

# DØ Upgrade Monthly Progress Report

for the month of September, 2000

**Subsystem:** Master Schedule and Overview  
**WBS:** All  
**Date Submitted:** 10/25/00  
**Submitted By:** Harry Weerts, Bill Freeman

<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	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
X	M1-Solenoid Installed and Tested	9/30/98	9/30/98	0 w
X	M3-Level Ø-South Installed	5/8/00	2/9/00	12.6 w
X	M2-Muon End Toroids Installed on Platform	8/4/00	11/15/00	-14.2 w
	M1-Begin Shield Wall Removal/Ready to Roll-in	11/9/00	11/22/00	-1.8 w
	M1-Detector Rolled-in and Hooked Up	2/22/01	2/2/01	2.8 w

Note: The full set of reportable milestones are collected and sorted by date at the end of this report. Also, a separate monthly report for the solenoid project will no longer be included, since that project is now formally complete. The reportable milestones associated with the solenoid project are now included in the above list.

## Areas of Concern

### Technical

Refer to the WBS level 3 system reports.

### Schedule

None

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

- Excellent progress has been made on the silicon system. Assembly of the SMT-South cylinder is monitored on a daily basis. Its completion is expected near the end of October.
- The silicon 10% test was a great success. Being able to read out ~40,000 channels without problems increases our confidence that this complicated detector will perform as expected.
- Waveguide installation on the south end of the fiber tracker was completed after solving a difficult routing problem.
- Installation of the forward muon system is progressing, but slower than anticipated due to unforeseen technical difficulties.

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**Subsystem:** Silicon Tracker  
**WBS:** 1.1.1  
**Date Submitted:** 10/19/00  
**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	3.86 w
X	H Half-Wedge Fabrication 80% Complete	3/29/00	2/23/00	5 w
X	6 Chip Ladder Fabrication 80% Complete	7/12/00	3/14/00	16.8 w
X	Low Mass Cables Available For Silicon South	7/17/00	NA	0 w
X	9 Chip Ladder Fabrication 80% Complete	7/31/00	3/27/00	17.4 w
X	F Wedge Assemblies 80% Complete	7/31/00	4/26/00	13.2 w
X	Low Mass Cables Available for Silicon North	9/4/00	NA	0 w
X	M2-First Silicon Tracker Barrel/Disk Module Complete	9/14/00	1/24/00	33 w
X	South H-Disks Ready to Move to DAB	10/13/00	7/3/00	14.4 w
	South Half-Cylinder Complete and Ready to Move to DAB	10/27/00	8/1/00	12.6 w
	M3-All Silicon Tracker Barrels/Disks Complete	12/12/00	8/25/00	15 w
	North Half-Cylinder Complete and Ready to Move to DAB	12/12/00	9/18/00	12 w
	M1-Central Silicon Complete	12/12/00	9/18/00	12 w
	M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	1/8/01	9/25/00	14 w

## Areas of Concern

### Technical

- The studies of the cross-talk observed in our signals continued. The main worry was cross-talk induced on the signal that validates and strobes the data bus lines. A spurious signal on this line causes additional data strobes and can completely invalidate the data readout. The cross-talk is induced in the HDI and low-mass cable system. Full-scale data integrity checks performed in the 10% test with barrel and/or disk assemblies show that the data is not compromised with the current version of the readout system. For the final readout system, additional safeguards will be implemented to further mitigate possible cross-talk. Although current tests are very promising, the completion of the final interface cards is late and tests on the final design boards cannot be done before November.
- Substantial effort went into preparing the barrels and disk for insertion into the silicon carbon-fiber support structure. As previously mentioned, a problem was encountered with the cooling manifold for the silicon detectors and the corresponding connections. Further study of the cooling manifolds and the routing of the cables away from the interaction region revealed that space between the end of the silicon support cylinder and the inner H disk was very tight. Inspection of the waveguides revealed that the first 1.5" of the waveguides were not flexible due to epoxy deposition. This didn't leave enough space to route the low-mass cables from the support cylinder over the inner H disks to the face of the calorimeters. Mock-ups were made to get an accurate feeling for how densely packed that region is and by how much the inner H-disk will have to be moved.

### Schedule

- During the month of August we suffered a significant setback due to the time needed to design and fabricate adequate "elbows" for the cooling lines, as discussed in earlier reports. A slippage of at least two weeks occurred due to this. Installation of barrel disk assemblies, however, went very smoothly after the initial problems were resolved and no further delays occurred. Completion of the south silicon detector should still occur as schedule by the end of October.
- The exposure to scheduling delays due to lagging part deliveries is diminishing. The last sensors from Micron Semiconductors were received this month. The books are now closed and government-furnished equipment loaned to Micron is being returned to Fermilab. All the HDI surface mounting of detector components at Promex

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also was completed. Only a handful of H-disk HDIs remain at Silitronics, but they do not represent a schedule risk since they are spares. The production of low-mass cables is proceeding well. Fabrication of the full complement of low-mass cables for the barrels and F-disks was achieved during this month, and fabrication of H-disk low-mass cables began. Completion of all H-disk low-mass cables is expected in early October.

- Production of ladders and wedges is proceeding well. We anticipate completion of production at the beginning of October. Four barrels have been completed and assembly of the remaining two barrels has started. All six end-disks for the south silicon detector were completed, assembled, and installed.
- Half-wedge and full-wedge production for the H-disks is lagging. Delays have occurred due to lack of availability of HDIs. Since the assembly of half-wedges and full-wedges is an intricate time-consuming procedure, we are worried that H-wedge production may fall behind even further.

