Shim Power Supply

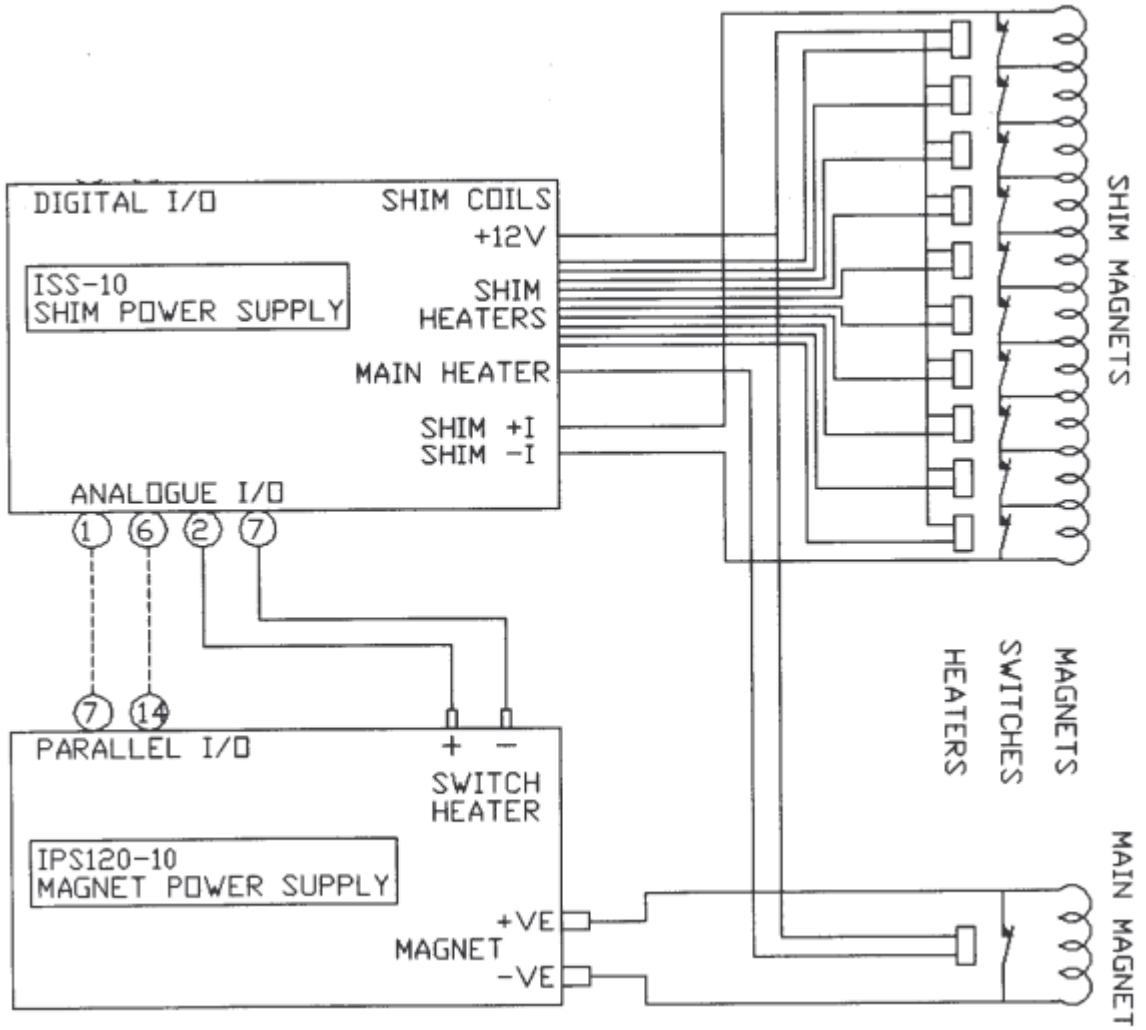
-Manual Summary-

Outline

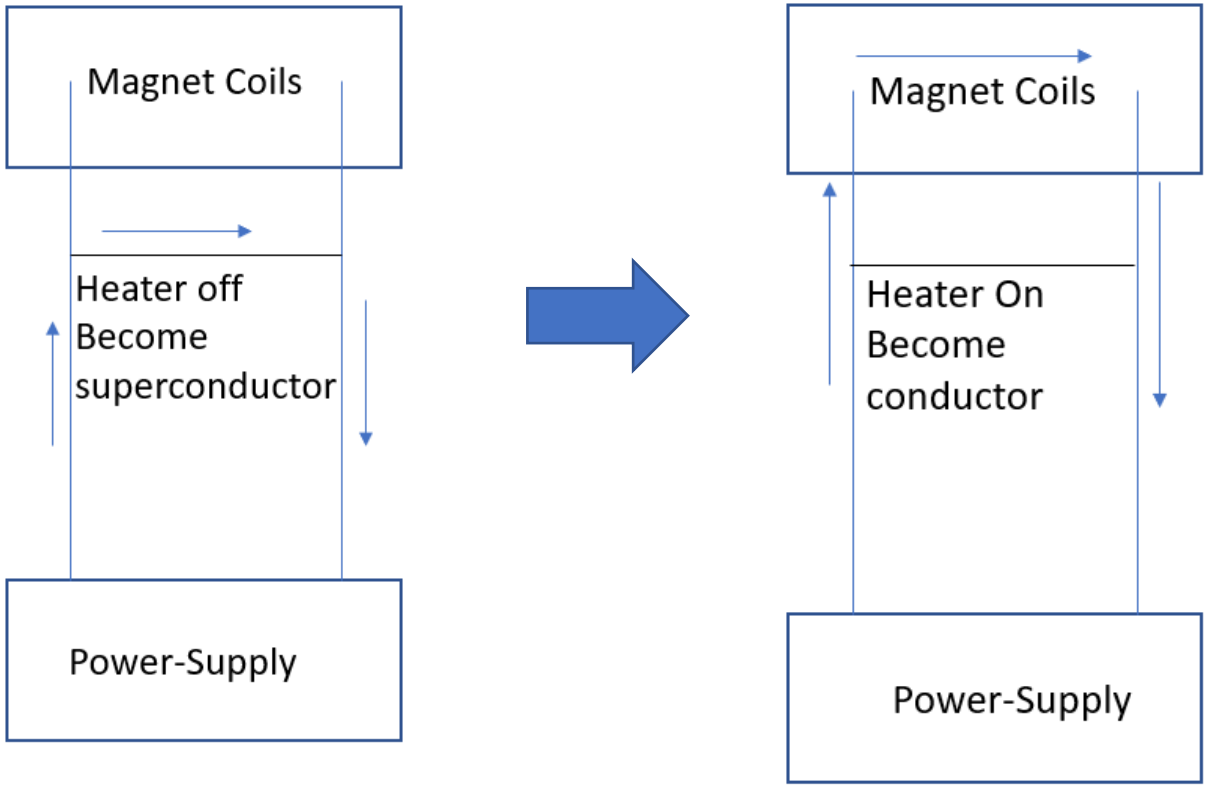
