

APEX Pre Beam Checklist

Last revised 02-08-2019 Date _____ time _____

This checklist will be performed after every restricted access to Hall A that maintenance is performed

Person(s) Completing Checklist _____

Left-HRS

Spectrometers

- ___ Current L-HRS angle of spectrometer is parked at 12.5 degrees (not to be used for calculations)
- N/A Check spectrometer for obstructions to movement
- ___ Check Intergen bottles for correct pressure
- ___ Ensure that Intergen alarm switch is in the normal position and the green light on the front panel is on
- N/A Ensure that 14-degree stop pin is installed (if used)
- N/A Ensure that outer limit stop is installed (if used)
- ___ Minimum/Maximum angles for spectrometer from 12.5 to 12.5 degrees.

Vacuum

- ___ Turbo on at turbo controller in rack # 1H71B01
- ___ Pump valves open at valve controller in rack # 1H71B01 channel #2
- ___ Convectron gages read "0" millitorr rack # 1H71B01
- ___ Cold cathode gauge in rack # 1H71B01 $< 5 \times 10^{-5}$
- ___ Actual cold cathode reading _____

****VERIFY ALL TEMP. READOUTS ARE IN FAHRENHEIT AND NOT CELSIUS****

- ___ Ensure that Q2 lead heaters in rack 1H71B07 are on and operating and at least 40° F
Actual lead temperatures left____ right____
- ___ Ensure that Q3 lead heaters in rack 1H71B08 are on and operating and at least 40° F
Actual lead temperatures left____ right____
- ___ Ensure that Dipole lead heaters in rack 1H71Q are on and operating and at least 40° F
Actual lead temperatures left____ right____
- ___ Ensure bogies power is off and locked out

Power Supplies (L-HRS)

*****MAKE SURE LCW IS ON TO ALL POWER SUPPLIES BEFORE POWERING ON*****

Q1:

 Visual inspection of main current leads, dump resistor, and lead flags (for condition, visual shorts, etc.)

 Unlock power disconnect switch and turn on AC power

 Visually check power supply front panel for faults

 When all faults have been cleared, Ensure that power supply is in remote control (light ON= remote)

Q2:

 Visual inspection of main current leads, dump resistor, and lead flags (for condition, visual shorts, etc.)

 Ensure that all doors and panels are closed and secured

 Unlock power disconnect switch and turn on AC power

 Turn on both sets of three pole breakers located on power supply

 Visually check power supply for faults

 When all faults have been cleared, lift lever on lower right side of supply

 Ensure that power supply is in remote control

Q3:

 Visual inspection of main current leads, dump resistor, and lead flags (for condition, visual shorts, etc.)

 Ensure that all doors and panels are closed and secured

 Unlock power disconnect switch and turn on AC power

 Turn on both sets of three pole breakers located on power supply

 Visually check power supply for faults

 When all faults have been cleared, lift lever on lower right side of supply

 Ensure that power supply is in remote control

Dipole:

 Visual inspection of main current leads, dump resistor, and lead flags (for condition, visual shorts, etc.)

 Unlock power disconnect switch and turn on AC power

 Turn on power lever on right upper side of supply

 Visually check power supply for faults on supply and at rack #

 When all faults have been cleared, Ensure that power supply is in remote control

 Ensure Kepco power supply is on in rack # 1H71B06

 Check position of polarity switch in rack # 1H71B06 positive___ negative___

 NMR gradient compensation for proper polarity positive___ negative___ (Dipole balcony)

N/A Ensure that the Q3 insulating vacuum pump is on and has sufficient oil

N/A Ensure the Q3 automatic valve is closed and open and it's the Convectron gage reads 0

N/A Ensure that the Q2 insulating vacuum pump/ blower is on and has sufficient oil

N/A Ensure the Q2 automatic valve is operational and open and it's the Convectron gage reads 0

 Ensure that spectrometer turbo backing pump is on, has sufficient oil and that the automatic valve is operational

Right-HRS

Spectrometers

- ___ Current R-HRS angle of spectrometer is parked at 12.5 degrees (not to be used for calculations)
- N/A Check spectrometer for obstructions to movement**
- ___ Check Intergen bottles for correct pressure
- ___ Ensure that Intergen alarm switch is in the normal position and the green light is on the front panel
- N/A Ensure that 14-degree stop pin is installed**
- N/A Ensure that outer limit stop is installed (if used)**
- ___ Minimum/maximum angles for spectrometer 12.5 to 12.5 degrees.

