

Accelerator Systems Division Highlights Ending October 22, 2004

ASD/JLAB: Cold Linac

All cavities are qualified for the H-11 string.

Following an unexpected vacuum transient, the completed H-10 string was disassembled, all cavities re-rinsed and then reassembled. Leak checking is underway.

The H-7 cryomodule was shipped to ORNL.

ASD/BNL: Ring

The 3 module extraction kicker magnet assembly has been continuously powered at 35 KV, 60 Hz for 3.5 hours. The magnet being powered is the one with TiN coating; it is sandwiched between two uncoated modules to check fringing effect. All components in the system worked nicely and the current wave-forms are fine. The pulse power group will do some final testing on their PFN power supply before it is disconnected. After that, the magnet assembly will be taken to Bldg. 919B where the kicker modules will be removed from the vacuum chamber for QA of the TiN coating.

More equipment was delivered from BNL to SNS/OR this week. An open truck was used to deliver the "jack plate" for the primary collimator and a special shipping crate that contained Diagnostic chambers for the RF and Collimation straight sections.

A shipping container is being packed for our next delivery from BNL, scheduled for early November. It will contain: RF anode power supplies, RTBT vacuum chambers, RF computer test stand, RF rack and the 2nd long injection kicker magnet.

Jim Alduino is on track to release the injection line footprint drawings on 10/29/04 and the injection installation drawings by mid November.

Mike Hechler's meeting minutes from Oct 13, 2004 (Review of Remaining BNL/SNS Mechanical Equipment & The Next Six Months) was distributed among engineers at OR and BNL.

IE Power: A total of five PS units were recently shipped from IE Power to ORNL. These included the two first article 900A power supplies, the 2500A first article power supply, and the two production 2500A units. Testing of the final two models of medium range supplies will be performed in early November. There are two injection bump power supplies left to be tested (the tests on one unit are nearly complete and testing on the second unit should be completed in early November).

APS: Production of the extraction kickers is now complete. The last four units are being prepared for shipment to SNS/OR.

Alpha Magnets has started the coil winding operation for the extraction Lambertson and RTBT bend dipoles. One coil is wound and is being prepared for epoxy impregnation. Work on yoke steel continues at Allied Engineering.



Two IPM chambers that are in our tech shop for welding.

Controls

Power supply controls efforts have been wrapped up at BNL. The power supply development laboratory has been disassembled and the components shipped to ORNL power supply and controls personnel.

Almost all remaining SNS Controls equipment has been shipped from LANL to ORNL. This includes specifically PLCs, IOCs and some laptops. This equipment will be used at ORNL in test and development stands, and as spares.

Work continued on the LEBT chopper controller prototype. The last board has been received, assembled and tested. This hardware is being installed with power supply in a suitable box, and will be tested on Friday afternoon.

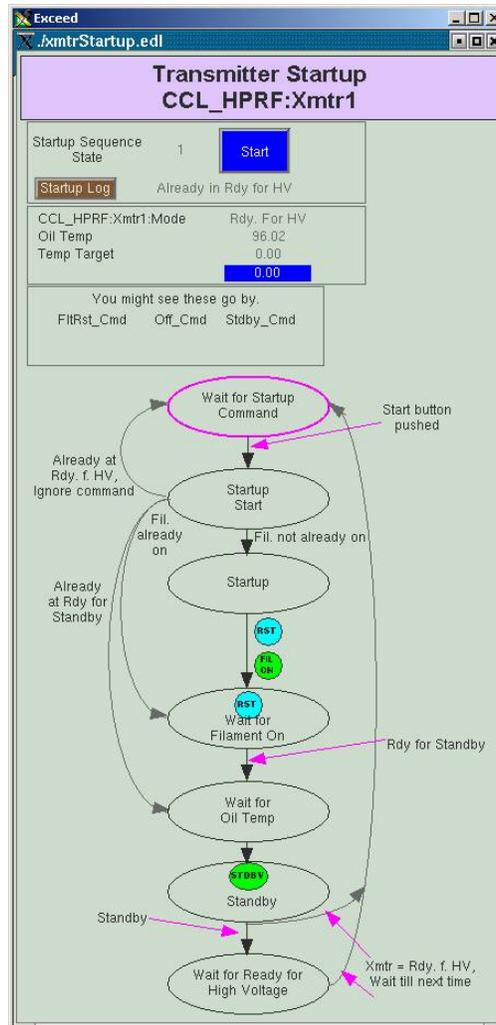
Work began on a mobile test stand for the MPS system, and an MPS channel test circuit was laid out.

RCCS Frequency Control loop tests were performed on DTL 3. The control algorithm will be installed on other tanks once its stability has been experimentally demonstrated.