## Resources

A number of experienced physicists have left the project to take other positions or to return from their visitor positions at Fermilab. We have been able to find some additional personnel and we think that production and assembly will not be affected in a significant way. We are still concerned about the commissioning of the readout system for the silicon detector both at the Silicon Facility and at the Assembly Building.

## Cost

There is continued cost exposure in the installation, cooling, and final assembly tasks.

## Change Requests

None

## Progress Summary

- Four barrels, eight F-disks and two H-disks of the DØSMT have been assembled. The assembly of the end F-disk assembly was completed and all modules were inserted in the south support cylinder. Cabling of the south silicon detector will commence early October.
- Ladder and wedge production and testing is proceeding smoothly, with the rate now limited by testing and repair.
- The 10% test continues to be an important system to test and debug electronics and systems. During the month we successfully read out a full barrel, the outermost barrel for the south silicon detector. Over 40,000 channels were read out and a data integrity rate of better than  $3 \times 10^{13}$  was achieved. The noise characteristics of the barrel are very good. With the nominal zero-suppression threshold of six ADC counts, an occupancy of less than 1% is observed. When taking into account noisy channels, pedestal distributions are Gaussian over four orders of magnitude. Non-Gaussian behavior in the pedestal distributions is understood. The plan now calls for the readout of a full barrel and a disk in the 10% test, corresponding to over 80,000 readout channels.
- Beam-loss monitors and radiation monitors were installed in the collision hall for operation during the Tevatron commissioning run. Progress is being made in setting up a fully functional readout system for these devices.

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**Subsystem:** Fiber Tracker and VLPCs  
**WBS:** 1.1.2  
**Date Submitted:** 10/17/00  
**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	-0.91 w
X	M2-Fiber Tracker Assembly Begun	2/1/00	12/6/99	6.2 w
X	"M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete"	3/2/00	1/28/00	5 w
X	M3-Fiber Tracker Ribbon Fabrication Complete	5/10/00	3/6/00	9.5 w
X	M3-Fiber Tracker Ribbon Mounting Complete	5/13/00	4/20/00	3.3 w
X	M2-Fiber Tracker Assembly Complete	5/26/00	5/4/00	3.3 w
X	Waveguide Production 50% Complete	7/24/00	1/29/00	24.6 w
	M3-Waveguide Production Complete	11/6/00	6/5/00	21.8 w
	<i>VLPCs</i>			
X	M2-VLPC Production 50% Complete	8/31/97	8/31/97	0 w
X	M3-VLPC Cryo System Operational	8/18/00	6/12/00	9.6 w
X	M3-VLPC Cassette Assembly 50% Complete	9/13/00	4/12/00	21.5 w
	M3-VLPC Cassette Assembly Complete	1/8/01	8/22/00	18.4 w

## Areas of Concern

### Technical

None

### Schedule

None

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

- Waveguide installation on south end of fiber tracker was completed.
- Fifty-six VLPC cassettes have been fabricated.
- Approximately twenty-five waveguide re-makes to go.

# DØ Upgrade Monthly Progress Report

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**Subsystem:** Forward Preshower  
**WBS:** 1.1.4  
**Date Submitted:** 10/18/00  
**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
X	Module Fabrication and Testing Complete	4/1/00	12/10/99	14 w
X	M3-2nd Forward Preshower Detector Complete	4/3/00	3/8/00	3.6 w

## Areas of Concern

### Technical

None

### Schedule

Although waveguide production for the FPS continues, completion of the remaining (~50%) cables requires the delivery of an additional supply of clear fibers, expected in early January 2001. The effect causes the installation of all FPS waveguides on both EC heads to begin later than expected. A re-evaluation of the schedule based on the understanding of delivery times and production rates is in process. However, no technical issues are of concern.

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

- Waveguide production continued at Notre Dame and Indiana University, with approximately 65% of the waveguides that will occupy the FPS shower layers 1 and 2 completed. The remaining forward MIP-detecting layers (3 and 4) require the additional supply of fiber mentioned above. This order will be placed in October.
- Waveguide and VLPC cassette labeling schemes for the FPS detectors were finalized.
- Final cable lengths from the detector to the platform for twisted-pair ribbon cables controlling the LEDs located within the FPS were established. An order to the vendor has been placed with delivery expected next month. Subsequent installation of custom electrical connectors on each cable will begin directly thereafter.
- Debugging and testing of the FPS/CPS calibration system ORACLE database is in progress.

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**Subsystem:** Tracking Electronics  
**WBS:** 1.1.5  
**Date Submitted:** 10/23/00  
**Submitted By:** Marvin Johnson, Fred Borcharding

<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
X	10 Digital Boards Available	7/28/00	3/22/00	18 w
X	Ten 8-chip Analog Boards Available	8/8/00	4/19/00	15.4 w
	Mixer Boards Ready	11/30/00	6/22/00	22.2 w
	Multichip Modules Received	1/30/01	2/23/00	47 w

## Areas of Concern

### Technical

None

### Schedule

- The interface boards and adapter boards for the silicon system have been ordered. Delivery is still scheduled for late October. If the vendor stays on this schedule, we will have enough parts for the south half in time.
- Cabling has been delayed due to checking of the cable itself, as well as checking for possible interferences with other installation efforts. If the work goes as planned, no impact on the overall schedule should occur.
- The mixer boards have slipped two weeks. However, we are trying to get the pieces back on the originally scheduled late November delivery.