- Overview
- Switch heater
- Shim coils
- LabView VI
- Recent status
- Notes

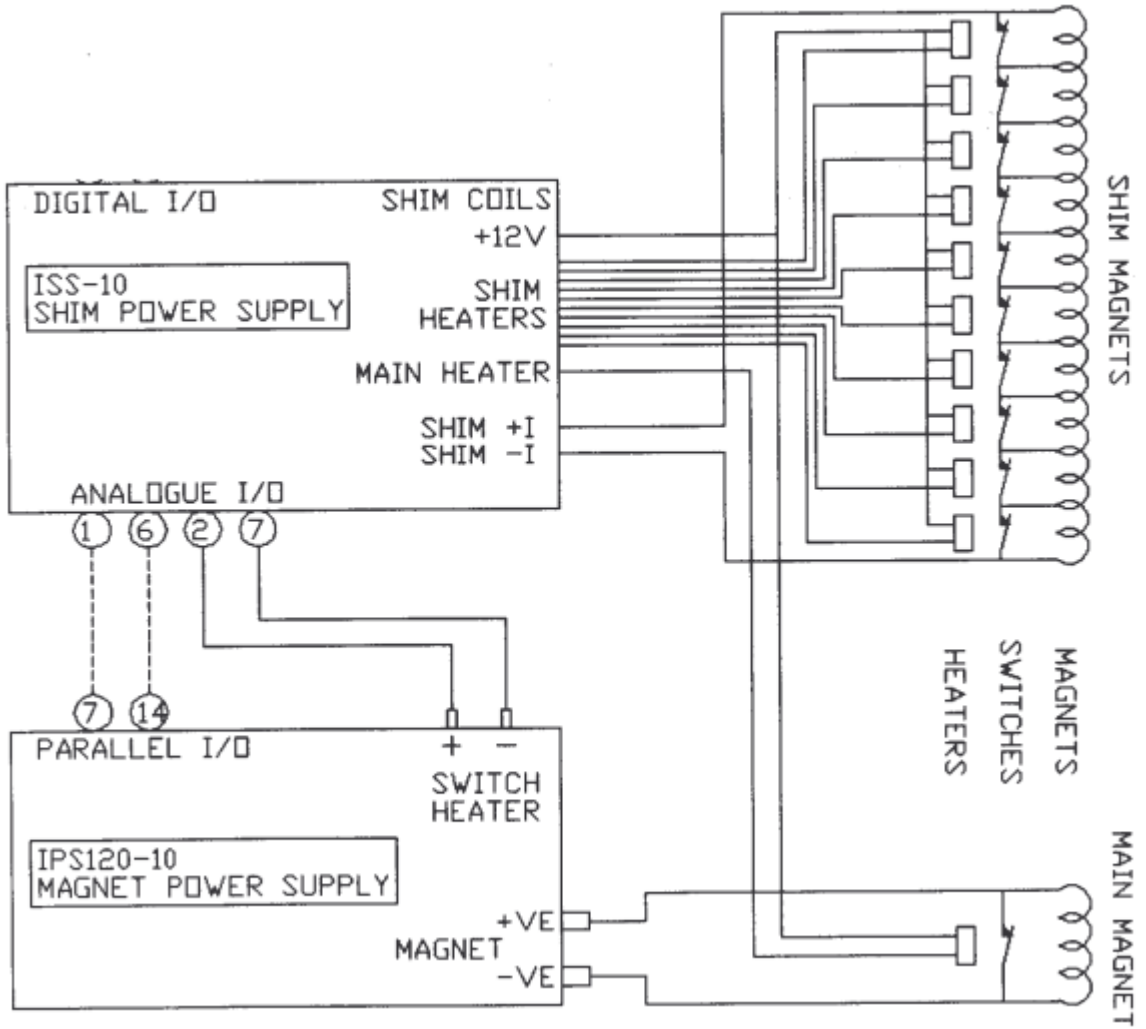
Overview:

- Consist of 10 **shim coils** connected in series & main heater (**switch heater**)
- Capable to output 20 Amp current
- The switch heater is required to ramping up/down or change the superconducting magnet current
- The shim coils are required to improve the field homogeneity and dump the current during ramping up (hence we need shim coils to energize the superconducting magnet, otherwise Quench)
- We don't use all 10 coils. Only switch heater and 2 shim coils
- The switch heater is controlled remotely via "Magnet PS VI" along with the main superconducting magnet
- The 2 shim coils are controlled via relay which are also remotely controlled via "Magnet PS VI"

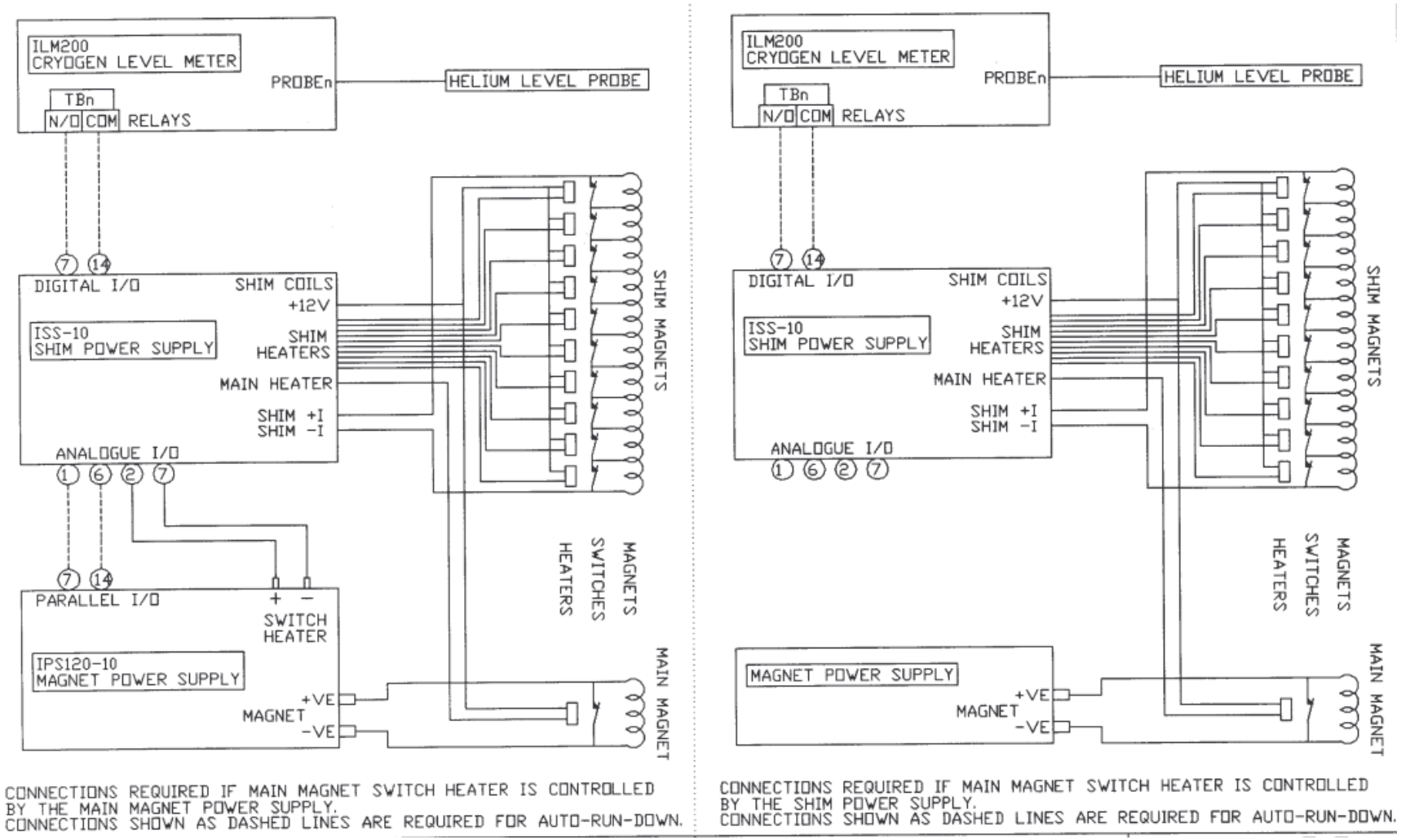


- Switch heater is made from superconductor





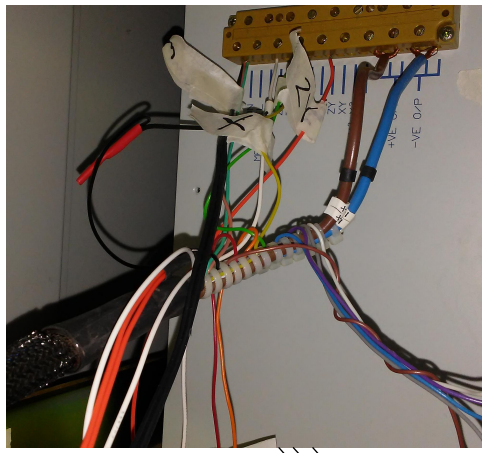
- Please note that in the manual there are two ways to connect switch heater



