

Resources

One additional student is being sought to help complete the remaining fiber-to-fiber inspection, module cabling and certification of the north detector.

Cost

None

Change Requests

None

Progress Summary

- The 1st detector (FPS-South) was completed, assembled and, aligned on the vertically-mounted spherical EC-shaped dome at BNL. Elements of the detector are being packaged for delivery to Fermilab.
- Production of bonded lead-stainless steel pieces for the north detector started and is 20% complete.
- Initial assembly and alignment of the north detector's support structure started at BNL.
- Final WLS fiber lengths for the four special modules in the north detector that accommodate the solenoid services were determined and given to Fermilab-Lab 3 for fiber-connector production and polishing.
- Module cabling as well as installation and testing of calibration systems for the remaining modules in the north detector continued and is 60% complete.
- Machining of all required inner and outer FPS mounting hardware that supports and aligns the detector on the EC head at DØ started at the Stony Brook shop. Delivery of parts is expected within the next month.
- Final prints for registration hardware and the inner mounting template, which precisely locate the preshower detectors on each EC head, were made and machining was started at Fermilab.
- Discussions continued with the ICD group regarding each subdetector's fiber cable routing plan on the EC. This was to better understand any clearance and/or constraints that must be respected.

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Subsystem: Tracking Electronics
WBS: 1.1.5
Date Submitted: 3/13/00
Submitted By: Marvin Johnson

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	First Readout Crate Installed & Working	11/16/99	12/2/99	-2 w
	Multichip Modules Received	4/5/00	2/23/00	6 w
	Ten 8-chip Analog Boards Available	4/26/00	4/19/00	1 w
	10 Digital Boards Available	6/8/00	3/22/00	11 w
	Mixer Boards Ready	8/17/00	6/22/00	7.8 w

Areas of Concern

Technical

None

Schedule

None

Resources

None

Cost

None

Change Requests

None

Progress Summary

- Delivery of boards from the manufacturers continues to be slow, but the quality is high. Yields to date are nearly 90%. Only 20% of the sequencers have been delivered. The manufacturer claims that he is only missing one part and that delivery will be fast once it arrives. The current delivery schedule shows all boards here in the next month.
- We are also awaiting delivery of additional crates. We use the same crates as the DØ level 2 system, so six crates have been loaned to them for their development effort. They will be replaced by new ones that have not yet been delivered. These are also needed before the system can be completed. The crates are past due.

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Subsystem: Calorimeter Electronics
WBS: 1.2.1
Date Submitted: 3/5/00
Submitted By: Mike Tuts

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SCA Testing Complete	11/23/99	12/15/99	-2.8 w
X	Shaper Hybrid 50% Complete	2/22/00	5/9/00	-11 w
	M2-Calorimeter Preamp System Test Complete	4/18/00	3/31/00	2.4 w
	M3-Calorimeter CC,ECN Preamp Installation Complete	5/2/00	3/31/00	4.4 w
	Timing System Installed	8/18/00	8/18/00	0 w
	Daughterboard Vendor Production Complete	8/21/00	6/16/00	9 w
	BLS Motherboard Assembly Complete	10/10/00	8/7/00	9 w
	M2-Calorimeter BLS Assembly Complete	11/30/00	9/26/00	9 w

Areas of Concern

Technical

- The final packaged lot of SCAs from the original 4" lot are expected in early March. Tests to determine whether additional devices will be needed are pending.
- Long-term burn-in tests of SCA devices continued to determine if there is any significant infant mortality.
- Recent tests of the new shaping prototype circuits and the calibration system have identified potential noise problems. These are being studied.

Schedule

- Additional slippage has occurred in the BLS system because of delays in reaching the pre-production stage for the BLS motherboards. Minor modifications continue to be made to the artwork. These delays are reflected in the above milestones. If necessary, these delays can be partially mitigated by a reduction of the commissioning time.
- The determination of the trigger sum resistor values remains a schedule concern. This had been delayed until additional manpower could be devoted to this effort. That manpower is now in place, but accumulated delays may have an impact on the present schedule.
- The proposed cooling plan for the preamp system is evolving, and a prototype is under construction. There are concerns about the potential schedule impact given the severe space constraints imposed on any retrofit of the preamp cooling system.
- There may be additional schedule delays as any problems uncovered by the safety review arise. For example we expect to remake a number of cable harnesses.

Resources

The present proposal for the preamp cooling may entail significant rework that was not in the original baseline plan. This will require additional manpower of approximately 12 man-weeks.

Cost

None.

Change Requests

Cost change requests to address the increase by \$33k in the calorimeter subsystem will be submitted.