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

### *Silicon Electronics*

- The silicon interface boards and adapter cards have been ordered with delivery scheduled to start in late October. Cable bundling and route planning continue. We plan to start cabling the south face in late October.
- Testing of various electronics is ongoing and a lot of progress has been made. So far, no major problems have been found.

### *Fiber Tracking Electronics*

- The first ten pre-production AFE8 boards are being tested. Most of the board systems have been checked individually.
- The AFE8 production is on schedule. The PCBs are now being fabricated and stuffing will begin in a few weeks.
- The production of the MCMs has started, and two of our staff leave soon to begin the setup of the QA test stand at the vendor. Over 100 MCMs are expected within three weeks.
- The layout of the Mixer Box boards began, however first prototypes are now not expected until mid December.
- The DFE motherboards were delivered. The DFEA daughter boards are expected in mid November. The order for the double-wide daughter board has been placed and delivery is expected soon.

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- The large FPGAs for the CTOC boards have arrived and the stuffing of the boards will begin when the PCBs arrive.
- Two parts for the sequencer and DFE power supplies are still not here – the AC distribution boxes (delayed by the vendor until after Nov-1), and special power cables and tooling. These orders are being expedited with the intent to start production in late October.

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for the month of September, 2000

**Subsystem:** Calorimeter Electronics  
**WBS:** 1.2.1  
**Date Submitted:** 10/17/00  
**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	-11.05 w
X	M2-Calorimeter Preamp System Test Complete	7/13/00	3/31/00	14.4 w
	M3-Calorimeter CC, ECN Preamp Installation Complete	10/20/00	3/31/00	28.4 w
	Daughterboard Vendor Production Complete	11/29/00	6/16/00	22.8 w
	BLS Motherboard Assembly Complete	12/12/00	8/7/00	17.6 w
	Timing System Installed	12/13/00	8/18/00	16 w
	M2-Calorimeter BLS Assembly Complete	1/8/01	9/26/00	13.6 w

## Areas of Concern

### Technical

None

### Schedule

- The BLS schedule (particularly the daughtercards) is a concern. Our past experience with the assembly vendor, Chipco, is a cause for concern. We have gone on a vendor visit and have agreement that they will raise the assembly rate from the contracted 250 per week to 300 per week. We will keep a close eye on this production.
- The BLS power supplies are a minor concern. These devices are being assembled in house, but we have had quality control problems, in part because of the use of piecemeal labor working on them. It is behind schedule, but we have placed this system on our highest priority list.
- We are concerned that the ramp up of activity on the detector platform may have an adverse impact on our installation. We are in close contact with the installation team to lessen any potential problems.

### Resources

We presently have sufficient FTE's made up of experienced techs working overtime. As long as this continues, manpower is not a major issue.

### Cost

None

## Change Requests

We submitted and were approved for a \$55k use of contingency to speed up the assembly of BLS motherboards.

## Progress Summary

- We have fully tested 18 preamp power supplies; 8 have been installed in the detector.
- The preamp cooling system is fully installed and being debugged.
- We have received 1,000 BLS daughtercards; the balance are in production.
- The pulser control cables for the ECS have been terminated.
- The old BLS supplies have been removed from ECN and are being reworked.
- 3 BLS power supplies have been fully reworked and tested; the others are under test.
- The HV system is being restored.
- The argon and temperature monitoring design has been approved.

# DØ Upgrade Monthly Progress Report

for the month of September, 2000

**Subsystem:** Intercryostat Detector  
**WBS:** 1.2.2  
**Date Submitted:** 10/23/00  
**Submitted By:** Andy White

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M3-ICD Tile Modules/Boxes Ready	4/19/00	1/18/00	13.2 w
X	M2-ICD Modules Arrive at Fermilab	4/24/00	1/25/00	12.8 w
X	M3-InterCryostat Detectors Installed	5/5/00	2/1/00	13.6 w
	Drawers Ready	11/10/00	12/14/99	45 w

## Areas of Concern

### Technical

- The scheme for final fiber cable routing on the ECs must still be determined.
- A missing component was determined to be the origin of noise problem seen in tests at UTA; motherboards will be modified to correct this.
- MIP calibration of ICD tiles will require individually dismantling each box and performing a cosmic-ray test; this will require close interaction with the FPS group, who are aware of this need.

### Schedule

- The second two crates should be ready to deliver to Fermilab in late November.
- Commissioning of the ICD modules is waiting on the construction of a second cosmic-ray test stand.

### Resources

We will need limited Fermilab technical support to install the second two crate/block/backplane assemblies under the cryostats. We will also need support (welder/tech) to install links for the fiber cables on the faces of the ECs.

### Cost

None

## Change Requests

None

## Progress Summary

- Two crate/backplanes assemblies were fully assembled and tested at University of Texas -Arlington.
- Fifty-eight electronics drawers have been assembled at Louisiana Tech. Approximately ten remain to be assembled (awaiting PMT sockets).

# DØ Upgrade Monthly Progress Report

for the month of September, 2000

**Subsystem:** Muon Central  
**WBS:** 1.3.2  
**Date Submitted:** 10/24/00  
**Submitted By:** Tom Diehl

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	CFA Commissioning Complete	1/4/01	7/10/00	24.3 w
	PDT Commissioning Complete	1/16/01	6/9/00	29.8 w

## Areas of Concern

### Technical

The design of the gas system for the PDTs drives the completion date for the central muon system. All of the components to be installed in the Gas Room have been specified and designed except for the gas recycling and cleaning system. We are still operating a limited number of PDTs (3 of 94) on bottled gas.

### Schedule

- The recycler/cleaner for the PDT gas system should be complete before we begin to take data with collisions.
- A- $\phi$  system commissioning has stopped because of a lack of physicists.

