

Oxford 400 unshielded Magnet Superconducting Magnet Cryogen shim Procedure

Updated: 11/29/2011

Problem: The water peak is very broad (>8000 Hz). RTShims are no effects to the line shape at all. The top of the peak is flat (like gradient shim profile), John Davidson, suggested that the Z1 cryogen shim was quenched.

Cryogen Shim Procedure:

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1. Fill Liquid Helium to full.
2. Setup the power supply
3. Insert the power lead
4. Measure the resistance
5. Connect the A and B
6. Cryogen shim
7. Take the power lead out and insert the plug
8. Gradient shim and RT shim.

Prepare the SPS10 Shim Power Supply:

There are two connectors on the back of the SPS10:

+VE and -VE Use copper wire to connect them together. It can be disconnected or connected them when it is needed. When it is connected, refer to "SHORT", before the cryogen shim, it should be connected to prevent current leak to the power sticker leads. That is between +VE and -VE should be absolutely ZERO. **When start to CSshim, you have to disconnect the wires.**

Before turn on the power of SPS10, Do the following:

- a. Knob on the main coil position (Red Marked)
- b. All shim switches are at UP position
- c. Output short is at ON position (no current will be output or the current by pass, limited inside of the unit).
- d. Main coil heater OFF (Do not use the key. It is for main superconducting coil heater power)

Turn On the power of SPS10. Let it warm up at least 10 minutes.

Check the current values in each shim: Leave the +VE and -VE connected.

- a. Flip the switch (short/not short) to "not short" position. The correct current setting will be displayed and circulated inside unit for each shim.
- b. Turn the Rotate knob on the Z0 position, wait for the display stabilized ----- it displays the current of Z0. Then turn the knob on the Z1 position, it displays the current of Z1.

- c. Check the magnet book, set all the relative cryogen shims. **Do not turn on the heater.** Note: clockwise --- to increase the current reading, ---goes to positive direction.
- d. After set all the shims, Flip the switch to short position. The +VE and -VE wire is still connected. Set the rotate knob to Z0 position.

Prepare for inserting power leads into the magnet:

Power Leader:

- a. Double check all leads, make sure they are clean and will have a good contact.
- b. Use Helium gas to purging plug and leads
- c. Gloves and Copper tools nearby the magnet (screw driver is useful, when the shorting plug is too tight)

SPS10 is power on and Standby:

- a. Power is ON
- b. Switch to output short position (DOWN!)
- c. Short wire for +VE and -VE is connected
- d. Do not connect A and B cables to the lead yet. After inserted, use voltmeter to measure the resistance of each shim heater.

Insert Power Lead:

- a. Setup to run H2O sample, see a FID on the screen
- b. Open the helium release valve on the magnet, Put temporary cover to prevent moisture goes into the magnet.
- c. Replace the check valve to an open rubber tube.
- d. Unscrew the top of the helium port, and remove the helium turbulent.
- e. Insert the unplug tool slowly, screw it on the plug, take the plug out. Immediately cover the port.
- f. Slowly insert the power lead, wait for 10-15 seconds, let the lead cool down, then enters the conical socket. You will feel the position for the longer pin. Make sure the connection is good.
- g. Screw on the cap.

Measure the Resistance of all connectors

Check with John's notes.

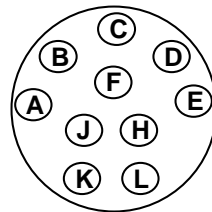
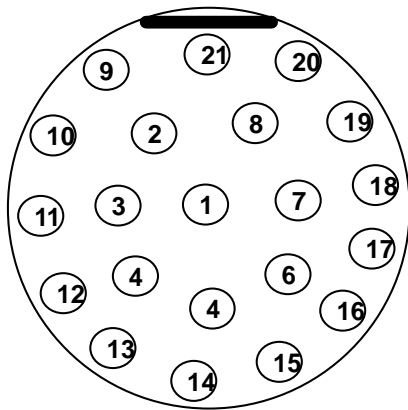
From the magnet manual: The power lead has 21 pins. Check the contact with a voltmeter.

(The first B is the B connector, the second letter is the pin number)

Pin 1 → B-B and B-A	Shims (+)
Pin 2 → A-E	X heater
Pin 3 → A-F	Y Heater
Pin 4 → A-J	ZX Heater
Pin 5 → A-H	ZY Heater

Pin 6 → A –K
 Pin 7 → A –L
 Pin 8 → B –D and B –E
 Pin 9, Pin 10, Pin 11 → B-H and B-J
 Pin 12 → B–L
 Pin 13 → A–A
 Pin 14 → A –B
 Pin 15 → A –C
 Pin 16 → A –D
 Pin 17 → B–C
 Pin 18, Pin 19, Pin 20 → B –H and B –J
 Pin 21 (Big) → B–F

XY Heater
 X2-Y2 Heater
 Shims (-)
 Main End
 Heaters Common
 Main Heater
 Z0 Heater
 Z1 Heater
 Z2 Heater
 Allen Bradley
 Main Start
 Allen Bradley



Pins assignment of the power lead
 (Oxford 400 unshielded magnet)
 View from bottom to the top.

Pin assignment of A and B Connectors
 View from top.

After the power lead is inserted into the magnet. Use voltmeter to measure the resistance: Connect the voltmeter (common) on the B-L (Connector B Pin L), connect the other end to each pin of connector A (A,B C, D, E, F, H, J, K ,L) the resistance should be around 100 Ohm. If not, then the contact to the magnet is not good. Push the lead down! For this magnet there is no Z2 and Z3 on the record, so there is no Z2 shim available.

 Cryogen shim:

Prepare the SPS10 shim power supply:

Make sure wait at least 40 seconds before change shim. -----

- a. Connect the A and B to the power lead. Make sure they have a good contact.
- b. **Disconnect the current short wire**, leave +VE and –Ve OPEN (not connected)

- c. Switch the output short to OFF position (UP). That will allow current go through the cryogen shim coils.
- d. Select the smallest value to start (smallest value means less current deposited in the superconducting shim coil). For example: S2 -0.267 A. after the current reading stabilized, turn on the heater, change the current very slowly, while watch the water peak on the screen. If it is good enough, turn off the heater, wait for 40 seconds, then switch to other shim, wait for the current stabilized, then turn on the heater, adjust the current, and then turn off the heater, wait 40 seconds. ----- until all shims are in the best values.

Take out the power lead from the magnet:

- a. Turn off Switch to SHORT ON position (down) ---- no current will go through the leads.
- b. Re-connect the wires.
- c. Prepare to remove the power leads.
- d. Take the power lead off, Insert the shorting plug. Make sure it is in the correct position.
- e. Close all the LHe port.
- f. Do RT shims!

Tips: Make sure the lead and plug remove tool are clean and dry. Use Heater Gun. Don't leave the plug remove tool in the magnet too long, take the plug out after screw in on.

Refill LHe to full!

Record all the Cryogen shims values on the log book.