

Accelerator Systems Division Highlights for the Two Weeks Ending May 30, 2003

ASD/LANL: Warm Linac

HIGH-POWER RF (WBS 1.4.1.1)

Accomplishments This Week: (1) The heat run data for the 4th SC linac transmitter was reviewed and approved, completing factory acceptance testing for this unit. The 5th unit is being installed in the test bay at Titan. (2) Thales is maintaining the CCL klystron factory acceptance dates (S/N 4 on 6/19-20, S/N 1 on 6/23-24, and S/N 3 on 6/26-27). Tests will use the SF₆ gas barrier from MEGA. (3) Five more CPI SC linac klystrons (S/N 13,19-22) and four magnets (S/N 20-23) were shipped to ORNL. S/N 23 was factory acceptance tested; we are awaiting test results. (4) One DTL klystron socket was shipped to ORNL.

Concerns & Actions: (1) Several weeks ago, we requested that CPI start shipping SC linac klystrons directly to ORNL rather than to LANL. The contract is being renegotiated to include changes in shipping costs, FOB locations, and payment timing. In the meantime, all CPI tubes shipped to LANL are being redirected to ORNL. (2) The first Thales SC linac klystron still does not meet the efficiency and the power specifications. Two Thales representatives are scheduled to come to LANL the week of 6/9 to tune it. (3) E2V representatives will be at LANL next week to retune DTL klystron S/N 11, which also suffers from low efficiency.

HIGH-VOLTAGE POWER CONDITIONING (WBS 1.4.1.2)

Accomplishments: (1) Dave Anderson and Bill North completed the performance acceptance testing of 7th high-voltage converter modulator (HVCM) at Dynapower using the newly revised testing procedures. We confirmed with Dave Anderson that he would prefer the order of the deliveries of the 140 kV units and 80kV units be changed so the last 140 kV modulator deliveries is swapped with the delivery of an 80 kV unit. (2) We worked with Dynapower and cable vendors to formalize and document the fire-resistant wiring changes and addition of fuses in the enclosures. (3) Tom Hardek will travel to Dynapower next week to observe final assembly of the 8th HVCM and assembly of 9th HVCM.

Concerns & Actions: (1) An SCR control card failed on the prototype HVCM system. Dynapower express-shipped us a replacement.

DRIFT-TUBE LINAC (WBS 1.4.2)

Accomplishments: Tank-1: Preparations for post couplers welding underway, but progressing more slowly than anticipated. We are breaking them into two batches to ensure welding begins at ESCO on 6/2 and to ease shipping requirements by reducing the shipping container size. The first batch is projected to be shipped to ESCO on 5/30, and the second batch on 5/31. Slug tuner vendor has trimming data; work should begin no later than 5/31.

Tank-4: (1) All groups (A, B, C & D) drift tubes have been brazed (Fig. 1). Three drift tubes have developed water channel weld leaks. Sections of the first leaking drift tube weld have been made and roughly polished and etched. The leak appears isolated to the electron beam weld "tail-out" section and seems caused by an irregular crack in the welded material. Two of the tank four empty drift tube bodies have been machined within .010" of final form and will be pressure He leak checked to detect any leaks or cracks that may have been uncovered by machining of the water channel welds. Only these two empty units have been machined; all other tank four drift tube body cavity and profile machining has been halted pending resolution of water channel weld leaks (see concerns/actions section below). (2) The waveguide is undergoing machining for port brazing; unit is expected to be ready for next plating and brazing cycle by 6/11 and delivered to LANL for leak checking prior to subsequent brazing into the waveguides.

Tank-5: (1) Water channel welding were complete on all drift tube bodies; diverter braze preparation machining of group E is underway. (2) Wave guide is undergoing machining for port brazing; unit is expected to be ready for next plating and brazing cycle by 6/11. (3) Tank stands were delivered to Oak Ridge.

Tank-6: (1) Water channel welding is complete on all drift tubes except for production spares. Welding on these spares has been halted due to leak problem detected in the tank 4 drift tube water channel welds (see below). (2) Wave guide interior cavity machining is underway; plating for equatorial brazing projected to occur approximately 6/18. (3) Tank stands were delivered to Oak Ridge.

Tank-2: (1) Machining of drift tubes and sleeves has begun at ESCO. (2) Rough machining of wave guide cooling channels features nearly complete, and scheduled to go to first plating 6/2.