### Resources

During September there were only 2.6 FTE commissioning the three systems that make up the central muon detector. This is down from 4.0 the month before. The decrease in the number of physicists reflects the returning to ITEP, Russia of two physicists working on the A- $\phi$  system.

### Cost

None.

## Change Requests

None

## Progress Summary

Considerable effort is being dedicated to finishing the installation of infrastructure, such as cabling and electronics.

# DØ Upgrade Monthly Progress Report

for the month of September, 2000

**Subsystem:** Muon Forward Trigger Detectors  
**WBS:** 1.3.3  
**Date Submitted:** 10/23/00  
**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	1/12/01	8/25/00	18.6 w

## Areas of Concern

### Technical:

It is not yet clear if the flatness of the forward muon planes with restraints will be within TDR specifications.

### Schedule

- The major concern is installation of the B-layer planes, which is behind schedule. Although octants are ready, design and production of mounting hardware have been delayed and are now on the critical path for this project. Efforts are concentrated on accelerating both of the above items. Currently we plan to install the B-layer planes by late December 2000.
- Development of software for the LED calibration of scintillation counters is delayed and is affecting the efficiency of scintillation counter commissioning.

### Resources

The availability of a survey crew, the manpower for processing survey results, Fermilab mechanical technicians, and welder(s) are all critical for on-time forward muon trigger detector installation.

### Cost

None

## Change Requests

None

## Progress Summary

- North A-layer plane is installed.
- Assembly of North C-layer plane on the shield wall has started.
- Design of B-layer mover progressed, with some of the parts sent for production.
- Cabling of North A-layer has started with cabling between front-end VME crates and MCH3 finished for all four crates.
- AC power installation in North EF truss has started.
- All eight front-end crates in the EFs are installed as well as all EF high-voltage fanouts.
- Transportation of octants from Lab F to DØ is progressing smoothly.
- Software for fast "local DAQ" readout of trigger counter octants is being developed and tested along with software for downloading front-end electronics parameters.

# DØ Upgrade Monthly Progress Report

for the month of September, 2000

**Subsystem:** Muon Forward Tracker  
**WBS:** 1.3.4  
**Date Submitted:** 10/23/00  
**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	1.68 w
X	M2-All Muon Forward Tracker MDT Modules At Fermilab	3/30/00	3/10/00	2.8 w
X	B-Layer Octants Assembled	8/24/00	4/18/00	18.04 w
X	All MDT Octants Assembled	8/24/00	7/14/00	5.8 w
	Muon Forward Tracker B-Layer Planes Installed	12/5/00	6/15/00	23.8 w
	All MDT Planes Installed	12/5/00	8/4/00	16.8 w

## Areas of Concern

### Technical

None

### Schedule

- Installation of MDTs is behind schedule. Efforts are concentrated on speeding up installation. Currently we expect all MDT octants to be installed by early December.
- Installation and commissioning of the MDT gas system is delayed.

### Resources

The availability of a survey crew, the time for processing survey results, Fermilab mechanical technicians, and welder(s) are all critical for on-time forward muon MDT installation.

### Cost

None

## Change Requests

None

## Progress Summary

- Installation of North C-layer MDTs is in progress.
- Design of mounting hardware for B-layer MDTs was finished and production was progressing, with estimated delivery date for all parts by early November.
- Cabling of North A-layer was finished.
- Cabling of South EF layer is in progress.
- All EF VME crates have been installed.
- Gas system monitoring devices have been mounted in both EFs and EMCs.
- Design of the MDT gas system has been finished and parts procurement and installation has started.
- Local DAQ software for fast octant readout has been developed and tested.
- Commissioning of North A-layer octants has started. Preliminary results of commissioning demonstrate no serious problems with MDT octants after transportation and installation.

# DØ Upgrade Monthly Progress Report

for the month of September, 2000

**Subsystem:** Muon Electronics  
**WBS:** 1.3.5  
**Date Submitted:** 10/18/00  
**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
X	FEB, CB Production Complete	4/10/00	1/3/00	14 w
X	SFE, SRC Fabrication Complete	9/21/00	2/3/00	32.5 w
X	MRC, MFC Production Complete	10/18/00	3/27/00	28.8 w

## Areas of Concern

### Technical

None

### Schedule

None

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

MFC production (the last remaining project) is expected to be completed in October.

# DØ Upgrade Monthly Progress Report

for the month of September, 2000

**Subsystem:** Trigger  
**WBS:** 1.4.1-1.4.5  
**Date Submitted:** 10/23/00  
**Submitted By:** Gerald C. Blazey

<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
	MBTs Received	10/17/00	3/16/00	30 w
	Preproduction MTCxx, MTFB, and MTCM Complete	10/19/00	1/24/00	38 w
	M3- Cal Readout Available to L2	11/1/00	2/11/00	37 w
	M3-Muon Level 1 Trigger Preproduction Testing Complete	11/2/00	4/18/00	27.8 w
	M3-L3 Operational (One Full Chain)	11/13/00	6/1/00	23 w
	Global Installation Complete	12/14/00	7/12/00	21.6 w
	L2 Cal Installation Complete	12/14/00	8/21/00	16 w
	L2 CTT Installation Complete	12/14/00	8/9/00	17.6 w
	Alpha Cards Received	12/18/00	5/15/00	30 w
	L2 Muon Installation Complete	1/3/01	7/26/00	21.6 w
	Production MTCxx, MTFB, and MTCM Complete	2/2/01	6/27/00	30 w
	M3-Trigger Level 2 Commissioned	4/25/01	9/21/00	29.6 w

## Areas of Concern

### Technical

Production versions of the L2 Alpha processors have failed performance specifications. Several repair and remanufacturing options are under consideration.

