

Accelerator Systems Division Highlights for the Week Ending November 1, 2002

ASD/LANL: Warm Linac

HIGH-POWER RF (WBS 1.4.1.1)

Accomplishments this week: (1) Successfully tested two 805-MHz, 550-kW load; (2) began heat run on 4th 805-MHz, 550-kW CPI klystron; (3) packed and shipped the following high power tested components to ORNL: one 402.5 MHz klystron, one 550 kW 805 MHz klystron, two 402.5 MHz circulators, one 402.5 MHz glycol load, two 550 kW loads, two 550 kW klystron magnets, 402.5 MHz klystron lifting fixture and alignment kit, one 402.5 klystron MHz socket, two 805 MHz klystron sockets, seven roll-around x ray shields for ORNL beam stick.

Concerns & actions: (1) Marconi klystron #5 failed the site acceptance tests due to high ion pump current caused by real or virtual vacuum leak. Marconi is examining recent changes in tube design. Tube will be shipped back to Marconi immediately after the #6 arrives later in month; (2) Increase in mean time to repair circulators and loads caused by replacing cooling hoses with hard piping – LANL communicated concern to ASD RF Group; (3) Installation of untested high power RF equipment at ORNL – received 90-day look-ahead schedule from ASD.

HIGH-VOLTAGE POWER CONDITIONING (WBS 1.4.1.2)

Accomplishments: (1) Bill Reass was at SNS for 3rd week in a row; ASD/LANL accomplishments included: final check of tank basket assembly and installation in oil tank, oil tank placement under safety enclosure, earth system checkout, IGBT switch plates installation, capacitor bank installation and wiring, tank filled with oil (no leaks), 13-kV substation energized, personnel and equipment safety interlock tests, interface checkout (PPS, TPS, Z-tec Rack, SCR, Modulator, etc.), SCR controller energized into open and dummy loads. *Congratulations to ASD David Anderson on producing the first output pulses from the HVCM late today!* (2) Reass was also at Dynapower last weekend and this week to conclude low-power testing of the second HVCM – results were satisfactory.

Concerns & actions: (1) Safety of 13-kV substation at SNS – we asked that electricians get the substations bolted tight; (2) SCR controller safety - electricians need proper equipment for when we open the SCR controller. We need clamp-on earthing jumpers to ground out the 1 MVA 2100 volt input line. Concern was transmitted to SNS. (2) Rust detected in two HVCM tanks delivered to SNS - will return tanks that exhibited rust to Dynapower for repainting. Dynapower agreed to assume warranty responsibility should paint problems arise on other tanks.

LOW-LEVEL RF CONTROLS (WBS 1.4.1.3)

Accomplishments: (1) A High Power Protect Module (HPM) Rev D unit was shipped to ORNL. It has been installed in a crate with an associated IOC and the required EPICS software. There are no indications of any problems so far; (2) HPM REV E was released for production of 10 units (to cover DTL as well as test units at LANL, LBNL & JLAB). This should be the final configuration (production release) if there are no changes in the requirements. REV E will be interchangeable with REV D boards: the minor changes were to improve manufacturing and testing; (3) Design work was started in LANL ECAD shop for a VXibus extender card to be used for acceptance test and troubleshooting. Card incorporates current monitoring and protection features that are not available in a ready-made commercial product; (4) Held an LLRF architecture review meeting at LBNL last Friday and Saturday. Several promising architectures identified and we are planning a meeting next week to select the board for the ultimate solution. A document listing the requirements and guidelines for this system has been written and emailed to participants; (5) Engineers are actively investigating potential digital and analog components in preparation for this meeting; (6) Developed first draft of a detailed plan and process for producing the ultimate LLRF system. This includes milestones, reviews, documents, test plans, etc.

DRIFT-TUBE LINAC (WBS 1.4.1.2)

Accomplishments: (1) Drift tube repair of the Tank 1 drift tubes continued at ISYS. Four more drift tubes were welded with the qualified "ring repair" method. This brings to twelve the number of Tank 1 drift tubes that have had the ring weld repair completed. For these twelve drift tubes (with 24 rings) only one weld exhibited any eruption. This one case was treated to one more pass that we believe sealed the eruption. The first four of the repaired drift tubes were machined to final profile and sent back to ISYS for leak checking. All four passed the pressurized leak check successfully. (2) First attempt test coupons for the Tank 3 weld repair were welded at ISYS this week. The results look better than originally anticipated but will need further development to assure that we will have a surface that will cleanup adequately. (4) Process drawings for the tank 1 and 2 drift tube manufacturing were developed and a meeting was held with Coronado Machine (CMI) to get their input. Good progress was made with the hope that at

least the first steps will be completed next week to allow us to negotiate with CMI to restart the Tank 1 manufacturing. (5) ASD/LANL team completed copper plating of Tank-4 at GSI, Darmstadt.