Fig. 1: Tank-4 drift tubes after the diverter braze.

EMD DT's: First magnet coil winding was made and placed in core pieces for trial fit; winding appears good and is of correct size and form.

Concerns & Actions: (1) The water channel weld leak that occurred in one of the Tank-4 drift tube bodies after diverter brazing has shown up in two more Tank-4 drift tube bodies. Sections have been cut through the leak in the first leaking drift tube and are being shipped to Los Alamos for metallurgical and chemical evaluation by LANL group MST-6. These evaluations will commence on 6/2. Parametric models of various possible weld repairs are being made to allow the rapid production of weld repair drawings if they become required. Copper stock for possible weld repair parts (rings and/or plugs) has been located and secured. Currently it is believed all the leaks originate at the "tail-out" region of the final deep electron beam weld. The leak zone shows cracking and there is also pinhole piping porosity; these flaws may indicate a material impurity or weld contamination. This welding problem will likely impose a seven to ten-day delay in the production schedule. (2) Fabrication of qualifying example T-2 drift tube at ESCO is delayed due to welding chamber rotary table malfunction; repairs are being attempted.

COUPLED CAVITY LINAC (WBS 1.4.4)

Accomplishments: (1) In support of assembly of Module-1 at ACCEL (still scheduled to begin during the week of 6/9), the support stands were completed and shipped to ACCEL. They are expected to arrive in Cologne on 6/33 and will clear customs there. We are satisfied with the results on the manufacturing. A detailed measurement process using theodolites and a team from LANSCE-2 showed that the features are well within design and drawing requirements. A permanent record was made of all critical hole locations and the surface flatness of the top rails. Fig. 2 shows some views of the measurement process done in Albuquerque in at Accurate Machine. Production of the remaining stands is proceeding well at General Tool and we will have some staff there in about two weeks for inspection of the module-2 hardware.



Fig. 2: CCL Module-1 support stands

PROJECT MANAGEMENT (WBS 1.4.6)

Accomplishments: (1) We signed the SNS Project Management Transition Plan (SNS 102000000-PN003-R00) and submitted to ORNL. (2) We submitted two Project Change Requests. PCR LI 03 008 adjusts the baseline CCL hardware to match the production schedule, and the deferral of HEBT procurement until after FY03. All delivery dates continue to support the Integrated Project Schedule. PCR LI 03 009 realigns the linac diagnostics baseline and transfers \$1.03M of budget from LANL to ORNL by eliminating the SC linac carbon wire scanners in favor of the laser profile monitor, transferring responsibility for BPM LO and CAL signals hardware, and transferring responsibility for design and fabricate the actuators and heads for the MEBT in-line emittance station. It also provides additional scope to LANL in the construction of a spare DTL BPM.

ASD/JLAB: Cold Linac

Cryomodule M-1 has been warmed up and is being prepared for shipment to Oak Ridge. Assembly of M-2 is complete and ready for testing. The cryomodule has been cooled to 2 K and testing of tuners is underway. To this point problems with sticking of the tuners have not been observed, although movement is not as smooth as we would like. Assembly of M-3 continues and assembly of M-4 has begun. Three cavities were qualified for the M-5 string. It is assembled and under vacuum. (See photos)

The electropolished high- β prototype cavity performed extremely well, see Figure.