### Schedule

The L2 project has an undetermined delay due to the poor quality alpha cards. The L2 CIC-SFO engineering was delayed but has resumed. The L3 schedule may suffer delay due to difficulty associated with parts procurement.

### Resources

Manpower has been reallocated within the L1 tracking group to the VHDL programming tasks. Additional personnel are required for L1 muon and L2 commissioning and engineering.

### Cost

None

## Progress Summary

### *Framework*

Readout of the framework to Level 3 was completed.

### *Level 0/Luminosity Monitor*

Colliding beams were observed in the Tevatron using the engineering run luminosity monitors. Progress was made on the luminosity monitor TDC board layout and vertex board FPGA design; however, parts procurement has been difficult.

### *Level 1*

The production Level 1 muon MTCMs were assembled and testing started. The production MTCxx was sent out for fabrication. The MTM MTFB final review was completed. The preproduction MTC05 MTFB card was sent to the assembler. Work began on the production design of the MTC10 MTFB. Layout of the preproduction MTCM board continued. Seven preproduction PB boards arrived and did not meet specification so they were returned to the manufacturer. Work continued on integrating the Level 1 muon trigger into the DAQ system.

# **DØ Upgrade Monthly Progress Report**

for the month of September, 2000

The first pre-production Level 1 CTT/CPS AFE8 boards were successfully tested, and the AFE8 boards were ordered. Work on the AFE12 layout continued. Production of the MCMs started. Design work on the mixer box continued. The DFE mother-boards were delivered and the order for the double-wide daughter-boards received. Significant progress on the VHDL coding of the DFE, collectors, and broadcasters was made.

## *Level 2*

Installation of Level 2 infrastructure continued. Alpha boards arrived, but were of disappointing quality; negotiations over the CIC and SFO layout re-started with different FNAL support engineers. The MBT passed important commissioning tests including integration with the SCL and Alpha-MBT broadcast communication. Software development for the Alpha, MBT, and SLICs continued. Training of new personnel began.

## *Level 3*

The DAB Level 3 system was upgraded to support multiple users and multiple runs. The Level 3 filter node data handling software was completed. The filter package Scriptrunner successfully filtered on muon events and calorimeter events. Design and layout of the core board for Level 3/DAQ was completed, however parts procurement difficulties led to delay.

# DØ Upgrade Monthly Progress Report

for the month of September, 2000

**Subsystem:** Online  
**WBS:** 1.5.1  
**Date Submitted:** 10/24/00  
**Submitted By:** Stuart Fuess

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	Steady DAQ Running	3/17/00	3/31/00	-2 w

## Areas of Concern

### Technical

None

### Schedule

None

### Personnel

None

### Cost

A requisition for the 3<sup>rd</sup> and principal Online UNIX host computer is in progress. The requisition is for an amount approximately \$80K greater than the remaining budget for that WBS item. We expect to recover a large portion of this from other remaining budgeted items in the sub-project. In particular, performance evaluations of disk array systems show a possible savings. We expect to submit a change request once the overall sub-project expenditures are reevaluated.

## Change Requests

None

## Progress Summary

- Continued routine operations for commissioning support.
- A workshop on calibration activities was held 8-Sep-2000, with eleven talks covering infrastructure (ORACLE database) activities and the progress of the sub-detector groups.
- Calibration of the Silicon Tracker was demonstrated at the "10% Test".
- Submitted requisition for 3<sup>rd</sup> and principal Online UNIX host computer.
- Implemented limited routing functionality on Online Cisco 6509 switch as precursor to isolation of Online components into virtual LANs.
- Began installation of Linux consoles in control room.
- Tested direct-attached Fibre Channel disk array, seen as low-cost yet performant solution for event data buffer disks.
- Tested Gigabit Ethernet performance; results influenced specification of 3<sup>rd</sup> host computer.

# **DØ Upgrade Monthly Progress Report**

for the month of September, 2000

## **September '00 Financial Summary**

Fiscal year end 2000 closed with obligations for the DØ Upgrade Project totaling \$4,751K on equipment M&S funds. While the spending plan shows that the year ended lower than plan for FY00, all remaining procurements are expected to be made in the first half of FY01. At this stage of the Project, it seemed only crucial to plan for the future, thus the spending plan for October through April was made equal to spending. On the other hand, planned spending from May through September was a best estimate. The Project was allocated an M&S budget of \$3,104K during November. In July, the unobligated AIP balance of \$282.4K was transferred to Upgrade M&S Equipment as budget dollars to be spent this fiscal year. To cover Operating expenditures, the M&S budget was reduced by \$400K early in the fiscal year and an additional \$200K reduction occurred during April. DØ did fully obligate its FY00 budget of \$2,786K. In addition to the Project's DoE funding, forward funding was instituted to cover expenditures beyond the current fiscal year budget. Funding support was accepted from Michigan State (\$800K), the University of Notre Dame (\$200K), and Northern Illinois University (\$200K) during August 2000. All three institutions will be reimbursed early in FY01. In addition, a \$1,000K forward funding agreement was established with SUNY Stony Brook. The Project used only a small fraction of the SUNY Stony Brook funds, which will also be reimbursed early in the next fiscal year. The remaining DoE funding of \$3,708K will be allocated during fiscal year 2001.

