

Accelerator Systems Division Highlights for the Week Ending August 24, 2001

ASD/LBNL: Front End Systems

We have resolved the dual-frequency ignition problem with the ion source by utilizing a 13.56-MHz amplifier that can withstand 200-W reflected power during the main discharge pulse. The antenna-coating question still has to be resolved before starting a meaningful antenna-lifetime test.

The first MEBT rebuncher cavity has now reached 23 kW (82% of nominal power for the Cavity #4 position) at full duty factor, limited by operational difficulties with the two RF amplifiers that feed this cavity in parallel.

We submitted the Front-End Estimate-To-Complete data to the SNS Project Office on Wednesday, August 22.

ASD/LANL: Warm Linac

The CCL hot model was disconnected from the high-power RF test stand and the JLab prototype power couplers were connected. After 3.5 days of conditioning, RF power to the coupler was at 350 kW. (WBS 1.4.1.1)

The latest estimate for the testing of the first 402 MHz Marconi klystron for SNS is October 22 - 26. (WBS 1.4.1.1)

The long-overdue Litton R&D klystron is making 2.5 MW peak power at 6% duty factor and low efficiency. The Litton lead engineer decided to take the klystron out of its socket, and reconnect the second harmonic tuner to its motor drive, and to move from two solenoid power supplies to six, to allow him to optimize the magnetic field. These ideas were good. The klystron now is running at 10% duty factor, the efficiency is over 60%, and they are using six magnet power supplies. (WBS 1.1.4)

An SCR on the SNS prototype high-voltage converter modulator (HVCM) failed during system turn on. Our attempts with snubbers and chokes so far have not been successful. The vendor was called and will be on site to install 50% higher voltage SCRs. Meanwhile, the test stand is operating well with the BMEWS power supply. (WBS 1.4.1.2)

The mounts for all of the DTL drift tubes are complete and will be shipping next week. All of the drift tube bodies for Tank 3 have been freeze fitted and are back at the welder. The diverter stems for Tank 3 are also at the welder and will be sent out for copper plating in the next couple of days. The PMQ drift tubes for tank 3 appear to be on schedule. (WBS 1.4.2)

The forged and rough-machined DTL end walls have been shipped to the fabricator for the final machining. We inspected them last week and found everything in order as shown in the following images. WBS (1.4.2)



Shipping Containers
with Forged End Walls



Rough Machined End Walls



Serial # on Rough Machined End Wall

The fabrication of the DTL tanks is moving forward. At this stage, all of the tanks have been rough machined and the vendor has two of the tanks back from stress relief. The final cuts on the ID of tank 3B should be completed this week. The vendor has successfully completed the prototype cuts for the drift tube sockets and is currently working on the process for cutting the dovetail o-ring groove for the drive iris. (WBS 1.4.2)



Rough Machined Tank Illustrating the Machining for the Cooling Channels and Drift Tubes



Prototype Cuts for the Drive Iris O-ring Groove with the Rough Machined Tank in the background

The RFPs for the DTL post couplers are back and are under evaluation. (WBS 1.4.2)

Preparations were made for the CCL FDR next week. We were instructed by ASD to provide a video conferencing link and will do so. (WBS 1.4.4)

We received the report from the SNS Beam Diagnostics Advisory Committee from their July 18, 2001 Linac D-Plate PDR Review. (WBS 1.4.5)

Work on the ETC exercise is nearly completed. The largest variance, to date, remains the extra labor hours needed for ORNL installation of DTL and CCL mechanical systems. (WBS 1.4.6)

ASD/JLAB: Cold Linac

The third field installation coordination meeting with SNS staff was held. Design of the field installation package continues.

Fabrication of remaining transfer line components continues.

Medium- β cavity #2 has been installed in the vertical dewar and cooled down.