Cryomodule M-1



Cryomodule M-2



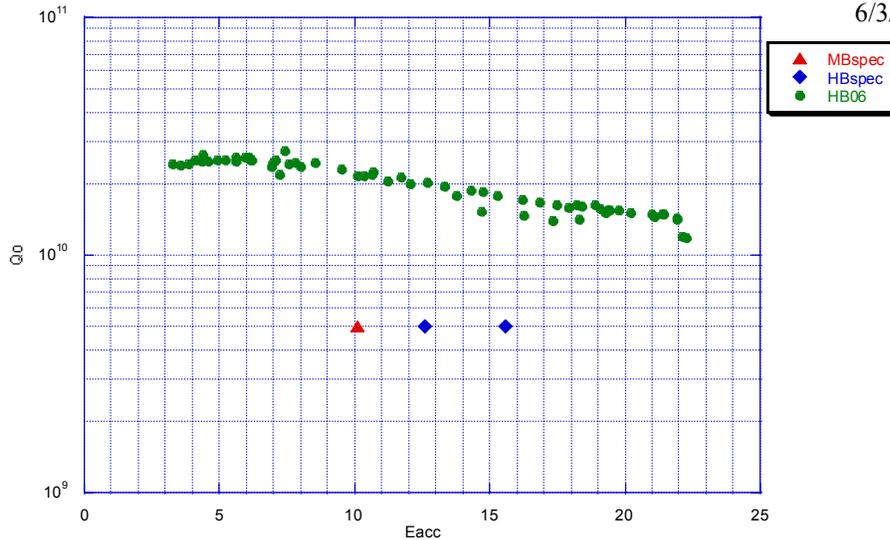
Cryomodule M-3



Cryomodule M-4



Cryomodule M-5



Q_0 vs E_{acc} for electropolished prototype high- β cavity.

ASD/BNL: Ring

Procurement options and BA are being reviewed for '03, '04 and/or '05.

21Q40 quad shimming – for the family of twelve Ring magnets, seven have been shimmed and measured. Stainless shims will not be used due to observed non-linear effects.

Work on the Ring RF Junction Box is underway at BNL.

Work continues at BNL on half-cells #11, 12 and 13.

New England Technicoil has started assembly of (4) 27CD30 magnets in support of ASD's HEBT installation plans. They will ship these units direct to SNS/OR on 6/11/03. NETC is also winding the last of the first four 36CDM30 correctors for BNL – ship date is 6/05/03.

26Q40 (8) - Stangenes reported the shipment of the last three production magnets.

Tesla – the first lot of eight magnets from the Ph II production arrived at BNL earlier today, 05/30/03.

BINP (Budker) two shipments (5 magnets each) are in route to BNL. The first lot of five arrived at BNL today, 05/30/03.

Rancor has started fabrication on the Outer Shield Box for the HEBT collimators.

Assembly work continues on the second set of (short) injection kicker magnets.

Design of the HEBT Momentum Dump Collimator is complete. An RFQ has been initiated for vendor quotes.

Controls

Over the last months we have had a number of problems relating to IOC configuration, communications and timing. An IOC overview page has been created to monitor the health of all installed IOCs. (See below.) For each IOC, the time as understood by the operating system and the time as received on the Real Time Data Link (RTDL) is displayed for comparison (they should be the same). Also shown is CPU loading, crate operating temperature and the result of periodic “pinging” to assure communications. IOC function, location and more detailed status can be obtained by clicking on the name.

The screenshot shows a window titled "IOC Status Information" with a sub-header "Unix NTP Server Status" highlighted in a pink box. The main content is a table with the following columns: IOC Network Name, vsStats Time-of-Day, Utility Module Time-of-Day, UM TS Fault, CPU Load (%), ICMP, and TEMP (C). The table lists various network and utility modules with their respective status indicators (green for OK, red for fault) and numerical values for CPU load and temperature.