Progress Summary

- The 1,000 H-species preamps ordered from our U.S. vendor are in production. That order will complete all preamps, including spares. The first 300 have been received.
- About 500 preamp motherboards have been assembled, populated with preamps, and tested.

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- A 5,000-channel burn-in test of the new preamps is being carried out in our test system.
- Installation of the populated preamp motherboards into the detector has begun.
- In collaboration with the online group, a full chain of electronics in the detector has been read out, including user interfaces and displays. This used new preamps and old BLSs.
- Commissioning of the pulser calibration system continued.
- The BLS daughtercards were released for pre-production.
- A prototype BLS power supply using the new transformers was completed, and tests are underway. The order for transformers has been placed (but not released).
- Additional manpower (MSU postdoc) is now starting to work on the determination of the trigger sum resistors.
- The preamp system (preamps, power supplies, calibration system) is under safety review. In a number of systems, the wire gauge has been identified as being too small to meet current specifications. Rework of the affected systems is underway, and the dialogue with the safety committee continues.

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Subsystem: Intercryostat Detector
WBS: 1.2.2
Date Submitted: 3/24/00
Submitted By: Andy White

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	M3-ICD Tile Modules/Boxes Ready	4/7/00	1/18/00	11.6 w
	M2-ICD Modules Arrive at Fermilab	4/21/00	1/25/00	12.6 w
	M3-InterCryostat Detectors Installed	5/5/00	2/1/00	13.6 w
	Drawers Ready	5/23/00	12/14/99	21 w

Areas of Concern

Technical

- First in-house prototype fiber cables were made. It was very labor intensive. The solution for making 140 cables still needs to be developed.
- Rack space needs to be identified for the SLP to drive the light mixing boxes (LMBs).
- Still need layout for items attached to crates (under ECs).

Schedule

- Waiting for LMBs for calibration system.
- Supertile/module delivery to be coordinated with FPS – expect installation late April.

Resources

None

Cost

The cost of fiber cables is still not well known.

Change Requests

None

Progress Summary

- Quality control on WLS fibers is complete for first 32 supertiles.
- Motherboards are in production.
- Pulser fanout operated successfully in stand-alone mode.
- On-going discussion with forward preshower group on the mounting/installation procedures.

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Subsystem: Muon Central
WBS: 1.3.2
Date Submitted: 2/29/00
Submitted By: Tom Diehl

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	PDT Commissioning Complete	10/17/00	6/9/00	18 w
	CFA Commissioning Complete	11/1/00	7/10/00	16.3 w

Areas of Concern

Technical

Only a small number of WAMUS PDTs are being operated because of a lack of final-version control boards. While at least fifty-five boards are in hand, none have programmable chips that are known to be completely debugged.

Schedule

The CFA counter commissioning will slip another month because of a lack of personnel resources

Resources

- The number of physicists available for commissioning the three detector systems is a concern. Currently, only 2.4 FTE physicists and no post-docs are available.
- The very capable and knowledgeable engineer who is responsible for the control boards has had some of his effort diverted to help other engineers solve problems with their boards. This has delayed the final version of the control board. It is an unfortunate, but necessary complication that may lead to further delays in PDT commissioning.

Cost

None

Change Requests

None

Progress Summary

Installation and testing of the LED-pulsar calibration system continued. More than 50% of the system for the A- ϕ counters has been installed and tested.

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Subsystem: Muon Forward Trigger Detectors
WBS: 1.3.3
Date Submitted: 3/3/00
Submitted By: Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	10/12/98	10/12/98	0 w
X	All Pixel Octants Assembled	2/23/00	4/4/00	-5.8 w
	All Muon Forward Trigger Detector Planes Installed	11/20/00	8/25/00	12 w

Areas of Concern

Technical:

None

Schedule:

None

Resources:

Design of the A-layer installation hardware is moving very slowly due to the lack of Fermilab engineering resources.

Cost:

The lack of Fermilab technicians for the production of octants caused an increase in the cost estimate.

Change Requests:

None

Progress Summary:

- The assembly of B-layer octants was finished at Lab F.
- Testing of the octants is progressing at the rate of three octants per week. The focus of this project is now moving toward installation and commissioning at DAB.

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Subsystem: Muon Forward Tracker
WBS: 1.3.4
Date Submitted: 3/3/00
Submitted By: Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	1/29/99	1/29/99	0 w
X	Arrival Of C-Layer MDT Modules At FNAL	11/3/99	10/22/99	1.7 w
	M2-All Muon Forward Tracker MDT Modules At Fermilab	3/29/00	3/10/00	2.6 w
	B-Layer Octants Assembled	7/14/00	4/18/00	12.2 w
	All MDT Octants Assembled	7/14/00	7/14/00	0 w
	Muon Forward Tracker B-Layer Planes Installed	10/30/00	6/15/00	19 w
	All MDT Planes Installed	10/30/00	8/4/00	12 w

Areas of Concern

Technical

None

Schedule

Assembly of C-layer MDTs is delayed due to the late arrival of octant assembly drawings.