Concerns & actions: (1) schedule recovery - Meetings with Hanford and LLNL were held this week to assess the possibility of qualifying additional e-beam welding capability. Both Labs appear to be promising and further discussions are continuing; (2) a leak was found in the final leak test of the Tank 3 iris. It occurred on the port for the iris NEG pump. Discussions took place with the braze fabricator this week looking at the various options to repair the leak. The problem does not appear to be too serious. We expect to have a repair plan in place next week; (3) inadequate QA and vendor surveillance at the braze house (near Philadelphia) – requested ASD take leadership role; (3) DT vacuum checking at ISYS on Nov 7-8 – requested assistance from ASD.

COUPLED-CAVITY LINAC (WBS 1.4.4)

Accomplishments: (1) Flange design modification for the CCL waveguide transition was finalized with ACCEL. This design modification replaces the O-ring system with a conflat-style joint as discussed at the design review in Germany in January; (2) preparation of revised manufacturing fixtures for the segment endwalls proceeding at MCE - expect that these modifications to the process will produce the required hardware for the December segment tuning meeting at ACCEL; (3) photos from ASD/LANL visit to ACCEL last month are inserted below.

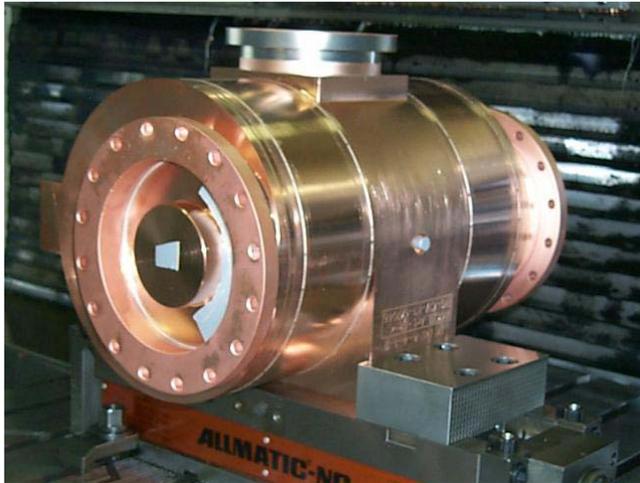


Fig. 1 Final Machining: Bridge Coupler #44



Fig. 2: 1/2-cell measurements on 1st CCL segment



Fig. 3: Tuning measurements on bridge coupler #44

ASD/JLAB: Cold Linac

JLAB shipped the turbine water filter system, 2K cold box variable frequency drives (minus two damaged during shipment from the vendor), 2K cold box magnetic control panels, cold compressor spares, utility vacuum pumps and LN2 level controls for cold traps, moisture gas analyzers, transfer line turn-around heater control panels and instrument cabinets.

Cavity MB03 has had its helium vessel welded and is being prepared for final qualification tests. MB02 is being returned to the VTA for a retest to resolve some inconsistencies in the original test. A third test stand is being prepared to expedite production.

ASD/BNL: Ring

Jie Wei, Mike Nekulak and William McGahern traveled to SNS/OR this week in preparation for the upcoming DOE Review.

Bill Birkholz and George Mahler visited Danfysik and Tesla this week to review coil brazing issues and the readiness of Tesla to start their phase II quad (21Q40) production run.

Wahfun Eng is at IE Power for a design review of the injection kicker power supplies.

Prep work continues for shipment of the #1 half-cell to SNS/OR. A carrier has been contracted for pick-up at BNL on Tuesday, Nov. 5. Magnet acceptance, travelers, and QA documentation are under final review. The assembly weighed in at 30, 500 lbs. w/o lifting equipment.

Magnet assembly and measurements:

- Ring dipole measurements – All have been measured and shimmed (16 left + 16 right + 1 left spare). Three (right) remain to be final measured; three “borderline ok” to be re-shimmed and remeasured.
- 21Q40 – nine measured to date. Measurements are currently paused.
- 26Q40 – testing of pole chamfer mod #2 is in progress. The Stangenes’ deviation report on the pole piece width has been reviewed and accepted.
- 30Q58 – measurements are complete. The pole lengths will be shortened by a total of 43 mils to reduce the duo-decapole component. On this basis, BINP has been advised to proceed with the production units.
- 21CS26 – measurements underway; 8 are complete, one remaining. One of the eight has a low transfer function that is being investigated.