IOC Network Name	vsStats Time-of-Day	Utility Module Time-of-Day	UM TS Fault	CPU Load (%)	ICMP	TEMP (C)
fe-cl-loc1	MAY 25 22:02:53	<FE_CL1_0PTEL1_T001>		16	UP	18.0
fe-cl-loc2	MAY 25 22:02:53	<FE_CL1_0PTEL2_T001>		22	UP	18.0
fe-cl-loc3	MAY 25 22:02:53	<FE_CL1_0PTEL3_T001>		17	UP	18.0
fe-pp-loc	MAY 25 22:02:54	<FE_CL1_0PTEL1_T001>		33	UP	18.0
ics-0m-loc	MAY 25 22:02:53	MAY 25, 2003 22:02:57.162		13	UP	25.5
ics-mps-loc1	MAY 25 22:02:53	<ICS_MPS_0PTEL1_T001>		13	UP	18.0
cl-ics-loc-k1	MAY 25 22:02:53	<CP_ICO_0PTEL1_T001>		8	UP	18.0
pps-0m-loc	MAY 25 22:02:53	<PPS_0M_0PTEL1_T001>		14	UP	18.0
dtl-vac-loc1	MAY 25 22:02:55	<DTL_VAC_0PTEL1_T001>		10	UP	18.0
dtl-ccs-loc1	MAY 25 22:02:53	<DTL_CCOS_0PTEL1_T001>		14	UP	18.0
dtl-0m-loc1	MAY 25 22:02:53	MAY 25, 2003 22:02:57.162		28	UP	26.5
dtl-0m-loc2	MAY 25 22:02:53	MAY 25, 2003 22:02:57.412		21	UP	27.5
dtl-0m-loc3	MAY 25 22:02:53	MAY 25, 2003 22:02:57.412		18	DOWN	30.5
dtl-0m-loc4	MAY 25 22:02:53	MAY 25, 2003 22:02:57.245		12	UP	29.0
dtl-0m-loc5	MAY 25 22:02:53	MAY 25, 2003 22:02:57.812		27	UP	30.5
tr-0m-loc1	MAY 25 22:02:53	MAY 25, 2003 22:02:57.285		9	UP	26.5
dtl-0m-loc-test	MAY 25 22:02:53	<DTL_0M_0PTELTEST_T001>		20	DOWN	18.0
dtl-day-loc-emb1	MAY 25 22:02:53	MAY 25, 2003 22:02:57.912		75	UP	27.0
dtl-day-loc-emb	MAY 25 22:02:53	MAY 25, 2003 22:02:57.148		43	UP	24.5
dtl-day-loc-emb	MAY 25 22:02:53	MAY 25, 2003 22:02:57.212		43	UP	28.0
dtl-pp-loc1	MAY 25 22:02:53	MAY 25, 2003 22:02:57.678		17	UP	25.5
cc-pp-loc	MAY 25 22:02:53	MAY 25, 2003 22:02:57.212		8	UP	28.5
NOT INSTALLED						
pps-0m-loc-2		N_0MPP_0MPP1_T001				
pps-0m-loc-3		N_0MPP_0MPP2_T001				
pps-0m-loc-4		N_0MPP_0MPP3_T001				

The pre-ARR, pre-Front End commissioning test of the timing system was completed this week. An unanticipated (silly us) requirement for simultaneous operation of the front end and DTL requires a non-trivial change to the timing system software. The proposed solution is to implement the variable rep-rate code, which already exists in the master timing IOC in each DTL3 timing IOC. A proof-of-principle is working in the lab and the code was installed at the site for initial testing this week.

The PPS for phase 0.0 (Front End) was re-certified on Thursday (5/29) and planning is continuing for rebuilding the system for phase 0.4 (front end and DTL1) starting June 10 with certification scheduled for June 16.

Three chipmunks have been completely calibrated with two units now in service for phase 0.0. Five units are at ORNL awaiting final gamma calibration (Six are required for phase 0.4). The Chipmunk vendor has completed a rebuild of the two prototype units with alternative Field Effect Transistors (FETs). Initial results look promising. Temperature cycling tests of these units will start next week.

The drawings for the temporary standalone ODH system required to support commissioning of the liquid nitrogen system in the CHL cold box area are complete. All of the components required have been delivered to the site and are being installed. Installation will be complete June 5 with final testing complete the next day. Work continues on the permanent CHL ODH system. The rack drawings are 80% complete. The PLC equipment required has been ordered and delivered and is being set up in the Safety lab at 701SCA.

The PLC code for the 4K cold box (300+ pages) has been completed and sent to the vendor for approval. The cryogenics controls team presented training for the cryogenics operating staff in the now-operating CHL control room. Two multi-headed OPIs and a color printer are now in service.

At BNL a software bug was discovered in the IOC real-time kernel. A workaround was proposed for evaluation at ORNL.

Design drawings for Linac and Extraction Beam Dump thermocouples were issued, and specifications for ring control racks were issued to our "rack factory" vendor, DCS.

A new server was implemented for the test facilities network.

Installation

Craft Snapshot 5/28/03

ASD craft workers	77.0
Foremen, ES&H, etc	12.0
Less WBS 1.9 etc	8.0
Less absent	4.0
TOTAL	77.0

The relocation of the Magnet Measurement and Power Supply Test Stands from RATS I to the Klystron Hall is underway. It is planned to have both operational by June 15, 03.

Due to the environmental problems with the 10plex trailers on site, the initial RATS I personnel move has been delayed until June 17, 03.

All HEBT dipole magnets and Ring Half Cells have been moved to the tunnel.