Resources

Due to errors in parts delivered by the vendor for the forward shielding support, a considerable amount of engineering time was spent on re-design, thus delaying the design of forward muon installation hardware.

Cost

Due to the lack of Fermilab techs for production of B/C-layer MDT parts, the parts were ordered from outside vendors, resulting in a cost increase.

Change Requests

None

Progress Summary

- The testing of assembled MDT octants moved steadily at the rate of two octants per week. The total number of A-layer octants tested by the end of February was 11 (out of 16).
- The design and production of hardware for A-layer MDT octant installation were finished.
- Half of the MDTs for the C-layer were tested at Fermilab in February, and the B-layer MDTs were shipped from Dubna, with arrival at Fermilab scheduled for mid-March.
- Design of B- and C-layer octants were finished, orders for the C-layer parts were placed, and B-layer parts orders are expected to follow in early March.
- EMC trusses have been assembled and surveyed.
- Tests of the forward muon shielding started.

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Subsystem: Muon Electronics
WBS: 1.3.5
Date Submitted: 3/29/00
Submitted By: Boris Baldin

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	MDT ADB Fabrication Complete	12/2/99	12/2/99	0 w
X	MDC Fabrication Complete	1/31/00	12/13/99	5 w
X	M2-Muon Electronics Preproduction Installation Complete	1/31/00	12/13/99	5 w
	FEB, CB Production Complete	4/3/00	1/3/00	13 w
	SFE, SRC Fabrication Complete	4/24/00	2/3/00	11.5 w
	MRC, MFC Production Complete	5/24/00	3/27/00	8.4 w

Areas of Concern

Technical

None

Schedule

Muon Fanout Card has been delayed.

Resources

None

Cost

None

Change Requests

None

Progress Summary

All Muon Electronics projects except MFC are in a production phase or complete.

- FEB production is complete.
- CB production will be finished in a few weeks.
- SLP production has started.
- MDRC production has started.

DØ Upgrade Monthly Progress Report

for the month of February, 2000

Subsystem: Trigger
WBS: 1.4.1-1.4.5
Date Submitted: 3/20/00
Submitted By: Gerald C. Blazey and Nikos Varelas

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SLICs Received	12/10/99	11/10/99	4 w
X	M3-Establish Single Crate Internal Data Movement	2/17/00	1/6/00	6 w
	Preproduction MTCxx, MTFB, and MTCM Complete	4/3/00	1/24/00	10 w
	M3- Cal Readout Available to L2	4/5/00	2/11/00	7.6 w
	Alpha Cards Received	5/15/00	5/15/00	0 w
	MBTs Received	5/18/00	3/16/00	9 w
	M3-L3 Operational (One Full Chain)	6/29/00	6/1/00	4 w
	Global Installation Complete	7/21/00	7/12/00	1.4 w
	L2 Muon Installation Complete	7/31/00	7/26/00	0.6 w
	L2 CTT Installation Complete	8/7/00	8/9/00	-0.4 w
	L2 Cal Installation Complete	9/5/00	8/21/00	2 w
	Production MTCxx, MTFB, and MTCM Complete	9/7/00	6/27/00	10 w
	M3-Muon Level 1 Trigger Preproduction Testing Complete	9/20/00	4/18/00	21.6 w
	M3-Trigger Level 2 Commissioned	10/3/00	9/21/00	1.6 w

Areas of Concern

Technical

There is a problem with the preproduction Level 2 Alpha off-chip cache. Diagnosis is underway. The multi-chip-module (MCM) channel-to-channel noise variations still are unexpectedly high, however progress was made in reducing the absolute noise levels. The source of transmission errors between Level 1 muon cables and the Level 2 muon crate are still under study.

Schedule

The pre-production Level 2 Alpha boards were delivered a month later than expected, so there is a concern that the final delivery date may slip by that amount. The entire Central Track Trigger (CTT) 12-MCM analog front-end (AFE) schedule is at risk because of limited resources.

Resources

An engineer is needed to help with the commissioning phase of the Level 2 system. Some technician help may be warranted for the Level 1 CTT project.

Cost

None

Change Requests

None

Progress Summary

- The Level 1 and Level 2 frameworks were fully installed.
- The luminosity monitor electronics design neared completion. Progress was made on the temporary luminosity monitor to be used in the Tevatron engineering run.
- Testing continued on nearly all of the Level 1 Muon preproduction modules.
- At DØ, a crate containing a VME processor and Level 1 Muon trigger hardware was installed on the DØ detector platform. Communication between the cards and the Level 1 framework was established.