Measurements on medium- β cavity #1 have continued, to determine the effect of various stiffening techniques and further assembly on Lorentz force detuning, and to benchmark the finite element analysis. The cavity in the helium vessel, without a tuner, has a predicted detuning coefficient of $-21 \text{ Hz}/(\text{MV}/\text{m})^2$. The measurement was $-18 \text{ Hz}/(\text{MV}/\text{m})^2$. The predicted value with a dummy tuner installed is $-5.2 \text{ Hz}/(\text{MV}/\text{m})^2$, while the measured result was $-5.6 \text{ Hz}/(\text{MV}/\text{m})^2$. See figure.

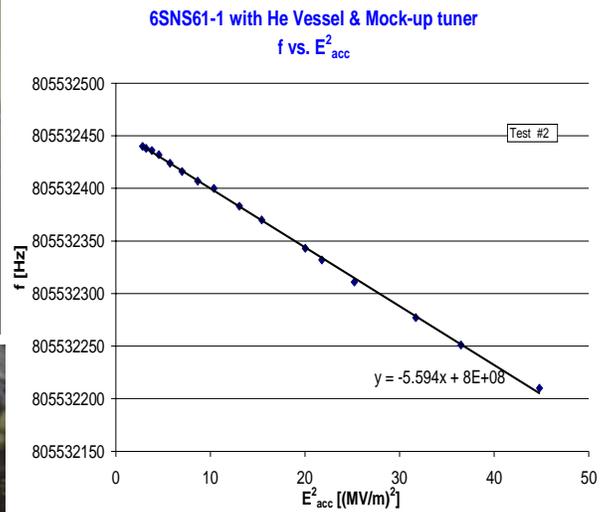
Fundamental power couplers are under test at Los Alamos. The conditioning of the pair presently being processed is proceeding normally.

HOM couplers have been successfully welded on to single-cell cavities of both types. See photo.

The contracts for the production of the cavities and the niobium for the end groups have been awarded. Procurement of the prototype and production stands, liquid level probes, silicon diodes and pressure gauges is underway. The first article tuner has been received.

A minor deviation was found in the QC inspection of the helium vessels. The deviation can be worked around in the prototype, but the vendor had been notified so that this can be avoided in the future.

Installation of infrastructure support for the RF test stand continues. Mark Champion, responsible for system integration of the test stand for SNS has been visiting at JLab.



$$K_L = -5.6 \text{ Hz}/(\text{MV}/\text{m})^2$$



ASD/BNL: Ring

Work continued on the "ETC" for all WBS 1.5 systems.

Work continued on year-end planning for the FY01/02 closeout and transition, including a review of APPs and phase funded procurements for the first quarter of FY02.

Preparations were made for the upcoming ASAC review.

Bill Weng submitted an MOA proposal to Norbert Holtkamp outlining BNL manpower support after handoff.

With the help of our Purchasing Department, Bob Lambiase sent out a request to all potential bidders asking them to include a 1.3 GeV option for the Medium Range Power Supplies. Bids are due August 31.

During our weekly production meeting with Danfysik, we were informed that a prototype 27CDM30 magnet has been shipped to BNL for inspection, testing and approval.

Controls:

With the exception of WBS 1.9.5 (Ring Controls), the ETC for all parts of WBS 1.9 were completed and delivered to the project office. WBS 1.9.5 has been submitted to the project controls team at BNL.

PPS backbone cabling requirements have been confirmed with Conventional Facilities.

The Network Final Design Review has been set for 9/17/01. A dry run will be arranged for 9/6/01.

The first batch of production Power Supply Interface units has passed their acceptance test, and BNL has approved partial delivery. The first group of 20 units is expected in the next week or two. Power Supply Controller units are also in production.

A Timing Slave board has been received, and a driver is being written at BNL.

Bumpless transfer between the IOC and PLC has been demonstrated in the controls laboratory for the CHL cryo management system.

Enhancements to the Ethernet-connected oscilloscope program at LBNL have been implemented, and planning has begun for software support of emittance scanning.

ASD/ORNL: Integration

Installation Support

Accelerator Physics

Jeff Holmes, A. Fedotov and S. Cousineau visited LANL to participate in experiments at the PSR. In particular data was taken to compare to the simulation model, and test ideas on halo production. Also time was spent observing machine operation.