Controls

The Controls Group, and in particular the Personnel Safety Team, was deeply involved in the resolution of remaining Accelerator Readiness Review (ARR) issues which led to a successful result early this week. The Safety Team then participated in all of the efforts to complete the Personnel Protection System (PPS) certification, which could not be completed without successful operation of the ion source. (You can’t test turning things off until you can turn them on!) The PPS Certification was completed at the end of the week, the keys were handed over to Operations, documents were signed and commissioning can now begin. This is a great milestone – congratulations to Paul Wright and the PPS Team.

The EPICS archiver was instrumental in identifying one of the problems that turned up during the certification procedure. Regular use of the archiver will reap dividends.

Considerable progress was made on the testing and EPICS integration of the LBNL Low-Level RF Control system to be used for the MEBT rebunchers and, eventually, the RFQ. All five systems are now installed and operating from the Front End control room.

Controls Group activities at the site have become so many and so complex that it has become necessary to initiate a daily series of controls installation meetings to plot out each day’s activities and, on Friday, the next week’s.

Testing of the MPS system proceeded in the controls lab, and preparations were made to install the cables that will enable the MPS to shut off beam next week. An integration test between the MPS PLC, Timing System Master, and MPS Master was completed. This allows the timing system to determine the Machine mode from the PLC and transmit the data on the RTDL. The MPS Master IOC completes the loop by writing back to the PLC to set the machine and beam mode. The timing master also adjusts the maximum beam width by sliding the timing references of the RF plasma and the RFQ.

Work proceeded at LANL on the analog temperature feedback loop that operators will use during NEG pump regeneration.

Plans were made for the visit of the LANL vacuum and RCCS controls engineers to ORNL the week of December 2. Handover training and some testing is planned.

Installation of communications cables in the DTL rack rows continued, and the backbone Title II design was issued CFC.

A contract with Sverdrup-Tullahoma to complete the mercury loop cabinet and instrument wiring design should begin in November 2002. This work is scheduled to be completed by April 2003.

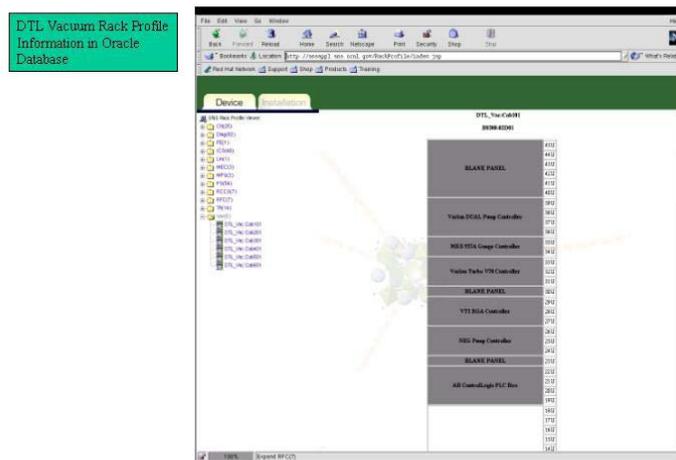
The Controls Team met to address the potential conflict between active participation in the November 19-22 EPICS Collaboration Meeting at Jlab and fully supporting commissioning. A car pool was arranged, which will allow flexibility and a rapid return if someone is required at the site. In addition, team members from BNL and LANL will also participate.

At BNL, one of the ring cavities was successfully driven by a signal from the Low Level RF system. For this test controls had only a very limited involvement. For future tests, however, EPICS screens will be used to control and monitor the DSP-based feedback loops.

A series of tests were made over the past weekend for FE vacuum IOC and PLC reboot or power cycling. As a result of these tests, the following actions will be taken:

1. UPS will be added for the FE vacuum IOC and PLC immediately
2. A software gauge noise monitor will be added to detect and alarm in the case of gauge reading stalling
3. The Save/Restore mechanism and the allocation of tasks between PLC and IOC will be revisited as part of a future modification.

The DTL Vacuum rack profile information and the FE beamline vacuum device data was placed in the Oracle database this week. A sample rack profile from the database is shown below:



Installation

Accelerator Physics

S. Valero, one of the DYNAC code co-authors, is visiting for two weeks to work with E. Tanke to prepare the code and necessary input files for use with the SNS linac.

The SNS baseline parameter list has been updated to include a few minor changes.

Thin lens and error modules have been developed for the ORBIT code, and these are being tested and benchmarked.

The measured Ring RF impedance has been evaluated using ORBIT. The impedance does not produce longitudinal instability with a safety factor of about 100.

Operations Group

On Monday October 28, we held a closeout meeting with the ARR Committee. In the meeting all issues raised at the ARR were closed and the committee recommended that DOE grant permission to begin commissioning of the Front End.