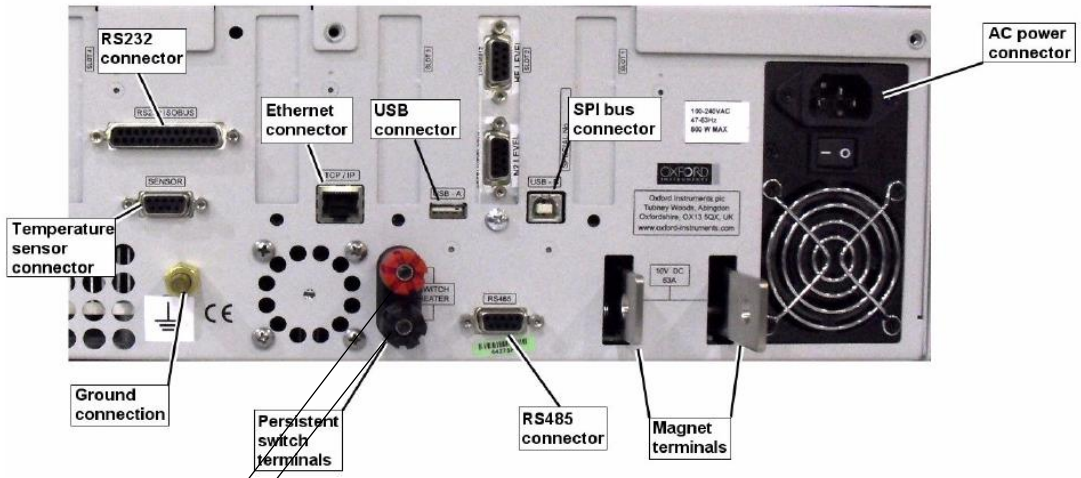
- We follow the left one (switch heater is controlled by the main magnet power supply)

- Therefore, please make sure that the switch heater cable is connected to the Magnet power supply

