RE-INSTALLING THE S800 SCATTERING CHAMBER

D. P. SANDERSON

12-3-04

- ❑ **1.** Close the upstream and downstream gate valves.
- ❑ **2.** Turn off the ion gauge on the experimental apparatus.
- ❑ **3.** Turn off the bias voltage on any internal detectors.
- ❑ **4.** Vent the experiment.
- ❑ **5.** Remove all traces of the experiment from the lower level of the vault.
- ❑ **6.** Turn off the ion gauge on the Lower Dipoles S800 Beamline section and vent.
- ❑ **7.** After venting is complete, force open the gate valve on the end of T5 and then remove its compressed air supply. Bleed the air out of the valve actuator.
- ❑ **8.** Disconnect the control wiring and reach inside the valve and free it from T5.
- ❑ **9.** Remove the beamline bellows between T4 and T5.
- ❑ **10.** Have Scott Hitchcock set up the Jig transit and calibrate it to T5.
- ❑ **11.** Remove the wooden platform to the south of the carriage pivot and all pieces which would interfere with the chamber track.
- ❑ **12.** Re-assemble the steel track for the chamber.
- ❑ **13.** Remove the northern C-clamps and move them to the end of the track.
- ❑ **14.** Reinstall the orthogonal adjusters: the West one moves N-S, the NE one moves E-W, and the SE one moves N-S.

- ❑ **15.** Using a cable come-along, roll the chamber northward until the sockets for the vertical adjusters are about 10" south of the orthogonal adjusters. Remove the ISO-100 blankoff from the roughing line to the roots blower.
- ❑ **16.** Thread the vertical adjusters into their sockets all the way up.
- ❑ **17.** Roll the chamber northward into position above the vertical adjusters.
- ❑ **18.** The old height is written on the side of the vertical adjuster socket. Lower the adjusters until they touch, then crank them down to the proper height using the A1900 custom spanner in the alignment cabinet in the brazing furnace room. Go down evenly, one turn at a time to keep the chamber from tilting.
- ❑ **19.** Remove the track and store its parts in the SE corner of the vault.
- ❑ **20.** Re-install the two ACME threaded bolts on the orthogonal adjusters, that were previously blocked by the track.
- ❑ **21.** Install an ISO-200 alignment target flange on the entrance port with a plastic target.
- ❑ **22.** Adjust the vertical ball mounts such that the entrance flange is at beam height and the bottom of the chamber is level in both directions. Use the 6" Starret machinist's level from the alignment equipment toolbox in the brazing furnace room.
- ❑ **23.** Adjust the orthogonal adjusters to put the entrance flange on the beam axis and use a tape measure to set the downstream hole horizontally to the beam axis.
- ❑ **24.** Recheck the vertical adjustments.

❑ **25.** Install the exitline bellows from the inside of the chamber and set the position along the beam axis to match the CAD drawing by measuring from the inside wall of the chamber to the exitline gate valve. *Alternative high precision method to set this position: Place another Jig Transit off to the south of the chamber and place a pentaprism on the beam axis at the expected pivot point. Set the focus of the T4-T5 transit to infinity and illuminate the reticle from behind. The pentaprism will turn an exact 90 deg. angle. If the southern transit is leveled and views the central pivot target simultaneously while its angle matches the optic axis from the other transit, then it is exactly perpendicular to the beam axis at the central pivot point. It can then be used to position the chamber exactly at the right location along the beam.*

❑ **26.** Reattach the cryopump high pressure hoses and the valve motor electrical connector.

❑ **27.** Reattach the 4" diam bellows to the roughing line to the roots blower.

❑ **28.** Retrieve the Kf-40 hose from the storage rack and connect the turbo roughing pump to the proper flanges.

❑ **29.** Reattach the compressed air line feeding the chamber valves.

❑ **30.** Redo the modicon to turbo pump controller connection.