Vacuum

- ___ Turbo on at turbo controller in rack # 1H72B01
- ___ Pump valves open at valve controller in rack # 1H72B01 channel #2
- ___ Convectron gages read "0" millitorr in rack # 1H72B01
- ___ **Cold cathode** gauge in rack # 1H72B01 < 5×10^{-5}
- ___ Actual cold cathode reading _____

****VERIFY ALL TEMP. READOUTS ARE IN FAHRENHEIT AND NOT CELSIUS****

- ___ Ensure that Q2 lead heaters in rack 1H72B08 are on and operating and at least 40° F
Actual lead temperatures left____ right____
- ___ Ensure that Q3 lead heaters in rack 1H72B07 are on and operating and at least 40° F
Actual lead temperatures left____ right____
- ___ Ensure that Dipole lead heaters in rack 1H72Q are on and operating and at least 40° F
Actual lead temperatures left____ right____
- ___ Ensure bogies power is off and locked out

Power Supplies (R-HRS)

*****MAKE SURE LCW IS ON TO ALL POWER SUPPLIES BEFORE POWERING ON*****

Q1:

 Visual inspection of main current leads, dump resistor, and lead flags (for condition, visual shorts, etc.)

 Unlock power disconnect switch and turn on AC power

 Visually check power supply front panel for faults

 When all faults have been cleared, Ensure that power supply is in remote control (light ON= remote)

Q2:

 Visual inspection of main current leads, dump resistor, and lead flags (for condition, visual shorts, etc.)

 Ensure that all doors and panels are closed and secured

 Unlock power disconnect switch and turn on AC power

 Turn on both sets of three pole breakers located on power supply

 Visually check power supply for faults

 When all faults have been cleared, lift lever on lower right side of supply.

 Ensure that power supply is in remote control

Q3:

 Visual inspection of main current leads, dump resistor, and lead flags (for condition, visual shorts, etc.)

 Ensure that all doors and panels are closed and secured

 Unlock power disconnect switch and turn on AC power

 Turn on both sets of three pole breakers located on power supply

 Visually check power supply for faults.

 When all faults have been cleared, lift lever on lower right side of supply.

 Ensure that power supply is in remote control

Dipole:

 Visual inspection of main current leads, dump resistor, and lead flags (for condition, visual shorts, etc.)

 Unlock power disconnect switch and turn on AC power

 Turn on power lever on right upper side of supply.

 Visually, check power supply for faults on supply and at rack #OD172Q

 When all faults have been cleared, Ensure that power supply is in remote control

 Ensure Kepco power supply is on in rack # 1H72B06

 Check position of polarity switch in rack # 1H72B06 positive___ negative___

 NMR gradient compensation for proper polarity positive___ negative___ (Dipole balcony)

 Ensure that the Dipole automatic valve is operational and open, that the Convectron gage reads 0 and that the backing pump is on, has sufficient oil

N/A Ensure that the Q3 automatic valve is operational and open, that the Convectron gage reads 0 and that the backing pump is on, and has sufficient oil

N/A Ensure that the Q2 insulating vacuum pump is on, and has sufficient oil

N/A Ensure the Q2 automatic valve is operational and open and it's the Convectron gage reads 0

 Ensure that spectrometer turbo backing pump is on, has sufficient oil and that the automatic valve is operational

Left-HRS (from the computer)

Spectrometer controls

N/A Bogie controls checked for operation (do not move)

N/A Check movement of left collimator for operation at 3 positions (if used)

N/A Check left angle camera for movement in both directions

Magnet controls

APEX Septum / Correctors LCW (check on side of APEX magnet)

Ensure LCW is on to magnet

Supply pressure _____ psi (must be >110psi)

Return pressure _____ psi (must be <50psi)

Q1 LCW (check at magnet and LCW lines)

Ensure LCW is on to magnet

Supply pressure _____ psi (must be >110psi)

Return pressure _____ psi (must be <50psi)