A draft note is prepared on the radiation levels recently measured at the LANSCE DTL linac and scalings to SNS conditions. This information is being used in considerations of shielding for the SNS front-end and first DTL tank area.

Magnet measurement requirements have been distributed to the ORNL and BNL magnet measurement groups. The magnet measurement groups are formulating a plan to meet these requirements.

Operations

Ion Source Group

Antennas which were previously vacuum fired at ORNL M&C were coated by Cherokee Porcelain.

Cherokee Porcelain coated also 3 antenna of transverse design. This design is promising as the electrical peak field is reduced by a factor of three as calculated by Yoon Kang.

Sachin Babu started to work for us. He will continue some of the work done by Rahul Raunihar and Sonali Shukla.

RF Group

Mark Champion has been at Jlab, getting up to speed for coordinating the HPRF test stand. Hengjie Ma is getting ready to spend next week at LANL getting into the LLRF system. Sang-Ho and David Anderson are making good progress on the Power supply and crowbar for the Jlab HPRF system, they are doing all that can be done while waiting for parts to be delivered, in October. David will do model studies of the SCR rectifier section for the Reass pieces power converter, the section that's failing often now. This rectifier section contract has not been made so tighter specifications and specific recommendations can be included. I'm moving to rat's next week. We are setting up a LLRF video conference once a month to keep signals, cables, connectors etc. from becoming orphan and to discuss any LLRF issues, 1st conference Sept. 17, at 11:00 am EDT. Yoon is at LANL for coupler testing; testing did not go smoothly because of a SCR failure in the Reass pieces rectifier section. A second set of couplers was to be sent to from Jlab to LANL for testing but the windows were bad, they will have to be reworked.

Due to recent failures of HVCM prototype at LANL associated with the SCR converter, ORNL has begun to develop a detailed PSpice circuit simulation model to correlate with the prototype circuitry. It is anticipated that this tool will be useful for evaluating the prototype and production converters, particularly the equipment's ability to survive transients and SCR commutation events.

Cryo Transfer Line Group

We have completed the 3rd of 4 Helium supply transfer lines that connect the CHL to the tunnel.

We are assembling an in depth installation schedule for the CHL.

Mechanical Group

Magnet Measurement Group

Power Supply Group

Survey and Alignment Group

Beam Diagnostics Group

LBNL report:

Required dates for diagnostic system components have been clarified.

Components for the offline emittance scanner have been identified. Although lead times are tight, the system should come together just in time for RFQ measurements in November.

Work continues on testing of the link interface.

LANL beam diagnostics report:

WSs: Revisions to the PC board for the wire scanner electronics are underway. A new board is expected in a couple of weeks. The SCL actuators drawings have been checked and corrected. We hope to place the order for the

prototype next week.

BPMs: We are working toward delivering a PCI motherboard to BNL around the end of September. Note this is a success-oriented schedule. Matt Stettler has solved a DMA transfer problem and is now troubleshooting the FIFO enable lines. The new DFE PC board arrived this week. It will be stuffed and tested ASAP. The DTL pickups are now expected to arrive at LANL the week of Sep. 3. We are now planning to use Kapton coax cables, rather than the Times LMR100A cable, for the cabling within the drift tube stems. The Kapton cable is about 100 X more rad hard and has similar electrical properties. The polyethylene replacements for the Teflon inserts in the SMA connectors have been fabricated and are ready to go. Bids for the CCL and SCL pickups have arrived and are being reviewed.

CMs: The order for the DTL CM pickups was placed last week.

D-plate: Detailed design work continues. Engineering design work on the beam stop should pick up again after the CCL FDR next week.

ORNL-SNS beam diagnostics report:

All of us at ORNL are working on Hand-off criteria. We also prepared the Diagnostic installation document as promised on time. Tom and Saeed are working on the Emittance scanner software and hardware requirements with LBNL. Ernest is setting up the control system at SNS to test the EPICS and provide support for the application program required by the RFQ commissioning in November. Dave has completed version one of the rack assignments for all diagnostics.