❑ **31.** Redo the modicon to cryopump thermometer connection.

❑ **32.** Redo the modicon to cryopump vent valve connection

❑ **33.** Reattach the dry nitrogen connection to the cryopump vent valve.

❑ **34.** Redo the modicon to cryopump gate valve connection.

- ❑ **35.** Redo the modicon to turbo pump gate valve connection.
- ❑ **36.** Redo the modicon to turbo pump foreline valve connection.
- ❑ **37.** Redo the modicon to KF-40 roughing valve connection.
- ❑ **38.** Redo the modicon to chamber vent valve connection.
- ❑ **39.** Redo the modicon to butterfly valve connection.
- ❑ **40.** Redo the modicon to (4) Pirani gauge connections.
- ❑ **41.** Redo the connection from the beamchamber ion gauge to its controller cable.
- ❑ **42.** Reattach the water cooling lines for the turbo pump.
- ❑ **43.** Open the water cooling to the turbo and the cryopump and check for leaks.
- ❑ **44.** Start the turbo foreline mechanical pump using the manual motor starter next to it.
- ❑ **45.** Go to the computer on the middle level and open S800vac.mt2.
- ❑ **46.** Plug in the turbo pump controller and the cryopump thermometer into the 115 VAC outlet.
- ❑ **47.** Open the foreline valve on the turbo and start the turbo pump.
- ❑ **48.** Enable cryopump regeneration on the panelmate and open the cryopump roughing valve.
- ❑ **49.** Turn on the circuit breakers on the cryopump compressor. The compressor should not start.
- ❑ **50.** Once the vacuum in the cryopump reaches 50 millitorr, start the cryopump using the panelmate.
- ❑ **51.** Close the cryopump roughing valve.

REMOVING THE S800 SCATTERING CHAMBER

D. P. SANDERSON

11-10-04

- ❑ **1.** Close the upstream and downstream beamline gate valves.
- ❑ **2.** Turn off the chamber ion gauge.
- ❑ **3.** Vent the chamber using the S800vac.mt2 panelmate application and the vent template on page 5.
- ❑ **4.** Turn off the chamber cryopump and open its dry nitrogen vent valve,
- ❑ **5.** Stop the big turbo pump,
- ❑ **6.** After 5 minutes, close the turbo foreline valve and vent slowly the turbo with the small vent valve on the side of the turbo.
- ❑ **7.** Stop the mechanical pump on the turbo foreline using the motor starter next to it and manually vent it by breaking a hose joint. Leave it disconnected.
- ❑ **8. DO EARLY:** Disconnect the main roughing connection (ISO-100) to the roots blower and the KF-40 hose from the butterfly valve elbow to the manual roughing valve.
- ❑ **9.** Disconnect the high-pressure helium lines and the motor wiring at the cryopump.
- ❑ **10.** Break the compressed air connection to the vacuum valves.
- ❑ **11.** Vent the beamline section upstream of the chamber,
- ❑ **12.** Open one of the doors and unbolt the downstream bellows assembly from the gate valve and the chamber,

- ❑ **13.** Remove the bellows between the upstream beamline gate valve and the isolation joint in the entrance beamline.
- ❑ **14.** Remove the plywood platforms that surround the chamber on the south and west sides.
- ❑ **15.** Under the chamber, on the NE orthogonal adjuster, remove the eastern horizontal adjustment ACME screw. The chamber will shift.
- ❑ **16.** Under the chamber, on the SE orthogonal adjuster, remove the southern horizontal adjustment ACME screw, The chamber will shift.
- ❑ **17.** Assemble the track per Renan Fontus' drawing.
- ❑ **18.** Attach big C-clamps to the ends of the track to prevent rolloff.
- ❑ **19.** Mark the height of the ball adjusters, then using the A1900 quad spanner, raise the 3.5" diam ball adjusters one turn at a time on each until the chamber wheels are on the track and carrying the load.
- ❑ **20.** Raise the ball adjusters as high as possible.
- ❑ **21.** Attach a heavy C-clamp to the brace under the center of the chamber and attach a come-along between it and one of the track cross-members using short lengths of chain.
- ❑ **22.** Pull the chamber approx, 8" to the south and remove the two eastern ball adjusters.
- ❑ **23.** Check clearances of protruding hardware for southern travel.
- ❑ **24.** Remove the Modicon wiring from the Cryopump thermometer on top of the chamber.