Vacuum testing in of the DTL #1 assembly continued in the FEB.

Accelerator Physics

AP group members have been staffing shifts for DTL3 commissioning for last several weeks. Finished 48 hr heat run last week and now staffing shifts for Front-end turn on.

Several Commissioning applications have been cast in the "Application Framework" which provides a common look and feel for applications.

Operations Group

Ran RF Processing and Heat Run operations for DTL Tank 3

Continued operator training

Obtained sign-off of Emergency Shutdown Procedures

Participated in "End-Game" planning

Worked on SNS power consumption estimates for a revised commissioning schedule.

Ion Source Group

The hazardous, exposed RF connection in the Front End Big Blue has been replaced with a high power, small O.D. RF cable. The new connection is identical to the one successfully tested on the Hot Spare Stand. This eliminates the need for LOTO when entering the Front End Big Blue Box.

All Ion Source and LEPT flange fiducials as well as the extractor aperture were remeasured with the Laser tracker to confirm the fiducialization data obtained in April.

The LEPT and ion source were aligned with the RFQ entrance aperture by using the laser tracker to position ion source fiducial H on its nominal coordinates adjusted for the position for the RFQ entrance aperture. To stop the motion when the coordinates were reached, the position cranks were backtracked. The LEPT flange was locked into position with the 4 setscrews on the newly installed brackets.

The position of the MEPT quadrupole #2 has been restored after it was found to be 0.6 mm to the right of the beam axis.

A fully integrated vertical test of all Front End steerer supplies has established proper connectivity of the new system with the new chopper boxes.

Survey and Alignment Group

Mechanical Group

Water System

- Piping installation continued on DTL 5 & 6 klystrons.
- Incidental leaks on D-Plate cooling system were repaired.
- The primary glycol pump developed a leak, again due to a bad seal, and was picked up for repair by the manufacturer.
- The TRCC cart for SCL 1 was installed.
- Drawings for the installation of piping from the facility to the SCL equipment have been completed and work has begun on the SCL TRCC feed drawings.

HEBT-Ring-RTBT

- Installation of the RING cable tray is proceeding.
- Cable pulling in the HEBT is proceeding.
- All the Ring Half-cell magnet assemblies were transported up on site from the RATS facility and staged in the RING tunnel.
- CF performed repair activities on the modification of the tunnel fire sprinkler heads.
- CF started repair activities on the tunnel large fiberglass air handling ducts.

Magnet Task

The Magnet Group is moving to the site.

Electrical Group

Completed testing of the CCL-ME2 modulator at Dynapower this week. Completed low voltage checkout of the HVCM in the RFTF. Started high voltage testing into a resistive load of the RFTF HVCM. Developed planning to support long term high average power operation of a HVCM at ORNL this week.

HPRF

Prior to running DTL1 klystron the oil was filtered to ensure no water was present. While the tank was open we discovered that the socket had been coated with a carbon-like material and some arc tracks were observed. We are consulting with LANL and E2V. Meanwhile we cleaned the connector and reinstalled with no apparent effect on operation.

Klystron forward power calibrations were completed for RFQ and DTL1. DTL1 klystron (E2V-2) was verified as ready for operation. Power, efficiency and perveance were measured on the DTL1 klystron and they agreed with factory values.

X-ray emission at 125kV on DTL1 klystron exceeded specifications; 9 mR/hr vs 1 mR/hr specified. LANL and E2V will be consulted. An exclusion zone around the top of the klystron will be implemented during operation until this can be resolved.

LLRF

1. DTL3 Operation

We continued to support DTL3 operation and to investigate performance issues. The resonance detection system is working correctly, but is somewhat sensitive to parameter settings. Modifications to the cavity field decay buffer are in progress and will be in place to support DTL1 operation in June. The DDS mode of operation was demonstrated, but is not yet ready to support automatic cavity warmup. We plan to complete this work prior to DTL1 operation. There is significant 20 kHz ripple on the DTL3 cavity field waveform (see Fig. 1). We are preparing a demonstration of feedforward compensation for next week.

2. DTL1 Preparation

Preparation for DTL1 commissioning continues. The RFQ, MEBT Rebunchers, and DTL1 LLRF control systems were connected to the 402.5 MHz tunnel reference line this week. The installation of heaters and sensors for temperature regulation of the reference line is ongoing and should be completed in the next week. The MEBT Rebuncher LLRF control chassis were powered up and checked out this week. We supported checkout of the PPS system and turn on of the RFQ, which needs some reconditioning due to its being vented since last operation.