DØ Upgrade Monthly Progress Report

for the month of February, 2000

- Design and prototyping of the Level 1 CTT hardware continued.
- Progress was made on the characterization of the MCM noise properties; channel-to-channel variations remain a concern.
- A schedule for the mixer was established and specification continued.
- The 8-MCM analog front end (AFE) board is in layout and proceeding on schedule. Work began on the schematic design of the 12-MCM AFE.
- Three pre-production Level 2 Alpha boards arrived in mid-February. So far, no manufacturing problems have been found on the two boards tested, and the design changes identified on the prototypes worked. However, there seems to be a problem with the off-chip, Level 3 cache. The cause and detailed nature of the problem are not yet known and debugging of the boards continues.
- Almost all functionality of the prototype Magic Bus Transceiver (MBT) was debugged.
- Testing of the SLIC boards continued.
- Two fully populated SFO and CIC pre-production prototypes were produced and partially tested.
- All the Level 2 crates have arrived and passed inspection.
- Progress has continued on the Level 2 software effort, focussed on integrating the present algorithm code into the trigger simulator. Work continued on the Level 2 Muon algorithm development and Level 2 Alpha device driver and testing software. The Level 2 Silicon Track Trigger group had a final technical review Feb. 25.
- Progress continued on the Level 3/DAQ software in preparation for the March 15 integration milestone and hardware development of the VRC, SB, and ETG continued at Brown University.

DØ Upgrade Monthly Progress Report

for the month of February, 2000

February '00 Financial Summary

The month of February fiscal year 2000 closed with obligations for the DØ Upgrade Project totaling \$2,546K on equipment M&S funds and \$48K on Solenoid AIP Plant funds. The current spending plan, which shows that spending continues to exceed plan for FY00, has been downloaded from the current Project schedule. Because the latest version of the Upgrade Project Cost Estimate still needs to be loaded into the Project's schedule, the probability for changes to this spending plan is high. The Project was allocated an M&S budget of \$3,104K during November. To cover Operating expenditures, the M&S budget was reduced by \$400K and an additional \$200K reduction is expected during March. DØ expects to spend the full FY00 budget, which is now \$2,504K. In addition to the Project's DoE funding, forward funding will be instituted to cover expenditures beyond the current fiscal year budget. The remaining DoE funding of \$1,020K will be allocated during fiscal year 2001.

The M&S Upgrade Project balance is currently \$4,977K, excluding contributions and contingency. Contributions to the Upgrade currently total \$1,442K. These contributions help to reduce the M&S balance. DØ Upgrade Spokespersons are in the process of negotiating additional contributions of approximately \$327K, but at this time, these funds are still unspecified. A new Cost Estimate is now being used in the determination of Project's estimate to complete (ETC), which, at this time, is equal to the Project's M&S balance. The overall cost of the Project has increased. A contingency estimate is also being developed and is expected to further increase the total Project cost.

The balance in AIP funds is \$272K. Once the Solenoid Project is complete, the unobligated AIP balance will be transferred to Upgrade M&S Equipment as budget dollars to be spent in either FY00 or FY01. The Solenoid Project is expected to be closed prior to the end of FY00.

The Project currently has commitments with universities and other institutions in the DØ Collaboration, via active Memoranda of Understanding (MoU), totaling \$8,807K. These funds represent an obligation on the part of the DØ Upgrade Project and are regularly costed each month via invoices received from these institutions as work is completed. In addition, several institutions have made significant contributions to the DØ Upgrade. A list of the universities and other institutions involved as well as a more detailed breakdown of the commitments and costs follows.