Q2

Q2 full of liquid (80%) actual reading from computer _____

Open lead flows on Q2 to 80 slm as read from the Hall A Tools page

Actual lead flows A_____ B_____

D1

Dipole full of liquid (60%) actual reading from computer _____

Open lead flows on Dipole to 80 slm as read from the Hall A Tools page

Actual lead flows A_____ B_____

Q3

Q3 full of liquid (80%) actual reading from computer _____

Open lead flows on Q3 to 100 slm as read from the Hall A Tools page

Actual lead flows A_____ B_____

Right-HRS (from the computer)

Spectrometer controls

N/A Bogie controls checked for operation (do not move)

N/A Check movement of right collimator for operation at 3 positions (if used)

N/A check right angle camera for movement in both directions

Magnet controls

Q1 (check at magnet and LCW lines)

___ Ensure LCW is on to magnet

___ Supply pressure ___ psi (must be >110psi)

___ Return pressure ___ psi (must be <50psi)

Q2

___ Q2 full of liquid (80%) actual reading from computer _____

___ Open lead flows on Q2 to 80 slm as read from the Hall A Tools page

___ Actual lead flows A _____ B _____

D1

___ Dipole full of liquid (60%) actual reading from computer _____

___ Open lead flows on Dipole to 80 slm as read from the Hall A Tools page

___ Actual lead flows A _____ B _____

Q3

___ Q3 full of liquid (80%) actual reading from computer _____

___ Open lead flows on Q3 to 80 slm as read from the Hall A Tools page

___ Actual lead flows A _____ B _____

Controls check from the computer console

- ___ Pull up the Hall A tools page
- ___ Ensure that all of the lead flows are in the green
- ___ Ensure that all liquid levels are in the green
- ___ Ensure all magnets on L-HRS are the same ___ negative or ___ positive
- ___ Ensure all magnets on R-HRS are the same ___ negative or ___ positive

- ___ Using the current button open the control page to **left Q1**
- ___ Clear all faults and turn on magnet with correct polarity
- ___ Ramp magnet to **50 amps**

- ___ Using the current button open the control page to **left Q2**
- ___ Clear all faults and turn on magnet with correct polarity
- ___ Ramp magnet to **50 amps**

- ___ Using the current button open the control page to **left Q3**
- ___ Clear all faults and turn on magnet with correct polarity
- ___ Ramp magnet to **50 amps**

- ___ Using the current button open the control page to **left Dipole**
- ___ Clear all faults and turn on magnet with correct polarity
- ___ Ramp magnet to **50 amps**

- ___ Using the current button open the control page to **right Q1**
- ___ Clear all faults and turn on magnet with correct polarity
- ___ Ramp magnet to **50 amps**

- ___ Using the current button open the control page to **right Q2**
- ___ Clear all faults and turn on magnet with correct polarity
- ___ Ramp magnet to **50 amps**

- ___ Using the current button open the control page to **right Q3**
- ___ Clear all faults and turn on magnet with correct polarity
- ___ Ramp magnet to **50 amps**

- ___ Using the current button open the control page to **right Dipole**
- ___ Clear all faults and turn on magnet with correct polarity
- ___ Ramp magnet to **50 amps**

- ___ input .5 GeV for both spectrometers
- ___ Ensure that all magnets lock in for the input momentum
- ___ List magnets that do not _____

Septum

- ___ Ensure that the area around the APEX septum and target are free of all loose material
- ___ Ensure water flow to APEX power supplies
- ___ Ensure hearing protection signs are in place and fence and platform gates are closed
- ___ Turn on power to APEX and Correctors power supplies
- ___ Ensure APEX and Correctors power supplies are in remote

Target

- ___ Ensure windows are on chamber all bolts installed
- ___ CCTV cameras “on” and focused
- ___ Target light “on” Control located online at HAREBOOT 6 channel 3 (hlauser)
- ___ Backing pump “on” at pump
- ___ Ensure roughing is closed
- ___ Turbo “on” at rack # 1H75B09 (at least one turbo should be on depending on target)
- ___ Turbo valve “open” at rack # 1H75B09 channel # 1 upper and/or #2 lower
- ___ Ensure target convectron gage is operational in rack # 1H75B09
- ___ Ensure target **convectron** set point is **5 torr**
- ___ Convectron “0” millitorr at rack # 1H75B09
- ___ **Cold cathode < 5x10⁻⁴** at rack # 1H75B08
- ___ Actual cold cathode reading _____