- ❑ **25.** Remove the modicon wiring from the turbopump controller on top of the chamber.
- ❑ **26.** Remove the modicon wiring from the cryopump vent valve.
- ❑ **27.** Remove the dry nitrogen feed from the cryopump vent valve.
- ❑ **28.** Remove the modicon wiring from the cryopump gate valve.
- ❑ **29.** Remove the modicon wiring from the turbo pump gate valve
- ❑ **30.** Remove the modicon wiring from the turbo pump foreline valve.
- ❑ **31.** Remove the modicon wiring from the KF-40 roughing valve.
- ❑ **32.** Remove the modicon wiring from the chamber vent valve.
- ❑ **33.** Remove the modicon wiring from the butterfly roughing valve.
- ❑ **34.** Remove the modicon wiring from the beamchamber pirani gauge.
- ❑ **35.** Remove the modicon wiring from the foreline pirani gauge.
- ❑ **36.** Remove the modicon wiring from the mechanical pump pirani gauge.
- ❑ **37.** Remove the modicon wiring from the cryopump pirani gauge.
- ❑ **38.** Valve off and remove the city water cooling of the Turbo pump.
- ❑ **39.** Remove any experimenter wiring attached to feedthru flanges.
- ❑ **40.** Remove the ion gauge cable from the ion gauge tube on top.
- ❑ **41.** Tie up all the loose control system cables and make sure they are all labeled.
- ❑ **42.** Close the main doors.
- ❑ **43.** Using a come-along, slowly roll the chamber to the south while watching from all sides for forgotten connections.

- ❑ **44.** Once the chamber is at its final position, install C-clamps to the rail to prevent movement.
- ❑ **45.** Disassemble the track between the chamber and the carriage.
- ❑ **46.** Reassemble the wooden platforms surrounding the experimental area.
- ❑ **47.** Remove the bellows between T4 and T5 on the beamline.
- ❑ **48.** Force open the beamline gate valve on T5 and vent the compressed air feed to the solenoid valve.
- ❑ **49.** Remove the beamline gate valve on T5 by removing the socket head cap screws inside the valve.
- ❑ **50.** Install the mirror assembly between T4 and T5 (either Sanderson or Hitchcock).
- ❑ **51.** Install the glass target flange on the end of T5 (either Sanderson or Hitchcock).
- ❑ **52.** Install the jig transit between T4 and T5 and calibrate it to the beam axis formed by the two end flanges of T5 (either Sanderson or Hitchcock).
- ❑ **53.** Begin the installation of the next experiment.

1. Target drives improvement – Alisher/Snow
   a. Redesign target frames, target ladder, target ladder mount
2. Modification of angle parts for the towers (Snow)
3. LBAS alignment improvement – design holders for Dave Sanderson's ball.
4. Parts needed for measurement with feeler tip from machine shop
6. There are dowel pins designed in the mounts and in the HiRA telescopes. However this feature which will eliminate sloppiness in mounting the detectors has never been implemented. The current design may be difficult to use the dowel pins. Please check and advice. -- Snow
7. New ASIC motherboard box. Snow – modifications of cooling bars and mounts etc – waiting for the final design of Lee Sobotka whose experiment will run in November.

8. New Cooling lines for the motherboard box

9. Beam Monitor mount

10. Cables from HiRA to chipboards including possibly new CsI cables.

11. Modifications of the snout.

12. Speed up the HiRA DAQ