Shim Power supply



Magnet Power supply



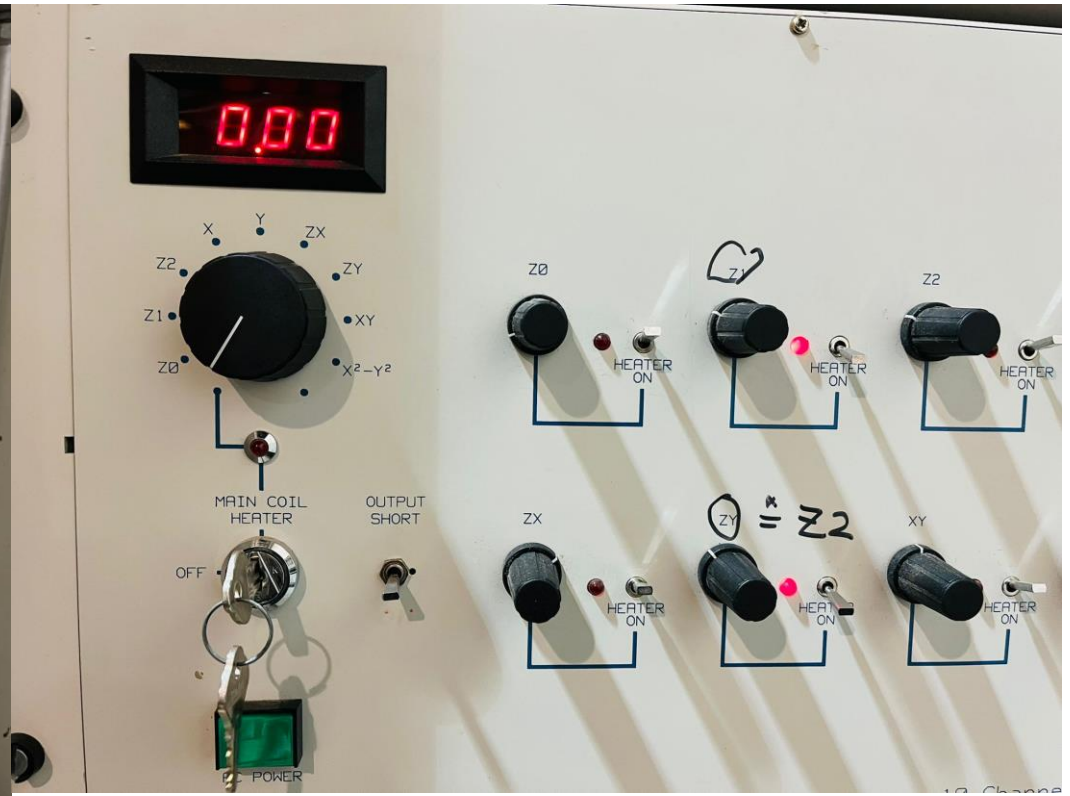
Many cables

A big (black) cable bundle

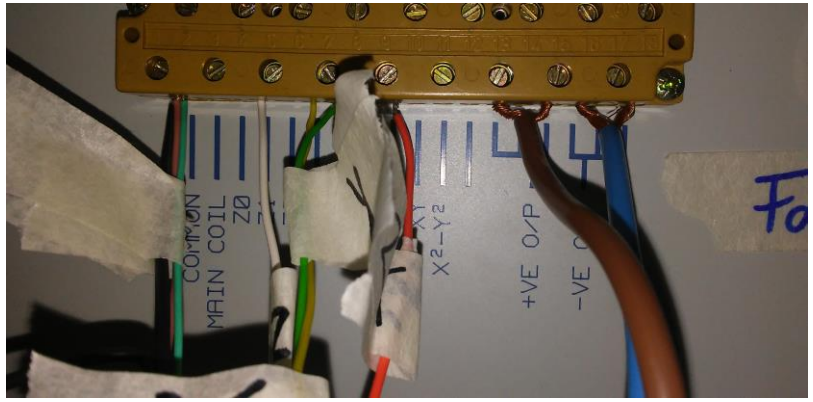
Two cables (positive/negative) with connector type:

- The switch heater is remotely controlled (On and Off) via “magnet PS VI”

- There are 10 shim coils: X, Y, Z1, ZY, ….
- We only use 2 coils: Z1 & ZY

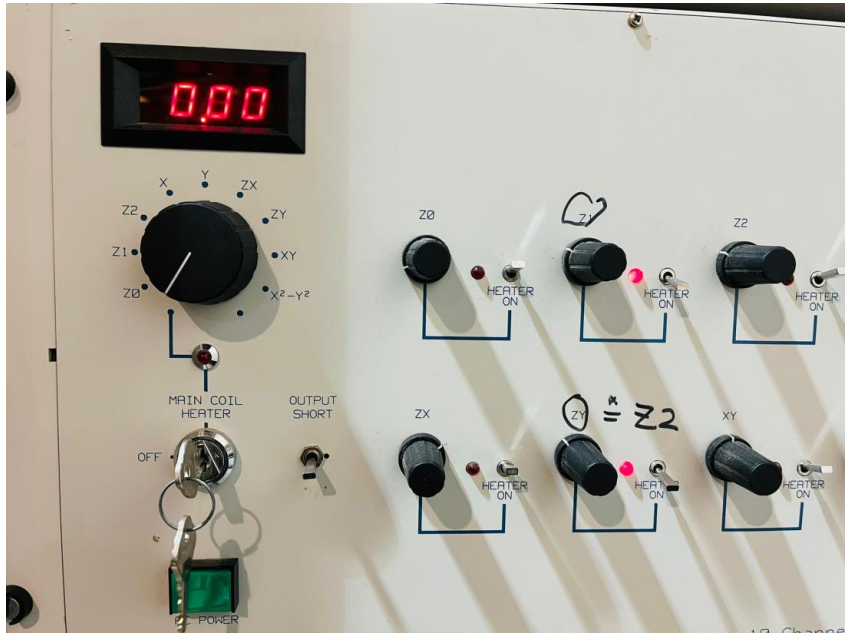


- In the original connection (UVA before move to FNAL), X & Y are also wired but turned off in the front panel. Effectively, we only use Z1 & ZY



Last photo before moving to FNAL. Current connection should nicer and not messy

- Please make sure and keep these knob position in the front panel which allow us to powering Z1 & ZY simultaneously while keep the other coils off



- Our shim PS does not have remote control feature. Therefore, the default connection (via front panel) is powering **switch heater**, **Z1** and **ZY**
- The switch heater is remotely controlled via “Magnet PS VI” (see slide 6)
- We insert relay that can be remotely controlled to Z1 and ZY wires for On/Off control in the back panel of Shim PS