Exit beam tube

- ___ **Diffuser cooler on**
- ___ **Diffuser water level ok**
- ___ Close flow valve and observe flow meter (drops to 0)
- ___ Open flow valve and observe flow meter (rises to 1 GPM) Actual GPM _____
- ___ Backing pump is “on” and operational
- ___ Valve “open” at pump
- ___ Turbo “on” at rack # 1H75B09
- ___ Convectron gage operational
- ___ **Convectron “<5” millitorr** at rack # 1H75B09
- ___ Actual convectron gage reading _____
- ___ Magnetic shielding downstream of APEX septum is installed

Entrance beam tube

- ___ Ensure that beam line girder turbo and backing pump are on and running
- ___ Ensure that beam line girder turbo fan is on
- ___ Ensure backing pump has sufficient oil, valve to turbo is open and automatic valve is operational
- ___ Verify cooling water flow to the Moeller Dipole (feel water line to determine if flow is present)
- ___ Verify LCW valves to 4 Moeller Quads are open
- ___ Ensure turbo upstream of Moeller and backing pump are on and running
- ___ Ensure Moeller turbo fan is on
- ___ Ensure backing pump has sufficient oil, valve to turbo is open and automatic valve is operational
- ___ Instrument air compressor functioning normally (this can be done by observing the compressor function [located near the flame lockers] or checking to see if the Hall have compressed air near the pivot)

___ Call MCC (x7048), get the name of the person you talked to _____ and say “I am doing the Hall A pre beam checklist, Please Ensure that the Hall A beam line valves are set to close” after they say that they are, say “I am turning the control key from **MAINTENANCE to OPERATIONAL** are you ready” after they say yes, turn key and tell them **“you have control could you please open the valves so that we can verify operability and make an e-log entry”**

___ Actuate the following valves; ___ VBV1C20, ___ VBV1C20A, ___ VBV1H00, ___ VBV1H00A, ___ VBV1H00B, ___ VBV1H04B & ___ VBV1H04C.

___ Ensure all beam line vacuum valves are “OPEN” (visually check VBV1H04 B and C which are upstream and downstream of target chamber)

Hall

- ___ All interlocks in rack # 1H75B08 indicate green
- ___ Ensure that all **4 Moeller power supplies** for on and in remote
- ___ Ensure installation of Ion Chambers at Compton, Moeller, and Target Chamber
- ___ Correct LCW flow and pressure (≥ 110 psi supply and < 50 psi return)
- ___ CCTV monitors at X terminal off
- ___ Walk to entire beamline clear it of all unnecessary trash, tools and equipment; make sure all guards are on and in place
- ___ Clear the beam line balcony of unnecessary tools, equipment and trash.
- ___ Clear the pivot area both HRS links of unnecessary tools, equipment and trash.
- ___ Clear the left and right power supply balconies of unnecessary tools, equipment and trash.
- ___ Clear the left and right detector platforms of unnecessary tools, equipment and trash.
- ___ Clear the hall floor of unnecessary tools, equipment and trash
- ___ Scissor Lift and Forklift near truck ramp
- ___ Move JLG inside truck ramp
- ___ Ensure that all lifting slings and safety harnesses are correctly stored and that the storage cage is at least 90 deg from the beam dump and at least 60 ft from the target
- ___ Perform pre sweep of run safe boxes [15 totals]. (**6-along wall, 3-L-HRS, 3-R-HRS, 1-Compton area, 1-personnel p-way, 1-top truck ramp door**)
- N/A Move Left spectrometer stairs clear of lower balcony.
- ___ **Ensure raster air conditioner is "ON"**

___ **Ensure polar crane is positioned over the entrance beam pipe, and that power is off at the power disconnect switch**

N/A **Ensure that spectrometer entrance window guards are removed**

___ **Ensure that spectrometer exit window guards are removed**

___ **Ensure that detector VDC covers are removed**

___ **Ensure that target window guards are removed**

___ Ensure operability of shield house doors

___ Deliver checklist to work coordinator

___ Make the following entries into the HALOG

“Checklist Complete”

“Target Windows and HRS Entrance and Exit Window Guards are removed”

“L-HRS starting angle is _____ degrees”

“R-HRS starting angle is _____ degrees”

“L-HRS External Sieve is _____”

“R-HRS External Sieve is _____”

“The tech on call at startup is _____”

***Note any outstanding issues not completed on the checklist

***Note any special requirements or restrictions

Name of person checklist was delivered to _____ .