A preliminary point-to-point test was conducted for the SCL Zone 1 and Zone 2 vacuum systems. A list of installation errors was prepared, and these will be corrected. The serial performance has been improved significantly with the new serial bus layout.

Notwithstanding earlier understanding that low-level RF (LLRF) adaptive feedforward (AFF) would not be required to operate the first parts of the SNS linac, experience has shown that it is absolutely required to compensate for beam loading. A "crash" program was initiated to implement this feature. A Matlab code was iteratively developed and tested, and the IOC code was modified to accommodate AFF. When the Matlab code was demonstrated to operate successfully, it was converted to run directly in the IOC. The last step was to test triggering of AFF learning from the timing system. Faster access to timing system data was required in order to meet specifications. This problem was solved, and by week's end a workable version of the system was installed and in use. This was, in the opinion of your humble scribe, a veritable tour de force.

The High Power RF (HPRF) systems from RFQ to CCL3 were successfully brought up using new startup sequences. A few systems needed a bit of nudging (one transmitter was reset manually, and one modulator was given a reset command and then a run command; the sequences have been changed to add the reset and to retry the modulator reset/run) and one sequence needed to be restarted after it was started in the time-out state and didn't get to the right place afterwards. That will need to be changed. The next step – for next week – will be to bring them all up together. Some screen shots are show below.



Installation

Craft Snapshot 10/19/04

ASD productive craft workers	59.0
Foremen (Pd by 15% OH)	5.0
AMSI management (Pd directly)	3.0
TOTAL AMSI WORKERS	67.0
Less WBS 1.9, 1.2 etc	10.0
Less absent	2.0
TOTAL PD BY ASD/ORNL DB WPs	47.0

Accelerator Physics

Operations

Ion Source

We are very happy to be able to report that all vacuum pumps are up and running. All pumps had to be dried to remove the water absorbed during the water leak reported previous week. We are now implementing a hardwired interlock that closes all gate valves when exceeding a certain pressure. A gate valve for the diagnostics chamber pump has been ordered. These efforts will mitigate most risks associated with future water leaks.

Survey and Alignment

In the Target area we have aligned the guide in core vessel insert numbers 5 and 13. These core vessel inserts have been installed in the core vessel. The core vessel insert for number 5 has had the mirror measured for installation error. This difference is the variation or delta between the ideal and the as built and is used to determine if the as built has enough variation to warrant more work. The core vessel insert for number 13 was inserted today and we will measure it on Tuesday. We have validated all of the sticky targets used for beam line alignment on all except beam line 18. This one will be validated some time next week.

Performed field work for settlement monitoring survey on Target shelf monuments

In Magnet Measurement we re-aligned the first warm section to facilitate a uniform installation plan.

In the HEBT we have started re-aligning the laser pipe to allow clearance for crane movement. We have set four stands at the end of the HEBT and three stands at the beginning of the RTBT. These stands are now ready for grouting and magnet mounting. We have worked two days in the re-align campaign in the HEBT. All of the dipoles are now aligned and the last two 21Q40 magnets without correctors are aligned.

Checked the bellows question on CCL4, and visually inspected the rest of bellows attached to the wire scanner beam tubes.

Setup network points for the core vessel insert to facilitate data gathering. Also, I devised a preliminary procedure for measuring this with the tracker. Minor details are to be worked out once the information request is finalized.

I started a procedural document with time estimates of tasks that may be requested for the first part of the machine during maintenance shutdowns.

Revised the planned layout of Survey and Alignment area in CLO basement, in order to avoid air handling units and to maintain access to valves. Also prepared RSS for Lab Space Manager for this area.

Transferred ceiling light locations to the floor of the CLO control room.

Arranged annual recertification of meteorological instruments used in determination of atmospheric ppm correction for EDM.

Continued work on paper describing non-traditional stochastic treatment of instrument and target centering uncertainty.

Mechanical

Water Systems Installation

- Installation of the DI piping to SCL-ME7 continued.
- The QMCS DI auto-fill tie-in was completed last week. Rerouting of piping near the TPS conduit was completed this week.
- The CCL DI auto-fill tie-in was started last week in the area where the Klystrons are not operating.
- Installation of the HEBT SB power supply cooling system was completed.
- The design of the HEBT DI auto-fill tie-in was started last week.
- Installation continued on the RING SB power supply cooling system upgrade
- Installation started on the HEBT tunnel magnet cooling system.
- Maintenance: This week's outage, the flow switches were cleaned and repaired. Biocide and corrosion inhibitor were added to both chiller loops to stop the fouling of the meters.

Ring Systems Installation

- The final alignment of the HEBT arc Dipole magnet chambers is in process.