On Tuesday October 29, Les Price, the SNS DOE Project Manager granted DOE Authorization to begin commissioning of the Front End.

At approximately 16:30 Friday November 1, the PPS phase 0.0a - Ion Source Only - was "certified for operation" by the PPS and Operations groups. All systems operated as expected.

Following the certification of the PPS for Phase 0.0a, the SNS OPM 6.E Operational Approval Checklist for Front End Systems was signed by all approvers in Norbert Holtkamp's office. A small celebration, including picture taking, followed. This signoff completes the transition from the installation and testing phase to the commissioning phase of Front End Systems

The PPS keys are now held by the Operations Manager and Deputy Operations Manager.

We have assisted the PPS group in preparation for certification of the PPS We prepared for presentations the upcoming DOE Review.

We are preparing to begin rotating shift coverage of Front End Commissioning next week.

We have worked on the ASD Spares list for the DOE review

We are preparing for laboratory space meetings with CF, XFD and the Project Office on CLO Lab and office space.

Ion Source Group

The DTI 70 kV supply (minus the fast in-line switch) arrived on the site late last Friday and therefore was installed on Monday morning. After all required connections were properly made, we were able to apply up to 67 kV to the ion source.

Preparing for the PPS certification on Monday afternoon, the high voltage of the RF amplifier arced and disengaged the circuit breakers within a second after being turned on. After extensive testing of various components involving our hot spare stand, it became clear that the 15 kV capacitors in the 12 kV plate circuit were breaking down. The marginal rating was enough of a concern for the manufacturer QEI to issue a service bulletin on October 11, 2001, requesting the modification of a high voltage wire conduit and 2 doorknob capacitors. The modification was considered mandatory, to be implemented as soon as possible. The bulletin supplied all required parts, including the new 40 kV and the new 60 kV doorknob capacitors, which somehow never got installed.

After the arcing 15 kV capacitors were replaced with the recommended 40 kV and 60 kV capacitors scavenged from the hot spare stand, it became possible to switch on the high voltage of the RF amplifier and to raise the RF power level to about 10 kW before the PPS fuse interrupted the AC power and terminated the testing.

Frequent discharges and a water leak in the matching network initiated the implementation of a range of arc reduction measures, significantly reducing the arc rate. By Friday the source operation became remarkable stable, logging about 5 hours at 65 kV with 5 Hz of 200 us long 20 kW RF pulses, with about 1% reflected power. The only remaining problem is RF amplifier plate voltage, which trips roughly once an hour due to a fault.

After surviving the PPS checkout the ion source became an accelerator.

We have created and presented a module and checklists to train the operators in the standard operation procedures of the ion source. Practical training starts on Tuesday.

Mechanical Group

Magnet Systems

#7 HEBT Dipole has been mounted on the measurement stand and efforts started towards mapping.

We have re-brazed 16 12Q45 Quadrupoles, and pressure checked 7.

We have 28 out of 33 12Q45's delivered.

All of the "magnetic" coil clamps were annealed. So far we have made field measurements on 8 12Q45's and the spread in GL product has gone from 3.2% to 1.5 %. So, we are still puzzled by this spread and will investigate further.

Vacuum Systems

Linac HPRF

After many trying moments with the SCR controller, including replacement of major control PCBs, questionable connectors, etc., we finally got the unit operating into a resistive load. At low voltages (few hundred volts), the unit regulated well. We then connected the HVCM to a resistive load (1400 ohms), and were able to generate the first pulse out of the RFQ/DTL1/DTL2 modulator! We stopped with an 11 kV, 1 ms pulse running at 0.2 Hz so as to end the weekend on a good note. There were a few problems with the readbacks into the control PLC unit which were not working and/or required calibration, but we expect to fix those next week when the LANL team arrives. Next week, we plan on increasing the voltage to the full 140 kV output and operating up to 1 Hz to perform the final portion of the "factory" acceptance test on the unit. After that, we'll perform a crowbar test on the unit and convert the load to a diode (planned for Wednesday).

Many thanks to those who have worked so hard over the past few weeks on the unit, including the ORNL technicians, visiting Russian scientist, and the entire LANL team. We still have a long ways to go, but so far, so good.

RFQ Klystron is waiting for HV, and a LLRF system. HVCM need to Run and a LLRF system should be installed by the 4th. We are shooting for the week of the 11th for producing RF, once that's accomplished we can connect to the RFQ and start conditioning.