DØ Upgrade Monthly Progress Report

for the month of February, 2000

FY00 Financial Report as of 2/29/00

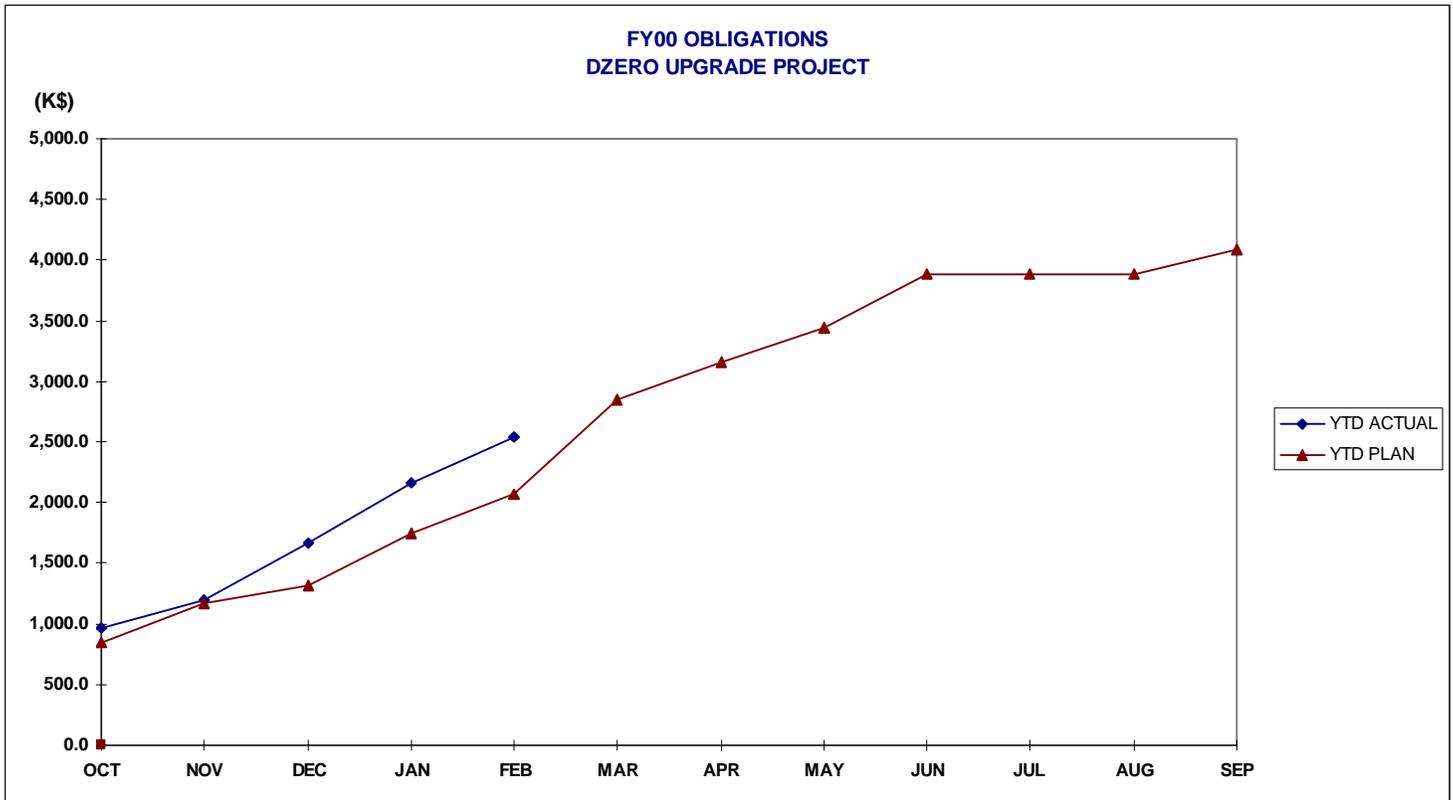
	<u>COST</u>	<u>PRIOR YR</u>	<u>FY 00</u>	<u>PROJECT</u>
	<u>ESTIMATE</u>	<u>OBLIG</u>	<u>YTD OBLIG</u>	<u>BALANCE</u>
1 TOTAL DZERO UPGRADE PROJECT	41,522.5	33,999.1	2,546.1	4,977.3
1.1 TRACKING DETECTORS	20,032.0	16,794.8	1,835.4	1,401.8
1.1.1 SILICON TRACKER	7,857.1	6,177.9	983.5	695.7
1.1.2 FIBER TRACKER	7,708.7	6,976.3	467.9	264.5
1.1.3 CENTRAL PRESHOWER DETECTOR	238.2	238.2	0.0	0.0
1.1.4 FORWARD PRESHOWER DETECTOR	524.3	500.3	13.0	11.0
1.1.5 TRACKING ELECTRONICS	3,703.7	2,902.1	371.0	430.6
1.2 CALORIMETER	4,656.8	4,162.0	60.1	434.7
1.2.1 FRONT-END ELECTRONICS	4,347.6	3,914.2	55.8	377.7
1.2.2 INTERCRYSTAT DETECTOR	309.2	247.9	4.3	57.1
1.3 MUON DETECTORS	9,478.2	7,829.4	511.5	1,137.2
1.3.1 COSMIC RAY SCINTILLATOR	1,223.2	963.2	0.0	260.0
1.3.2 CENTRAL TRIGGER DETECTORS	951.9	713.6	54.3	184.1
1.3.3 FORWARD TRIGGER DETECTOR	2,133.3	1,673.1	20.3	439.9
1.3.4 FORWARD TRACKING DETECTOR	1,410.8	943.4	300.5	166.9
1.3.5 FRONT-END ELECTRONICS	3,759.0	3,536.2	136.4	86.4
1.4 TRIGGER	6,609.5	4,919.5	61.9	1,628.1
1.4.1 FRAMEWORK	1,859.4	1,859.4	0.0	0.0
1.4.2 LEVEL 0	136.4	124.2	6.1	6.1
1.4.3 LEVEL 1	1,502.6	1,120.0	55.9	326.8
1.4.4 LEVEL 2	2,047.1	1,002.3	0.0	1,044.8
1.4.5 LEVEL 3	1,064.0	813.7	0.0	250.4
1.5 ONLINE EQUIPMENT	746.0	293.4	77.2	375.5
1.5.1 ON-LINE EQUIPMENT	746.0	293.4	77.2	375.5
<hr style="border-top: 1px dashed black;"/>				
3.1 TOTAL SOLENOID PROJECT	5,168.0	4,848.2	48.2	271.6
3.1.1 SOLENOID	5,168.0	4,848.2	48.2	271.6