The M&S Upgrade Project balance is currently \$3,318K, excluding contributions and contingency. Contributions to the Upgrade currently total \$1,442K. These contributions reduce the M&S balance. DØ Upgrade Spokespersons have been negotiating additional contributions of approximately \$385K, but at this time, these funds remain unspecified. A new Cost Estimate is now being used in the determination of Project's estimate to complete (ETC), which continues to be reported as equal to the Project's M&S balance. The overall cost of the Project has increased. A contingency estimate was developed as a result of a PPD Cost Review, which took place during March. The contingency, which is held by the Directorate, further increases the total Project cost. The total Cost Estimate has increased by \$554K as a result of contingency usage requests approved by the Directorate. Additional contingency requests are expected to be presented in early FY01.

The Project currently has commitments with universities and other institutions in the DØ Collaboration, via active Memoranda of Understanding (MoU), totaling \$5,676K. 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 September, 2000

## FY00 Financial Report as of 9/30/00

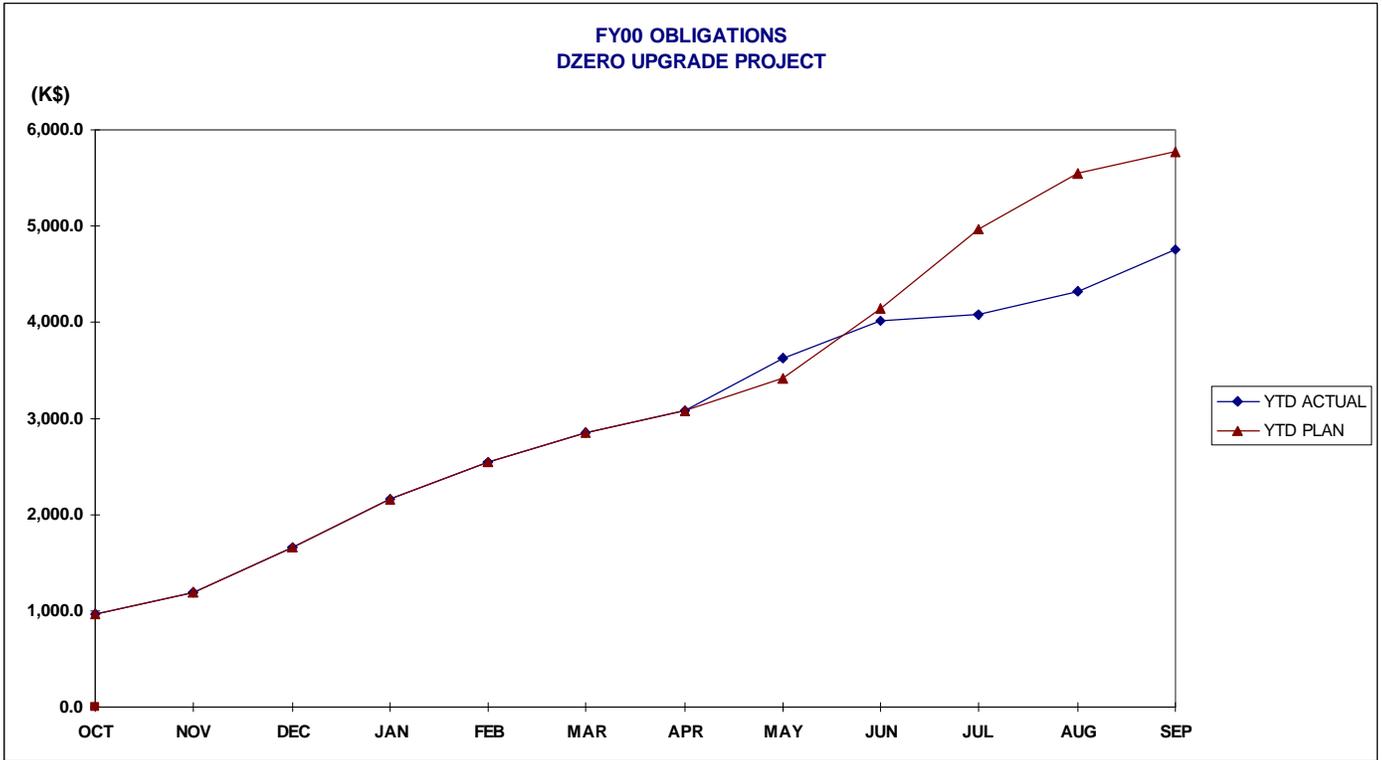
	<u>COST</u> <u>ESTIMATE</u>	<u>PRIOR YR</u> <u>OBLIG</u>	<u>FY 00</u> <u>YTD OBLIG</u>	<u>PROJECT</u> <u>BALANCE</u>
1 <i>TOTAL DZERO UPGRADE PROJECT</i>	42,076.2	34,007.1	4,751.2	3,318.0
1.1 TRACKING DETECTORS	20,452.7	16,787.2	3,002.2	663.3
1.1.1 SILICON TRACKER	8,212.2	6,166.1	1,753.2	292.9
1.1.2 FIBER TRACKER	7,774.3	6,976.3	721.3	76.7
1.1.3 CENTRAL PRESHOWER DETECTOR	238.2	228.2	0.5	9.5
1.1.4 FORWARD PRESHOWER DETECTOR	524.3	500.3	14.6	9.4
1.1.5 TRACKING ELECTRONICS	3,703.7	2,916.2	512.7	274.8
1.2 CALORIMETER	4,711.8	4,163.4	323.4	225.0
1.2.1 FRONT-END ELECTRONICS	4,402.6	3,915.5	262.3	224.9
1.2.2 INTERCRYOSTAT DETECTOR	309.2	247.9	61.2	0.2
1.3 MUON DETECTORS	9,493.1	7,840.3	719.9	932.9
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	71.6	166.7
1.3.3 FORWARD TRIGGER DETECTOR	2,133.3	1,673.1	93.7	366.5
1.3.4 FORWARD TRACKING DETECTOR	1,410.8	954.2	343.0	113.6
1.3.5 FRONT-END ELECTRONICS	3,773.9	3,536.2	211.6	26.1
1.4 TRIGGER	6,672.6	4,922.8	354.0	1,395.7
1.4.1 FRAMEWORK	1,859.4	1,859.4	0.0	0.0
1.4.2 LEVEL 0	136.4	124.2	6.4	5.8
1.4.3 LEVEL 1	1,588.0	1,120.0	236.0	232.0
1.4.4 LEVEL 2	2,039.8	1,002.3	102.2	935.3
1.4.5 LEVEL 3	1,049.0	817.0	9.4	222.6
1.5 ONLINE EQUIPMENT	746.0	293.4	351.6	101.1
1.5.1 ON-LINE EQUIPMENT	746.0	293.4	351.6	101.1
<hr style="border-top: 1px dashed black;"/>				
3.1 <i>TOTAL SOLENOID PROJECT</i>	4,885.6	4,848.2	37.4	0.0
3.1.1 SOLENOID	4,885.6	4,848.2	37.4	0.0