Old photo after moving

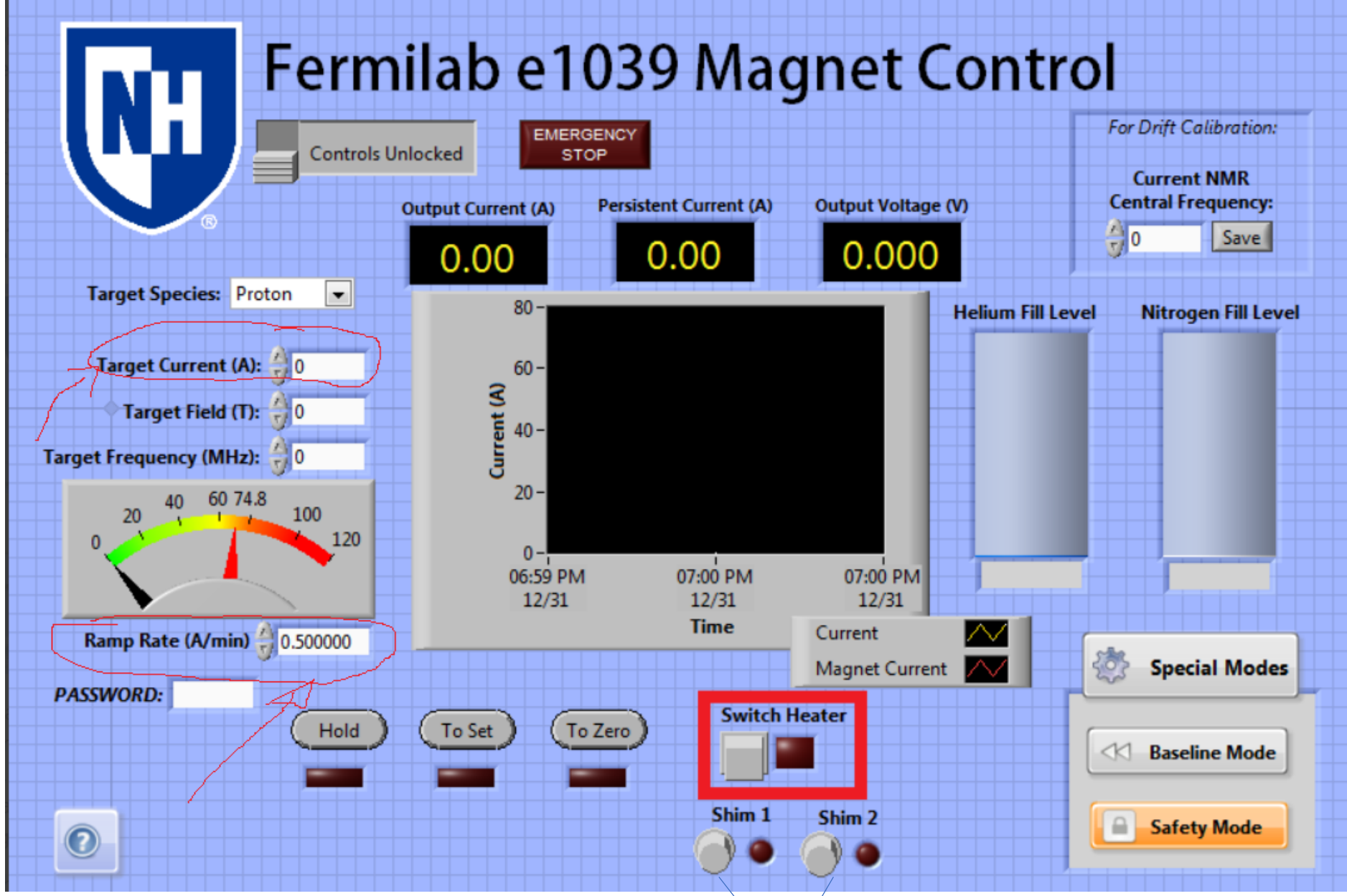
The new Relay is installed and tested. Please check whether the relay is in normal open or normal close connection? (not sure at this point)

Magnet PS VI

Ramping up procedure:

1. Set Target Current
2. Set Ramp Rate
3. Click/Turn On switch Heater
4. Click/Turn On Shim 1 & Shim 2
5. Click To Set

Regarding step number 4, it is very important to check whether the relay is connected in normal open or close position



Z1 & ZY

Last status:

- The hardware works
- Relay works
- Relay communication works when tested with the Sub-VI
- Toggle when tested with Main (integrated) VI

- In summary, the instrument (Shim PS and Magnet PS) work. The VI is also tested and work (forget whether it was tested from laptop or from the target computer)

- But we never tested with the close connection to the magnet (only with the copper bar)

Notes:

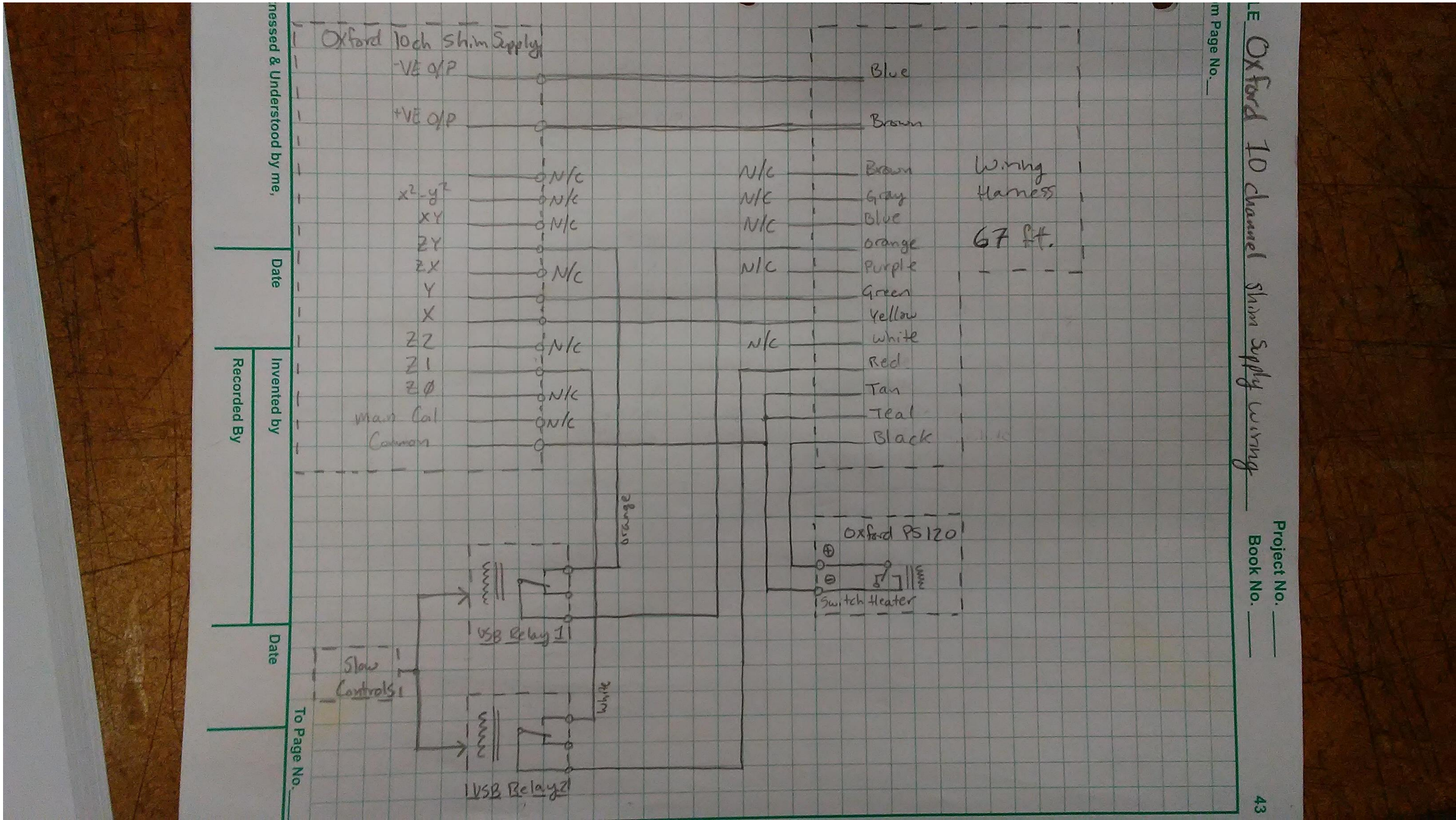
- There is no soft copy of the manual. The circulated manual (https://confluence.its.virginia.edu/pages/viewpage.action?pageId=46536573&preview=/46536573/107385854/ShimPS_Manual.pdf) is for the more recent model which has GPIB/RS232 connection. But we believe that in general they have the same feature, apart from the remote connection
- There is hard copy of the manual at UVA. Please note that the manual assume the shim PS works with the old magnet PS from Oxford instrument (expect some modification)
- We don't have pinout mapping

Pin connection on the 20 way "SHIM COILS" connector are:-

1	MAIN switch heater
2	Z0 switch heater
3	Z1 switch heater
4	Z2 switch heater
5	X switch heater
6	Y switch heater
7	ZX switch heater
8	ZY switch heater
9	C2 switch heater
10	S2 switch heater
11	Z3 switch heater
12	+12 volts switch heater common
13	MAGNET +
14	MAGNET +
15	MAGNET +
16	MAGNET +
17	MAGNET -
18	MAGNET -
19	MAGNET -
20	MAGNET -