DEFINITION OF TERMS:

Funds: DØ Upgrade = M&S Equipment Funds; Solenoid = AIP Plant Funds.
 Cost Estimate: Total Project and Sub-Project Budgets without contingency.
 Prior Year Obligations: Obligations for fiscal years '92 through '99 as applicable.
 FY 00 Year-to-Date Obligations: Obligations for fiscal year '00.
 Project Balance: Cost Estimate - (Prior Year Obligations + Fiscal 00 YTD Obligations)
 DØ FY 00 Plan: The M&S funds allocated to the Project/Sub-Projects as extracted from the current schedule.
 DØ FY 00 Balance: DØ FY 00 Plan - FY 00 Year-to-Date Obligations

DØ Upgrade Monthly Progress Report

for the month of February, 2000



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
YTD ACTUAL	962.6	1,199.8	1,664.6	2,169.3	2,546.1							
YTD PLAN	843.0	1,164.0	1,316.0	1,754.0	2,076.0	2,845.0	3,158.0	3,439.0	3,884.0	3,884.0	3,884.0	4,086.0

DØ Upgrade Monthly Progress Report

for the month of February, 2000

Active MOUs as of 2/29/00

<u>INSTITUTION</u>	<u>EQUIPMENT</u>	<u>R&D</u>	<u>COSTED</u>
Boston University	298,200	5,200	8,776
Brookhaven National Laboratory	236,439		171,357
Brown University	856,867	106,000	152,644
California State University, Fresno	26,160		3,555
Columbia University, Nevis Labs	140,000		107,937
DAPNIA / Saclay	0	0	0
IN2P3	0	0	0
Indiana University	65,000		23,880
Institute for High Energy Physics (IHEP)	404,512	15,000	218,414
Joint Institute for Nuclear Research (JINR)	996,902	22,000	935,398
Kansas State University	298,620	100,012	239,972
Louisiana Tech University	80,854		51,988
Michigan State University	1,445,027		1,011,951
Moscow State University	238,400		219,200
NIKHEF / Amsterdam	0	0	0
Northern Illinois University	133,000	18,000	130,872
SUNY at Stony Brook	1,105,750	20,000	191,819
University of Arizona	809,598	78,100	429,193
University of Calif, Davis		9,720	0
University of Calif, Irvine	48,800		28,449
University of Calif, Riverside	89,116		84,310
University of IL, Chicago	129,103	22,000	91,042
University of Kansas, Center for Research, Inc.	16,000		0
University of Maryland	221,000		221,000
University of Michigan	206,500		167,897
University of Nebraska, Lincoln	95,913		0
University of Notre Dame	167,000	77,000	222,774
University of Oklahoma	43,000		30,085
University of Texas, Arlington	126,764		90,655
<u>University of Washington</u>	<u>50,640</u>	<u>5,250</u>	<u>38,538</u>
Total Fermilab Funds:	<u>\$8,329,165</u>	<u>\$478,282</u>	
Total Costed:	4,625,238	246,467	<u>\$4,871,704</u>
Total Open Commitments:	<u>\$3,703,927</u>	<u>\$231,815</u>	