Linac LLRF

A LLRF Control System brainstorming meeting was held on 10/25/2002 at LBNL. In addition to Champion, Ratti, and Shoae, the following technical experts were in attendance: Doolittle, Stettler, Hovator, Regan, Prokop, and Corredoura. The purpose of the meeting was to present and discuss ideas for the design of the Feedback Control Module that will be implemented for the CCL, SCL and HEBT.

The LLRF Advisory Board met on 10/29/2002 at Oak Ridge to discuss the LLRF Development Plan.

The new System Requirements Document for the LLRF Control System has been issued.

The LLRF Development and Production Plan has been issued.

Mark Champion and Ricky Campisi co-chaired the Workshop on High-Power Couplers for Superconducting Accelerators. The workshop was held 10/30 - 11/01/2002 at Jefferson Lab. Approximately 75 colleagues from around the world participated in the workshop. See <http://www.jlab.org/hpc2002> for more information.

Electrical Systems Group

Survey and Alignment Group

We researched and experimented with different observation patterns and procedures for precise leveling through the linac floor monuments. Technicians completed a substantial portion of the precise floor monument elevation resurvey. Processing of the data has begun. We also determined the index correction for two invar bar-code scales.

We wrote a report summarizing the longitudinal and cross-sectional deformation of the linac tunnel floor due to re-compression settlement. We recommend that the remaining backfill be completed as soon as possible. This report can be found on the pueblo users drive under Error\Linac_Floor\Linac_Floor_Epochs_1-5.pdf

The fiducialization of another HEBT dipole was completed.

Re-verification of RATS EDM (Electronic Distance Measuring) baseline was completed last week. This baseline is used regularly by many of the site surveyors.

The fixture for the manual setting of the Q45 quadrupole magnets in the magnet-measuring machine is finished and will be ready for installation next week. This fixture will enable the magnet measurement group to set the quadrupoles on the magnet-measuring machine independent of needing Survey and Alignments support.

The Survey and Alignment database is being updated to include the 1.3 GeV cryomodules and warm section components.

A meeting with Target Group has led to the reestablishment of the target center. Target Group, along with the physicists, is looking at the impact of moving the target center 0.200" to the North and 0.200" to the East.

Rewrote eleven JHA's after input from the S&A team. These JHA's included indoor and outdoor leveling, target liner, quad-magnet survey, night survey work, etc.

Cryogenics Group

CHL: The 4.5K cold box platform has been assembled and the Linde technical team is installing the remaining equipment. The JLAB shipment of turbine water filter system, 2K cold box variable frequency drives, 2K cold box magnetic control panels, Cold Compressor Spares, utility vacuum pumps and LN2 level controls for cold traps, moisture gas analyzers, TL turn-around heater control panels and instrument cabinets have arrived and are being placed in storage at RATS 2.

Tunnel: the 3.5-inch supply pipes in the east end of the tunnel have been welded and are now being cold shocked. All the return support stands have been installed.

Transfer lines: The east and west supply end boxes are completed and ready for delivery to the tunnel on Monday, along with two return modules R-MB11/HB1 and R-HB2/HB3.

Beam Diagnostics

Laser profile monitor design is progressing very well. The initial results of vibration measurements made by Dan Stout and James Kelly show very little vibration at the entrance of the laser mirror box on HEBT ceiling. Dan reports the following preliminary analysis:

For frequencies below 10 Hz, the peak of 2.4 micrometer [RMS] is observed at 1 Hz. For frequencies above 10 Hz, the RMS vibration drops to less than $2E-7$. This is certainly good news.

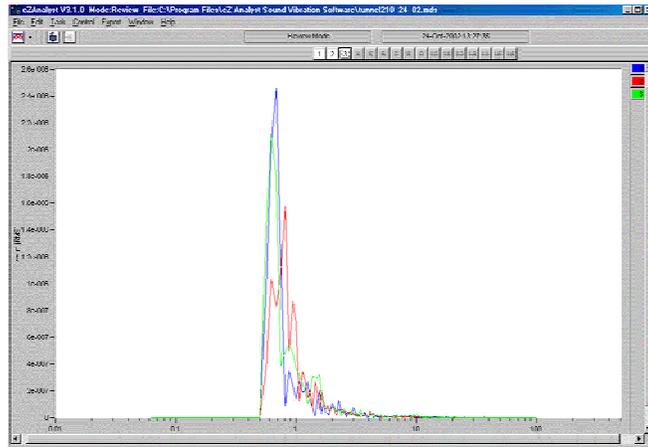


Figure 1) Red=longitudinal axis, Blue="x" direction and Green is in "y" direction.