- The final alignment of the HEBT arc 21Q40 magnets is in process.
- The DC and diagnostic cable installation in the HEBT tunnel was completed on the 21Q40 magnets.
- The HEBT 12Q45 #31, 32, 33 and 34 stands and magnets were set in position.
- The RING Primary Collimator Mounting Plate was received and is being painted.
- The RING RF Straight Section QMM / Tune-Pickup Diagnostic Chambers and BCM were received.
- The RTBT 21Q40 #11, 12, 13 magnet stands were formed for grouting.

Magnet Task

Electrical Group

Installation of SCL-ME5 has begun, and should be near completion by mid-November. Installation of SCL-ME4 is complete. Start-up of checkout is being delayed due to traffic in the area and safety concerns. We expect completion prior to the DOE Review. SCL-ME1 was operated successfully at 69 kV into a 12 klystron load at 1350 us pulsewidth and 60 Hz with no problems. A problem has been discovered on CCL-ME1 which causes random trips. We have tracked the source of this problem down to electrostatic discharge from the oil circulation, and are investigating solutions. The LEBT Chopper pulser channel B was removed and operated successfully on the bench. The overcurrent problem is being caused by breakdown in the oil-filled mixer box. We provided a temporary fix, so hopefully Operations can now use the chopper system.

HPRF

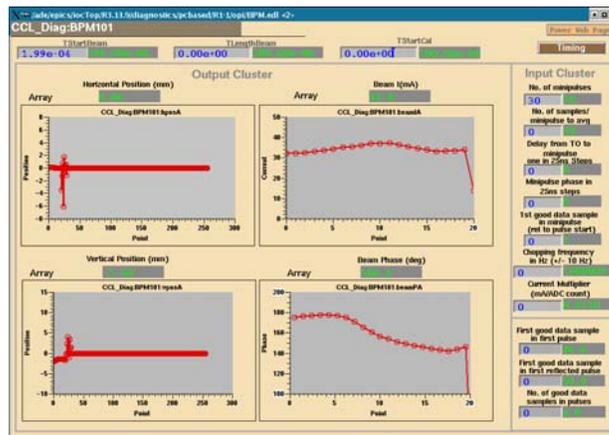
Ring RF System

- All Cavity Tuning cables and Screen/Grid coaxial cables have been pulled.
- Reviewed AC Power connections for the RF system with electricians.
- One row of equipment (one station) has been set in place in the Ring Service Building.

LLRF

Operations: We continue to support beam commissioning of the warm linac.

Development: The IOC-based implementation of adaptive feedforward (AFF) beam compensation was tested successfully on the warm linac on Friday afternoon, Oct. 22. We observed high frequency noise build up over time. We plan to add a low pass filter on Monday morning to remedy this problem. We anticipate turning over the AFF system to Operations early next week. We used the Matlab-based implementation of AFF on Oct. 20 to demonstrate the effectiveness of beam compensation with respect to beam parameters (see Fig. 1).



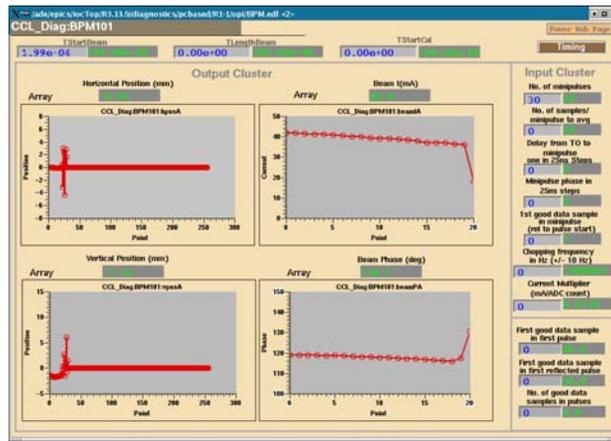


Figure 1. Illustration of the effectiveness of adaptive feedforward beam compensation. Data are shown for BPM 101 at the beginning of the CCL on Oct. 20. Beam current was ~ 40 mA peak with a duration of ~ 40 μ s. AFF beam compensation was active on all DTL tanks. The significant result is the flatness of the beam phase (lower right quadrant) with AFF active (left image) compared to the case without AFF (right image). These data were obtained using the Matlab-based implementation of AFF.

Installation: All tunnel helix cables for the installed medium-beta cryomodules are terminated and ready for use. The installation of the RF power coupler fiber optic arc detector system is 50% complete and will be finished next week. Another zone of 755 MHz local oscillator distribution was completed in the SCL. The 110 VAC power for the 2nd half of SCL ME-3 and the 1st half of SCL ME-4 was turned on, so we can begin the check out of those systems.

Cryo Group

Beam Diagnostics