3. New Hardware Development

The Major activity of this short week (three days) was to produce sufficient hardware for parallel testing at the three partner laboratories.

As planned, LANL shipped a complete LLRF field control module consisting of the VXI motherboard, the DFE, RFO and AFE to LBNL; ORNL shipped a VXI crate to LBNL. Next week Kay Kasemir of LANL, Larry Doolittle of LBNL and Craig Swanson of ORNL will continue system integration activities at LBNL.

We are producing three more complete systems, one for ORNL, one at LANL and a spare system to be used on demand. Bergoz of France has shipped three more units of AFE, which we should receive next week.

Following successful tests at LBNL we are planning to ship a system to ORNL during the week of June 16 for tests with the DTL.

Work continues on modeling and simulation of the VHDL code with MATLAB and ModelSim.

We are collecting modifications to the DFE and the RFO boards with the goal of producing Rev A by the end of July.

We have started identifying long-lead items for producing the final system in October.

HPM Board: The final Rev of this board is expected back from SUNTRON next week. Work continues on interfacing the new board to EPICS and also on reducing the calibration sensitivity for the HPM. The paddleboard for the HPM test stand has been released to fabrication and assembly.

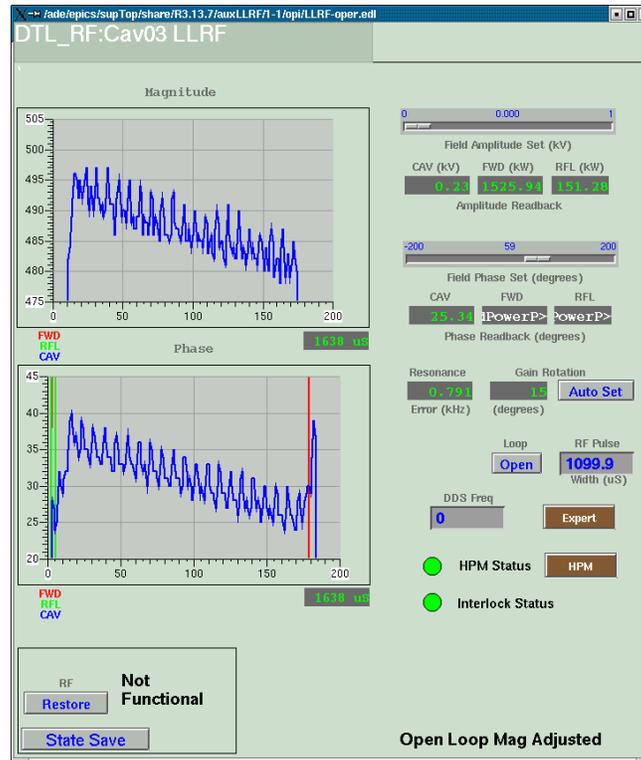


Figure 1. DTL3 cavity amplitude and phase waveforms showing 20 kHz ripple. Operating parameters are 30 Hz, 1.1 ms, 1.5 MW incident RF power, 110 kV from converter modulator.

Cryo Systems Group

Beam Diagnostics

BNL beam diagnostics progress report

General: Diagnostics personnel participated in and gave presentations at the Halo Workshop

1.5.7.1 BPM: Received (6) 30cm BPMs from the brazing shop, completed assembly. Delivered (3) 36cm BPMs for brazing. Continue testing Prototype baseband design. Replacing the Quicklogic PGA in the LANL style PCI card resulted in an operating card, but there are problems with stuck bits on a few FIFOs. This appears to be a solder bridge problem. The BNL PCI card is currently being assembled, and should be completed in a few days.

1.5.7.2 IPM: Preparing the order for 22 PCI digitizer cards from Strategic Test Scandinavia AB. Decided upon twisted pair cables from the tunnel to the rack, and conversion from balanced to coax at the rack.