The design of the optics box is almost finished, the manufacturing drawings will follow. The mechanical group is working hard to complete the design of the MEBT laser test system to measure the BIG requested by AP group. We have ordered some of the optical lenses and the laser table for this test. Jim Pogge is working on the laser trigger system. To understand the input frequency coming from the LLRF master oscillator, the LLRF group and the diagnostic group with support from Tektronix engineer setup a jitter test comparing the 2.5 MHz from the LLRF Roscoe box is about 200 Pico-second which translates to about 60 degree's phase jitter at 805 MHz. Of course, this is one box and does not represent the final product. The first version of Jim Pogge's laser circuit is showing less than 16 Pico-second [RMS] at 2.5 MHz. Our goal is to have less than one Pico-second jitter. Craig Deibele and Jim will work on that. This circuit can also be used for the Fast Faraday Cup and Wim's differential current measurements necessary for the SCL laser data acquisition.

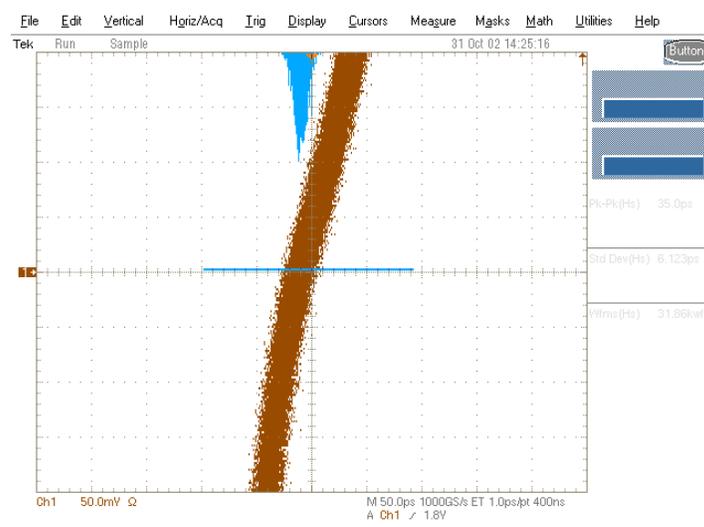


Figure 2. Jim Pogge's trigger box jitter measurement at 2.5 MHz.

Wim, Craig Deibele, Any Webster with an enormous support from the Mechanical group have come up with electroplating the 32 micron carbon fiber for the MEBT wire scanners. They have successfully demonstrated the electroplating and soldering the plated carbon to a copper wire. The rapid development is also attributed to a lot of support from LANL and BNL diagnostic teams. We would like to express our appreciation to the SNS mechanical group and the partner labs' teams.

Dave Purcell is working on video imaging for the MEBT view screen and the Laser system. He is also compiling the D-plate list of cable's necessary to be pulled. The SNS EE group is managing and leading this effort. The diagnostic group is providing the technical assistant to DB electricians. The first D-plate multi-wire video cable is in place. Teresa Toomey from EE group is the lead engineer organizing the diagnostic cable pulls with the DB electricians. David Rogers from LBNL and Carl Lionberger from the controls group have setup the neutron detectors loaned to us by Berkeley for the MEBT in the diagnostic lab. EPICS is serving the data from the detectors. Carl and Saeed will install the system on site next week.

LANL beam diagnostics report:

BPM pickups: Fabrication is complete on all but two DTL pickups. We are waiting for the new SMA vacuum feedthroughs to complete the fabrication. Mapping and electrode-to-feedthrough pressure tests are complete on all the CCL pickups. Mapping and testing the SCL pickups will begin soon. The D-plate DTL-style BPM is now at LANL for mapping and testing. After our tests it will be welded to the DTL to D-plate transition spool piece.

BPM electronics: Work is underway to refine the clock circuit layout, power supply regulation, and power supply isolation. These modifications on the PCI motherboard should reduce the electromagnetic noise and bring into specification the accuracy and resolution of the beam phase measurements.

WS actuators: The prototype 3-inch and 6-inch stroke actuators successfully passed the vacuum test after being cycled about 2000 times. We are now preparing to measure their positioning accuracies. Work is underway to add the forks, collets, and signal cable wiring to the actuators for DTL-1 and the D-plate. Work is in progress to modify the CCL to SCL transition region beam box for conflat flanges needed due to its proximity to the SCL. BNL is investigating the possibility of using a larger beam box for the HEBT that will allow the tines of the wire scanner fork to stay out of the beam pipe aperture.

WS electronics: Work is in progress to add a commercial daughter card with a USB port to monitor the HV bias and power supply voltages in the signal processor chassis. This upgrade will allow remote monitoring of the health of the signal processor and help troubleshoot system problems.