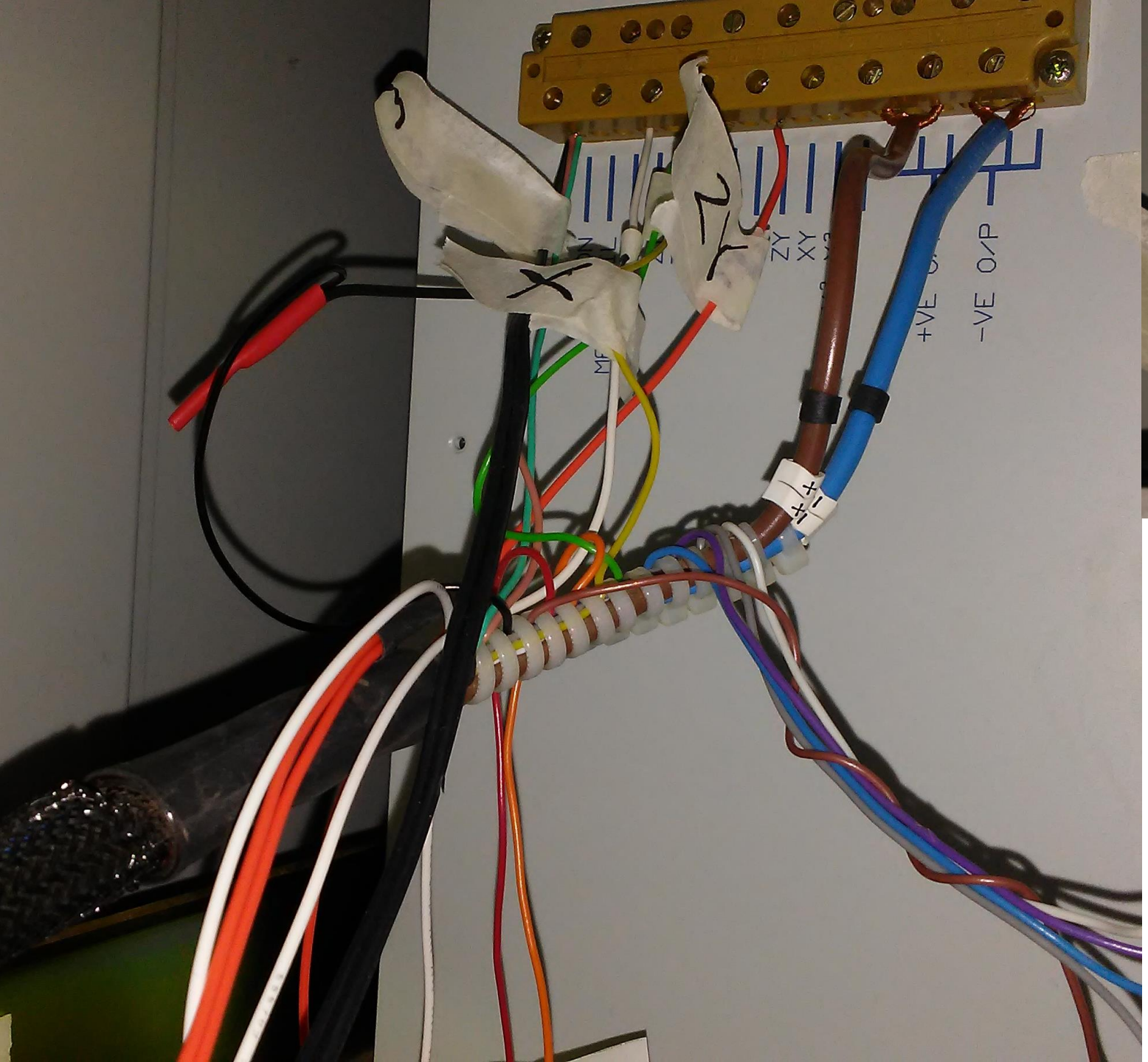
- The manual mention 20 way connector but I think it is 2 x 10 way connector

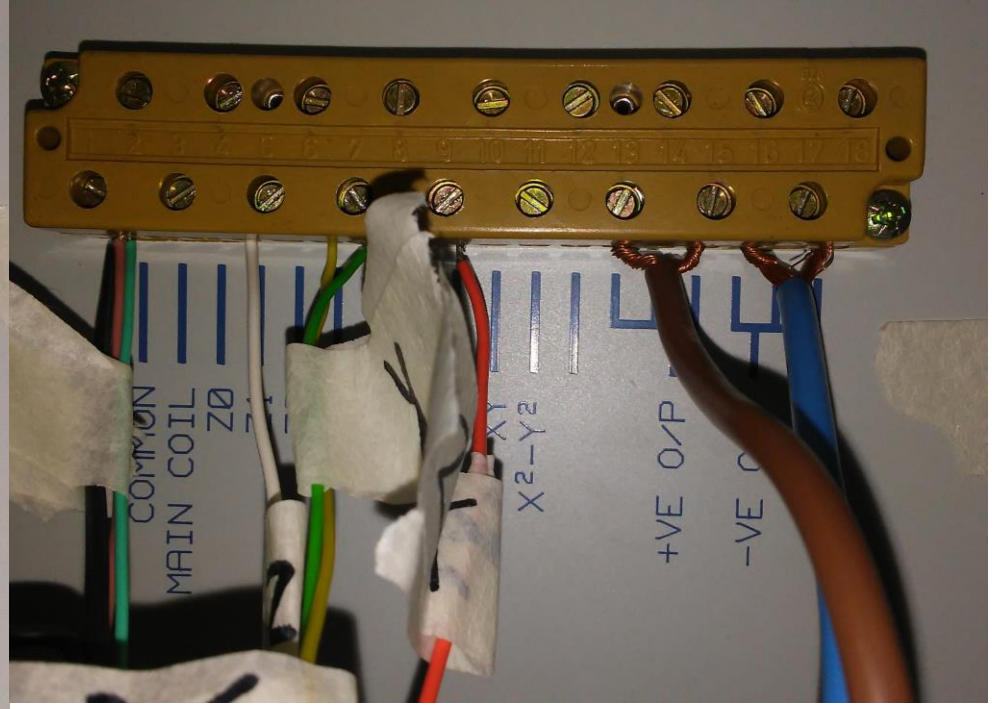
Connection before we move to FNAL



Magnet PS VI Manual:
https://confluence.its.virginia.edu/display/SeaQuest/Magnet+Power+Supply+Operation

Shim PS Manual (more recent model):
https://confluence.its.virginia.edu/pages/viewpage.action?pageId=46536573&preview=/46536573/107385854/ShimPS_Manual.pdf


-VE O/P
+VE O/P


MAIN COIL
Z0
X²-Y²
+VE O/P