**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 September, 2000



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
<b>YTD ACTUAL</b>	962.6	1,199.8	1,664.6	2,169.3	2,546.1	2,855.8	3,077.4	3,623.2	4,009.5	4,073.1	4,326.1	4,751.2
<b>YTD PLAN</b>	962.6	1,199.8	1,664.6	2,169.3	2,546.1	2,855.8	3,077.4	3,421.4	4,141.4	4,975.4	5,555.4	5,775.4

# DØ Upgrade Monthly Progress Report

for the month of September, 2000

## Active MOUs as of 9/30/00

<u>INSTITUTION</u>	<u>EQUIPMENT</u>	<u>R&amp;D</u>	<u>COSTED</u>
Boston University	298,200	5,200	82,107
Brookhaven National Laboratory	236,439		181,469
Brown University	820,076	106,000	211,319
California State University, Fresno	26,160		17,452
Columbia University, Nevis Labs	140,000		127,292
DAPNIA / Saclay	0	0	0
IN2P3	0	0	0
Indiana University	65,000		42,835
Institute for High Energy Physics (IHEP)	270,433		168,313
Kansas State University	113,300	92,512	138,603
Louisiana Tech University	98,856		60,822
Michigan State University	384,238	176,000	83,872
Moscow State University	23,250		23,250
NIKHEF / Amsterdam	0	0	0
Northern Illinois University	133,000	28,000	141,000
SUNY at Stony Brook	1,105,750	20,000	613,135
University of Arizona	790,598	26,600	503,955
University of Calif, Davis		9,720	0
University of IL, Chicago	129,103	22,000	91,042
University of Kansas, Center for Research, Inc.	16,000		3,553
University of Maryland	0		0
University of Nebraska, Lincoln	0		0
University of Notre Dame	68,000	199,500	144,095
University of Oklahoma	43,000		36,896
University of Texas, Arlington	162,886		120,481
<u>University of Washington</u>	<u>60,188</u>	<u>6,200</u>	<u>61,388</u>
Total Fermilab Funds:	<u>\$4,984,477</u>	<u>\$691,732</u>	
Total Costed:	2,530,599	322,280	<u>\$2,852,879</u>
Total Open Commitments:	<u>\$2,453,878</u>	<u>\$369,452</u>	82,107

# DØ Upgrade Monthly Progress Report

for the month of September, 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	1.68 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	-0.91 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	3.86 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	-11.05 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
X	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	Fiber Tracker	3/2/00	1/28/00	5 w
X	Steady DAQ Running	Online	3/17/00	3/31/00	-2 w
X	H Half-Wedge Fabrication 80% Complete	Silicon Tracker	3/29/00	2/23/00	5 w
X	M2-All Muon Forward Tracker MDT Modules At Fermilab	Muon Forward Tracker	3/30/00	3/10/00	2.8 w
X	Module Fabrication and Testing Complete	Forward Preshower	4/1/00	12/10/99	14 w
X	M3-2nd Forward Preshower Detector Complete	Forward Preshower	4/3/00	3/8/00	3.6 w
X	FEB, CB Production Complete	Muon Electronics	4/10/00	1/3/00	14 w
X	M3-ICD Tile Modules/Boxes Ready	Intercryostat Detector	4/19/00	1/18/00	13.2 w
X	M2-ICD Modules Arrive at Fermilab	Intercryostat Detector	4/24/00	1/25/00	12.8 w
X	M3-InterCryostat Detectors Installed	Intercryostat Detector	5/5/00	2/1/00	13.6 w
X	M3-Level Ø-South Installed	Luminosity Monitor	5/8/00	2/9/00	12.6 w
X	M3-Fiber Tracker Ribbon Fabrication Complete	Fiber Tracker	5/10/00	3/6/00	9.5 w
X	M3-Fiber Tracker Ribbon Mounting Complete	Fiber Tracker	5/13/00	4/20/00	3.3 w
X	M2-Fiber Tracker Assembly Complete	Fiber Tracker	5/26/00	5/4/00	3.3 w
X	6 Chip Ladder Fabrication 80% Complete	Silicon Tracker	7/12/00	3/14/00	16.8 w
X	M2-Calorimeter Preamp System Test Complete	Calorimeter Electronics	7/13/00	3/31/00	14.4 w
X	Low Mass Cables Available For Silicon South	Silicon Tracker	7/17/00	NA	0 w
X	Waveguide Production 50% Complete	Fiber Tracker	7/24/00	1/29/00	24.6 w
X	10 Digital Boards Available	Fiber Electronics	7/28/00	3/22/00	18 w
X	9 Chip Ladder Fabrication 80% Complete	Silicon Tracker	7/31/00	3/27/00	17.4 w
X	F Wedge Assemblies 80% Complete	Silicon Tracker	7/31/00	4/26/00	13.2 w
X	M2-Muon End Toroids Installed on Platform	Master	8/4/00	11/15/00	-14.2 w
X	Ten 8-chip Analog Boards Available	Fiber Electronics	8/8/00	4/19/00	15.4 w
X	M3-VLPC Cryo System Operational	VLPCs	8/18/00	6/12/00	9.6 w
X	B-Layer Octants Assembled	Muon Forward Tracker	8/24/00	4/18/00	18.04 w