D-plate: The beam stop acceptance tests are now scheduled for next week (week beginning 4/Nov). This is the last component needed for the system vacuum checks. Fabrication continues on the water system manifolds.

ED/FC: Fabrication continues on the air actuators for the DTL-1 and D-plate units. New air cylinders had to be ordered due to a design error carried over from a previous design that we had cloned.

BNL beam diagnostics report:

General: Preparations for the DOE review continue.

1.5.7.1 BPM: Five units of 26cm BPM PUEs were delivered to the Vacuum Group. Five additional 26cm PUEs have been sent out for brazing. The diplexer resonance has been traced back to a self-resonance in the coils, and a fix is being tested. Reviewed artwork real-estate difficulties (four channels will not fit on a single board). The IFE is now undergoing further review, and we are looking into a two-board design. TI has announced that two ICs used in this design will become obsolete. We are looking into substitutes.

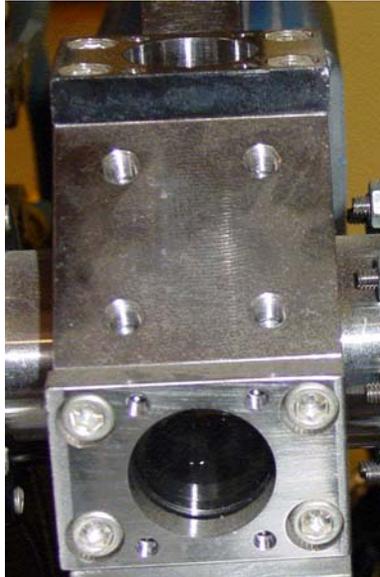
1.5.7.2 IPM: Detailed design continues. An additional (very competent) mechanical engineer has been assigned to this design effort. Awaiting drawings for a mounted MCP of dimensions 140 x 30mm from Burle. Controls group has assigned an engineer to the control system for the IPM/luminescence profile monitor gas system. Development plan for luminescence monitor is progressing.

1.5.7.3 BLM: Efforts continue with the electrical design group on the schematics and PCB layout of the AFE module and back plane, MPS comparator module, and detector PCB. Began ordering discrete parts for these systems. Detailed cable information and connector ordering information has been given to ORNL for the February DTL run. PCR effort continues.

1.5.7.4 BCM: Reviewed software changes to accommodate difference current measurements and EPICS. Added calibration software to automate the calibration process. Simulated testing with calibrator at ORNL to help identify problem with one transformer. The transformer appears to have been connected to the wrong windings (interchanged calibrate and output). The calibration certificate for our current calibrator measurements has been located and will include in the BCM traveler. TI has announced that two ICs used in this design will become obsolete. We are looking into substitutes.

1.5.7.6a Carbon Wire Scanner: Prepared and sent a maintenance kit to ORNL for repairs to the broken MEBT wires. Shipped all parts for the spare WS actuator to ORNL. Plans are in place to send the lead tech to ORNL next week to help with repairs. Waiting for a vendor's cost estimate for the alternative beam box design to accommodate the 6" wide LANL fork in the 5"OD beam pipe in HEBT

1.5.7.6b Laser Wire Scanner: Preparations for testing at 750KeV continue



From the picture above, you can see the exposed o-ring.

Craig Deibele and LANL engineers worked on MEBT BPMs and phase matching the Helix cables. The BPM electronics that was sent to ORNL from LBNL was non-functional. The preliminary conclusion points to excessive dust and loose connection. Matt Stettler and John Power think that they have found the problem but they need the 2.5 MHz reference from the RF group. We expect to see that on Monday.

Wim Blokland and the Wynn Christensen with help from ORNL technicians installed all five MEBT wire scanners. After biasing the wires, they discovered that all wires require repair due to shorting to ground.

Dave Purcell has all MEBT diagnostic edm screens ready and 100% working, PVs are being published for the physics use and remote access to NADS are available. He has a working bar-code program that is implemented for the MEBT. All TDRs and diagnostic comments can be stored to Oracle via his system. We will use his program for BPM cable installation from now on.

Wim Blokland and Dave Thompson from the controls had a productive meeting with Matt Stettler and Lisa Day on implementation of shared memory. The future revision will provide compatibility with both LANL and ORNL APIs. This will provide LANL with a smooth migration path to IOC core.

Craig Swanson is working on the timing card. He reports the ETC board is now recovering the EL and RTDL. The PCI bus is also communicating with the Altera chip. He is working on enabling the PCI bus to read a set of registers that stores the RTDL frame and data. He expects by the end of next week he will have the RTDL being fully recovered onto the PCI bus.