DØ Upgrade Monthly Progress Report

for the month of February, 2000

Reportable Milestones Summary

<u>Done</u>	<u>Reportable Milestones</u>	<u>Project</u>	<u>Date</u>	<u>Baseline</u>	<u>Var.</u>
X	M1-Solenoid Delivered to Fermilab	Solenoid	5/12/97	5/12/97	0 w
X	M2-VLPC Production 50% Complete	VLPCs	8/31/97	8/31/97	0 w
X	M2-Central Preshower Module Fabrication Complete	Central Preshower	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	Central Preshower	5/21/98	5/21/98	0 w
X	M1-Solenoid Installed and Tested	Solenoid	9/30/98	9/30/98	0 w
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	Muon Forward Trigger	10/12/98	10/12/98	0 w
X	M2-Forward Preshower Module Fabrication Begun	Forward Preshower	11/4/98	11/4/98	0 w
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	Muon Forward Tracker	1/29/99	1/29/99	0 w
X	M2 - Assembly Design Complete	Fiber Tracker	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	Fiber Tracker	9/2/99	9/2/99	0 w
X	H Half-Wedge Fabrication 20% Complete	Silicon Tracker	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	Silicon Tracker	10/26/99	10/20/99	0.6 w
X	Arrival Of C-Layer MDT Modules At FNAL	Muon Forward Tracker	11/3/99	10/22/99	1.7 w
X	9 Chip Ladder Fabrication 20% Complete	Silicon Tracker	11/4/99	11/3/99	0.2 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	Fiber Tracker	11/5/99	11/12/99	-0.9 w
X	First Readout Crate Installed & Working	Silicon Electronics	11/16/99	12/2/99	-2 w
X	SCA Testing Complete	Calorimeter Electronics	11/23/99	12/15/99	-2.8 w
X	MDT ADB Fabrication Complete	Muon Electronics	12/2/99	12/2/99	0 w
X	SLICs Received	Trigger	12/10/99	11/10/99	4 w
X	F Wedge Assemblies 20% Complete	Silicon Tracker	1/24/00	1/19/00	0.4 w
X	6 Chip Ladder Fabrication 20% Complete	Silicon Tracker	1/31/00	1/3/00	3.9 w
X	MDC Fabrication Complete	Muon Electronics	1/31/00	12/13/99	5 w
X	M2-Muon Electronics Preproduction Installation Complete	Muon Electronics	1/31/00	12/13/99	5 w
X	M2-Fiber Tracker Assembly Begun	Fiber Tracker	2/1/00	12/6/99	6.2 w
X	M3-Establish Single Crate Internal Data Movement	Trigger	2/17/00	1/6/00	6 w
X	Shaper Hybrid 50% Complete	Calorimeter Electronics	2/22/00	5/9/00	-11 w
X	All Pixel Octants Assembled	Muon Forward Trigger	2/23/00	4/4/00	-5.8 w
X	M3-1st Forward Preshower Detector Complete	Forward Preshower	2/24/00	1/12/00	6.2 w
	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	Fiber Tracker	3/2/00	1/28/00	5 w
	M3-Fiber Tracker Ribbon Fabrication Complete	Fiber Tracker	3/6/00	3/6/00	0 w
	9 Chip Ladder Fabrication 80% Complete	Silicon Tracker	3/10/00	3/27/00	-2.2 w
	Waveguide Production 5 Complete	Fiber Tracker	3/16/00	1/29/00	6.8 w
	H Half-Wedge Fabrication 8 Complete	Silicon Tracker	3/29/00	2/23/00	5 w
	M2-All Muon Forward Tracker MDT Modules At Fermilab	Muon Forward Tracker	3/29/00	3/10/00	2.6 w
	Module Fabrication and Testing Complete	Forward Preshower	3/31/00	12/10/99	14 w
	FEB, CB Production Complete	Muon Electronics	4/3/00	1/3/00	13 w
	Preproduction MTCxx, MTFB, and MTCM Complete	Trigger	4/3/00	1/24/00	10 w
	Multichip Modules Received	Fiber Electronics	4/5/00	2/23/00	6 w
	M3- Cal Readout Available to L2	Trigger	4/5/00	2/11/00	7.6 w
	M3-ICD Tile Modules/Boxes Ready	Intercryostat Detector	4/7/00	1/18/00	11.6 w
	M3-2nd Forward Preshower Detector Complete	Forward Preshower	4/7/00	3/8/00	4.4 w
	6 Chip Ladder Fabrication 8 Complete	Silicon Tracker	4/18/00	3/14/00	5 w
	M2-Calorimeter Preamp System Test Complete	Calorimeter Electronics	4/18/00	3/31/00	2.4 w
	Steady DAQ Running	Online	4/20/00	3/31/00	2.7 w
	M2-ICD Modules Arrive at Fermilab	Intercryostat Detector	4/21/00	1/25/00	12.6 w
	SFE, SRC Fabrication Complete	Muon Electronics	4/24/00	2/3/00	11.5 w
	Ten 8-chip Analog Boards Available	Fiber Electronics	4/26/00	4/19/00	1 w
	M3-Level Ø-South Installed	Luminosity Monitor	4/28/00	2/9/00	11.4 w
	M3-Calorimeter CC, ECN Preamp Installation Complete	Calorimeter Electronics	5/2/00	3/31/00	4.4 w
	M3-Fiber Tracker Ribbon Mounting Complete	Fiber Tracker	5/3/00	4/20/00	1.9 w
	F Wedge Assemblies 8 Complete	Silicon Tracker	5/3/00	4/26/00	1 w
	M3-InterCryostat Detectors Installed	Intercryostat Detector	5/5/00	2/1/00	13.6 w
	Alpha Cards Received	Trigger	5/15/00	5/15/00	0 w