## DØ Upgrade Monthly Progress Report

for the month of September, 2000

X	All MDT Octants Assembled	Muon Forward Tracker	8/24/00	7/14/00	5.8 w
X	Low Mass Cables Available for Silicon North	Silicon Tracker	9/4/00	NA	0 w
X	M3-VLPC Cassette Assembly 50% Complete	VLPCs	9/13/00	4/12/00	21.5 w
X	M2-First Silicon Tracker Barrel/Disk Module Complete	Silicon Tracker	9/14/00	1/24/00	33 w
X	SFE, SRC Fabrication Complete	Muon Electronics	9/21/00	2/3/00	32.5 w
X	South H-Disks Ready to Move to DAB	Silicon Tracker	10/13/00	7/3/00	14.4 w
	MBTs Received	Trigger	10/17/00	3/16/00	30 w
X	MRC, MFC Production Complete	Muon Electronics	10/18/00	3/27/00	28.8 w
	Preproduction MTCxx, MTFB, and MTCM Complete	Trigger	10/19/00	1/24/00	38 w
	M3-Calorimeter CC, ECN Preamp Installation Complete	Calorimeter Electronics	10/20/00	3/31/00	28.4 w
	South Half-Cylinder Complete and Ready to Move to DAB	Silicon Tracker	10/27/00	8/1/00	12.6 w
	M3- Cal Readout Available to L2	Trigger	11/1/00	2/11/00	37 w
	M3-Muon Level 1 Trigger Preproduction Testing Complete	Trigger	11/2/00	4/18/00	27.8 w
	M3-Waveguide Production Complete	Fiber Tracker	11/6/00	6/5/00	21.8 w
	M1-Begin Shield Wall Removal/Ready to Roll-in	Master	11/9/00	11/22/00	-1.8 w
	Drawers Ready	Intercryostat Detector	11/10/00	12/14/99	45 w
	M3-L3 Operational (One Full Chain)	Trigger	11/13/00	6/1/00	23 w
	Daughterboard Vendor Production Complete	Calorimeter Electronics	11/29/00	6/16/00	22.8 w
	Mixer Boards Ready	Fiber Electronics	11/30/00	6/22/00	22.2 w
	Muon Forward Tracker B-Layer Planes Installed	Muon Forward Tracker	12/5/00	6/15/00	23.8 w
	All MDT Planes Installed	Muon Forward Tracker	12/5/00	8/4/00	16.8 w
	M3-All Silicon Tracker Barrels/Disks Complete	Silicon Tracker	12/12/00	8/25/00	15 w
	North Half-Cylinder Complete and Ready to Move to DAB	Silicon Tracker	12/12/00	9/18/00	12 w
	M1-Central Silicon Complete	Silicon Tracker	12/12/00	9/18/00	12 w
	BLS Motherboard Assembly Complete	Calorimeter Electronics	12/12/00	8/7/00	17.6 w
	Timing System Installed	Calorimeter Electronics	12/13/00	8/18/00	16 w
	Global Installation Complete	Trigger	12/14/00	7/12/00	21.6 w
	L2 Cal Installation Complete	Trigger	12/14/00	8/21/00	16 w
	L2 CTT Installation Complete	Trigger	12/14/00	8/9/00	17.6 w
	Alpha Cards Received	Trigger	12/18/00	5/15/00	30 w
	L2 Muon Installation Complete	Trigger	1/3/01	7/26/00	21.6 w
	CFA Commissioning Complete	Muon Central	1/4/01	7/10/00	24.3 w
	M3-VLPC Cassette Assembly Complete	VLPCs	1/8/01	8/22/00	18.4 w
	M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	Silicon Tracker	1/8/01	9/25/00	14 w
	M2-Calorimeter BLS Assembly Complete	Calorimeter Electronics	1/8/01	9/26/00	13.6 w
	All Muon Forward Trigger Detector Planes Installed	Muon Forward Trigger	1/12/01	8/25/00	18.6 w
	PDT Commissioning Complete	Muon Central	1/16/01	6/9/00	29.8 w
	Multichip Modules Received	Fiber Electronics	1/30/01	2/23/00	47 w
	Production MTCxx, MTFB, and MTCM Complete	Trigger	2/2/01	6/27/00	30 w
	M1-Detector Rolled-in and Hooked Up	Master	2/22/01	2/2/01	2.8 w
	M3-Trigger Level 2 Commissioned	Trigger	4/25/01	9/21/00	29.6 w