SNS/ORNL hosted an ICFA Workshop on Diagnostics for High Intensity Hadron Beams. Feedback from the participants was positive and several collaborations may result. John Galambos and Tom Shea are preparing proceedings that will be published on the workshop website and summarized in the next ICFA newsletter.

A meeting of the LLRF Advisory board has been scheduled for next Tuesday. The board will discuss the following: current requirements document, latest development plan, proposed budget, and results of the Berkeley meeting. The group's first report will be drafted next week.

The diagnostics group is helping operations prepare a response to last week's accelerator readiness review. Requirements for beam accounting have been refined and a proposal is in place to add this functionality to the MEBT BCM system. BNL diagnostics and controls groups have already updated the software. A call-down list is being prepared to support operations. In addition, a group meeting was held to review safety and training policies.

LANL beam diagnostics report:

BPM pickups: Fabrication continues on the DTL BPMs. Contact pressure tests on CCL BPM electrode to feedthrough connection all look great. Mapping is now in progress. We received all the SCL BPMs on 17/Oct. Testing will commence soon. The prototype SCL BPM is being shipped to ORNL for testing and characterization.

WS actuators: Both the 3-inch and 6-inch prototype actuators have been cycled 2000 times. They are now being vacuum checked. Positioning accuracy tests will commence soon.

D-plate: Fabrication continues at local machine shops, and assembly continues here at LANL. All Huntington actuators are now on hand, and work is underway to mount the slit heads, the harps, and the wire scanner forks. Beam stop acceptance testing is now scheduled for the week of 28/Oct. Work continues to prepare packing crates for the D-plate shipment to ORNL.

Misc: John Power and Matt Stettler worked at ORNL this week to assist with installation of the MEBT BPM system. Wynn Christensen graciously agreed to extend his stay at ORNL through last weekend and the beginning of this week to continue troubleshooting the MEBT wire scanner actuators. Mike Plum attended the ICFA beam diagnostics workshop at ORNL this week.

BNL beam diagnostics report:

General: Preparations for the DOE review continue. Three group members attended the ORNL Diagnostics workshop, and participated in preparations for MEBT commissioning.

1.5.7.1 BPM: The base-band IFE is still in layout. The 17MHz diplexer has been bread-boarded. It provides good SWR (<1.2:1 DC to >300MHz), however a resonance at 374MHz due to self-resonance of an inductor was observed and is being corrected. Simulation of Ring beam spectral content continues. Five units of 26cm BPM PUEs have been sent out for brazing. Five additional 26cm PUEs are in assembly in preparation for brazing.

1.5.7.2 IPM: Assembly of Argonne-style electron detectors for testing in RHIC ring (and comparison with CERN style detectors) continues. Detailed design of IPM electromagnets and vacuum chamber is underway. Presentation on the SNS IPM was given at the Diagnostics workshop.

1.5.7.3 BLM: Detailed design of AFE schematic and detector end cap PCB layout continues. We received an estimate from a local vendor of \$130 each, (large quantity) for manufacture and installation of the endcap for the new style detector. We began the effort to purchase 10 of the newly designed BLM detectors from LND for testing and eventual installation in the DTL early next year.

1.5.7.4 BCM: A low current calibrator has been constructed. There seems to be a problem with the second channel DAC. As a result, plan for MEBT commissioning is to have one calibrator channel set to 4.998ma, and the second to 4.066ma. A request from ORNL for changes to software to provide difference measurements during MEBT commissioning is under investigation. Parts for the high current calibration driver have been received. A group member traveled to ORNL to assist with BCM commissioning efforts. Efforts are progressing to accommodate an ORNL request for changes to software to provide difference measurements.

1.5.7.5 Tune: Presentation on the incoherent tune measurement was given at the Diagnostics workshop.

1.5.7.6a Carbon Wire Scanner: A group member assisted in chasing electrical shorts in the MEBT wire scanner system. Preliminary conclusion was that these shorts do not originate in the fork/actuator assembly. Refinement of the MEBT scanner carbon wire attachment method continues. Continuing investigation of alternative vacuum chamber designs in response to the LANL request to accommodate the 6" wide LANL fork in the 5"OD beam pipe in HEBT.

1.5.7.6b Laser Wire Scanner: Still waiting for word from ORNL on the status of and requirements for any laser wire testing they might want accomplished at BNL. Time is getting short. Presentation on a fast, low laser power, low cost laser wire for the AGS LTB line was given at the Diagnostics workshop, and was well received by the participants.

1.5.7.8 Video Foil Monitor: Discussions continue with machine physicists and mechanical engineers to implement the third camera in the VPM system, to monitor the electron catcher. Evaluation of the 'throwaway' IR camera option is progressing with assistance from applied physics group.