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M2-Fiber Tracker Assembly Complete	Fiber Tracker	5/17/00	5/4/00	1.9 w
MBTs Received	Trigger	5/18/00	3/16/00	9 w
Drawers Ready	Intercryostat Detector	5/23/00	12/14/99	21 w
MRC, MFC Production Complete	Muon Electronics	5/24/00	3/27/00	8.4 w
M3-VLPC Cassette Assembly 5 Complete	VLPCs	6/5/00	4/12/00	7.4 w
10 Digital Boards Available	Fiber Electronics	6/8/00	3/22/00	11 w
M2-First Silicon Tracker Barrel/Disk Module Complete	Silicon Tracker	6/19/00	1/24/00	20.8 w
M2-Muon End Toroids Installed on Platform	Master	6/27/00	11/15/00	-19.6 w
M3-L3 Operational (One Full Chain)	Trigger	6/29/00	6/1/00	4 w
M3-VLPC Cryo System Operational	VLPCs	7/7/00	6/12/00	3.6 w
B-Layer Octants Assembled	Muon Forward Tracker	7/14/00	4/18/00	12.2 w
All MDT Octants Assembled	Muon Forward Tracker	7/14/00	7/14/00	0 w
Global Installation Complete	Trigger	7/21/00	7/12/00	1.4 w
L2 Muon Installation Complete	Trigger	7/31/00	7/26/00	0.6 w
North Half-Cylinder Complete and Ready to Move to DAB	Silicon Tracker	8/1/00	8/1/00	0.2 w
M3-Waveguide Production Complete	Fiber Tracker	8/2/00	6/5/00	8.4 w
North H-disks Ready to Move to DAB	Silicon Tracker	8/4/00	7/3/00	4.6 w
L2 CTT Installation Complete	Trigger	8/7/00	8/9/00	-0.4 w
Mixer Boards Ready	Fiber Electronics	8/17/00	6/22/00	7.8 w
Timing System Installed	Calorimeter Electronics	8/18/00	8/18/00	0 w
Daughterboard Vendor Production Complete	Calorimeter Electronics	8/21/00	6/16/00	9 w
L2 Cal Installation Complete	Trigger	9/5/00	8/21/00	2 w
Production MTCxx, MTFB, and MTCM Complete	Trigger	9/7/00	6/27/00	10 w
M3-Muon Level 1 Trigger Preproduction Testing Complete	Trigger	9/20/00	4/18/00	21.6 w
M3-Trigger Level 2 Commissioned	Trigger	10/3/00	9/21/00	1.6 w
BLS Motherboard Assembly Complete	Calorimeter Electronics	10/10/00	8/7/00	9 w
M3-VLPC Cassette Assembly Complete	VLPCs	10/13/00	8/22/00	7.4 w
PDT Commissioning Complete	Muon Central	10/17/00	6/9/00	18 w
M3-All Silicon Tracker Barrels/Disks Complete	Silicon Tracker	10/27/00	8/25/00	9 w
South Half-Cylinder Complete and Ready to Move to DAB	Silicon Tracker	10/27/00	9/18/00	6 w
M1-Central Silicon Complete	Silicon Tracker	10/27/00	9/18/00	6 w
Muon Forward Tracker B-Layer Planes Installed	Muon Forward Tracker	10/30/00	6/15/00	19 w
All MDT Planes Installed	Muon Forward Tracker	10/30/00	8/4/00	12 w
M1-Begin Shield Wall Removal/Ready to Roll-in	Master	11/1/00	11/22/00	-3 w
CFA Commissioning Complete	Muon Central	11/1/00	7/10/00	16.3 w
All Muon Forward Trigger Detector Planes Installed	Muon Forward Trigger	11/20/00	8/25/00	12 w
M2-Calorimeter BLS Assembly Complete	Calorimeter Electronics	11/30/00	9/26/00	9 w
M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	Silicon Tracker	12/19/00	9/25/00	12 w
M1-Detector Rolled-in and Hooked Up	Master	2/1/01	2/2/01	-0.2 w