1.5.7.3 BLM: Effort continues to test all of the capabilities of the AFE test stand. A preliminary AFE test procedure has been written. Work continues with controls to automate the AFE tests We are continue to work with Hamamatsu regarding performance and choice of a gated MCP/PMT. Mechanical work continues on the moveable chamber stand Labview Vi's and a Cesium source provider info have been sent to ORNL to assist them with BLM detector evaluation. A Keithley current source has been received allowing us to continue with testing using DC signals. Rexolite BNC connectors have been received for use with the BLM detectors.

1.5.7.4 BCM: Work has resumed on the last 2 calibrator boards based on the DAC2902 evaluation board. Expect this to be complete in next few days. Power supplies for the calibrator are still under examination. Incorporated protected amp schematic with RF schematic. Several new additions have been reported for inclusion to the artwork. Layout is nearing completion. Completed shipment of HEBT BCM assemblies and associated support structures to

ORNL Continue to work on Ring production drawings. Submitted a PO for another ceramic break. Worked with General Technics to come up with a short-term solution to rack mount PC purchases. Placed an order for 5 rack mount PCs. Evaluating switching supplies to overcome noise.

1.5.7.6 Carbon Wire Scanner: Completed drawings for the support structure. Working on ECN to update the changes in the final assembly

1.5.7.7 BIG: Work continues on implementing various tune algorithms for testing at the AGS Booster, including both FFT and fit methods. Received the sample EIA flange connectors. Working on feedthru design to integrate the EIA connector to the vacuum chamber.

Electron Detector: Reviewing drawings for the electron detector, sent corrections back to design room. Reassembled a spare detector. Obtained price quotes for amplifiers.

LANL beam diagnostics progress report:

BPM pickups: Weld flanges are being added to 9 ea. DTL BPMs. Jim O'Hara has finished reports entitled "Results of SNS SCL BPM Mapping," (SNS-01:03-032), "Modification to the SCL BPM Electrode Design", and "Modification to the CCL BPM Electrode Design". Reports are in progress on the electrode pull tests that we did to check the electrode-to-feedthrough contact pressure, and on the CCL PBM mapping results.

BPM electronics: Work continued to prepare new PC chassis and PCI card assemblies to replace the prototype units in the MEBT.

WS actuators: Preliminary layout work for the HEBT wire scanner forks and actuators indicate that the wire scanner fork will protrude slightly into the beam pipe aperture due to the constraints imposed by the already-fabricated beam boxes. Design work continues at Huntington on the 3 and 6-inch actuators.

WS electronics: We received the remainder of the 27 each stuffed PC boards for the signal processors. One has been installed into a chassis, hooked up and tested, and it works like a champ.

Harp: Work continued on the harp mechanical layout. We have located a vendor for the copper tubing needed for the crimps and another vendor to fabricate the crimps from the tubing. The order for the tubing has been placed.

Software: Work continues on the timing card software and on merging the drivers for the LLRF and BPM systems.

ORNL beam diagnostics progress report:

D-plate: All actuators have gone under the vertical tests. The quad magnet has loose coil and an open. We are investigation that. All electronics including the video system are tested. We have observed 2.2 kHz noise on the video system. We have traced the noise source to the Klystron gallery. INR is sending 6 neutron detectors (three are PM style and three are semiconductor type). We performed vacuum, RCCS, and water tests on the D-plate. The aperture to 8.5 GPM limits the water flow. LANL has informed us that 8.5 GPM is sufficient for 38 mA, 6% duty factor beam (the original design was for 11 GPM and 50 mA beam at full duty factor).

D-box: The first ORNL designed FC/beam stop actuator is installed on the anti-chopper box. The five remaining actuators will be installed in the next 2-3 weeks as time allows. After the successful installation of the first actuator, the Mechanical Design lead engineer (Tom Roseberry) has started work on the inline HARP box. This box will replace the 4th wire scanner beam-box.

Software: Wim and company are working on the D-box low level and high level application software.

Differential Current measurement: A simple circuit to interface MPS with current monitor signals is being developed for use during D-Plate operations.

Timing: The schematic has been modified to include the ps jitter programmable clock. This is in layout at Lumagraph. We are investigating a bug that showed up during integration testing this week at LANL.

General: Test plans are being prepared for all MEBT and DTL systems. These build on the system handoff acceptance criteria. We continue to develop our strategy to capture system design and configuration information. As originally planned, all critical data will reside in the global database. We are discussing techniques to integrate this information with DataStream and ProjectWise.