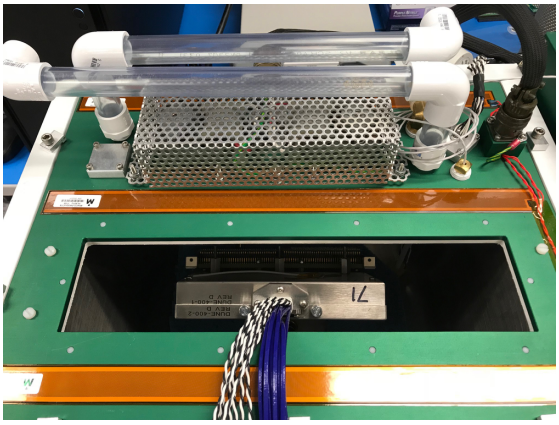
BNL FEMB Test Procedures with MSU Cryogenic Test System (CTS)
V1 – 2/5/2018

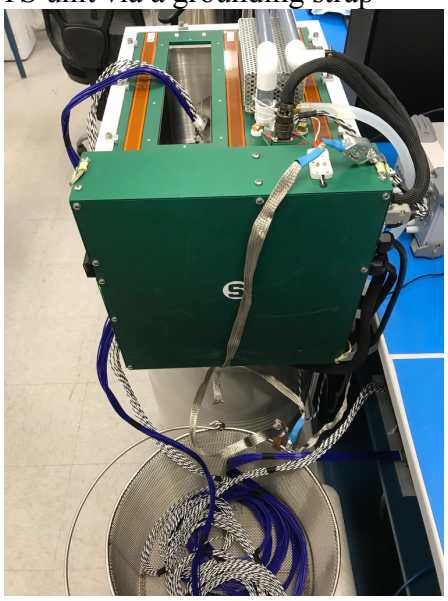
Log in as operator on hothdaq1:

Environment will be automatically set up for the nominal femb_python version.
If you want to use a release other than the default:
“source /opt/sw/releases/femb_python_x/sourceme”
export FEMB_CONFIG=”wib_sbnd_v109_femb_protodune_v323”

For full test (to certify board for shipment):

1. Receive CE box with cables attached and traveler signed off
2. Use wrist strap connected to ground of power supply and latex gloves
3. Remove black shorting caps connected to PSL adapter
4. Connect toy TPCs to PSL adapter on outside of CE box. Orientation matters: match the empty 8 pins to the side of the connectors in the middle of the box
5. Turn off CTS with switch on back of green control unit
6. Place CE box on top of styrofoam holder inside the CTS. The WIB/power supply ground should be connected to the cable basket and the CTS unit via a grounding strap





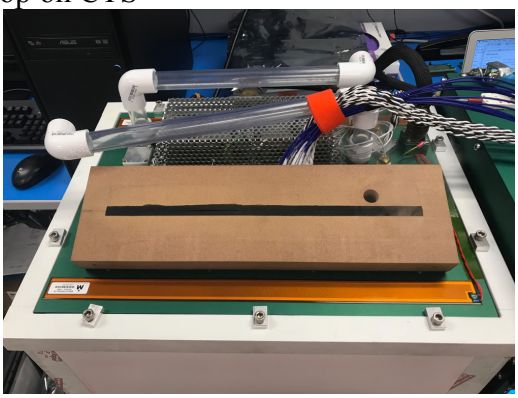
7. Connect cold data cable (thick blue cable) to WIB adapter board. “Samtec” writing on connector should be facing up.
8. Connect LV cable (black/white twisted pair cable) to WIB adapter board (slot must be same as data slot). Keyed so only goes on one way
9. Turn on 12V LV power supply output. Current draw should be ~1A before you start taking data. You may remove wrist strap now as you should no longer be touching the board.
10. Make sure ethernet connection between WIB and hothdaq is plugged in. femb_read_reg 5 any output fine, just a check to make sure you have network connection. If not, check the arp table (“arp”). If it is incomplete, do “sudo restart-network”

Warm Test

1. Run “femb_prod_gui”: fill in your name, check the WIB slot you are using, room temperature, and fill in all the information requested for the slot you are using. You will find all the information (except the toy TPC numbers written on the toy TPC boards) on the travelers that come with the board. For the ASICs, you must enter 8 numbers separated by spaces. Please do not comma separate!
2. Press “Start Tests” now. Current draw will go up to ~2.2A when board is powered. Running under sumatra, test takes about 1 hour to complete
3. Output will be written to /dsk/n/data/oper/femb/wib_sbnd_v109_femb_protodume_v323/TIMESTAMP keep an eye on the output as it is being written. Do not expect identical noise measurements given different lab conditions. Do expect all channels working
4. Enter runs in the Google Doc logbook, noting whether or not the data is good. https://docs.google.com/spreadsheets/d/1rtJYg5v41rcLxmTQlQDLlz46yUhW3eCRTdfQpMe2leg /edit#gid=1712213243
5. Sign off “Passed Warm Test” on traveler if data looks good

Cold Test

1. Make sure FEMB is not drawing current: CH1 power supply should be ~1A
2. Put top on CTS



3. Turn on CTS with switch on back of control unit. Wait for CTS to power up; setting should be in IDLE
4. Check CTS status: if Worthington dewar is full then S1, S2, and S3 counts should all be ~18,000 or greater
5. Push up on front switch until WARM GAS is selected
6. Wait 5 minutes: temperature should be about 40^{o}C, pressure should be about 4 PSI
7. Push up on front switch until COLD GAS is selected
8. Wait 5 minutes: temperature should be about 0^{o}C, pressure should be between 15-20 PSI. The L1 counts should be ~18,000 or greater
9. Push up on front switch until IMMERSE is selected
10. In order the levels of L2, L3, L4 and L5 counts should go to ~18,000 or greater. This should take about 5 minutes: temperature should be about -75^{o}C, pressure should be between 20-25 PSI
11. Wait another 5 minutes: temperature should be about -95 ^{o}C
12. Switch the setting in the femb_prod_gui to cryo temperature

13. Repeat steps 2-4 under Warm Test; the current draw will now be ~1.6A when the FEMB is powered
14. Sign off "Passed Cold Test" on traveler if data looks good

To warm up (after all tests):

1. Verify only ~1A is drawn on power supply
2. Turn off LV power supply output
3. Push down front switch until WARM GAS is selected
4. Wait until temperature reaches about 25^{o}C, pressure should be about 4 PSI. The dewar should be drained so all L counts should be less than 18,000. This should take about 15 minutes
5. Push down front switch until IDLE is selected
6. Put wrist strap back on. Remove the CE Box from the CTS
7. Warm CE Box for 30 min in oven
8. Remove toy TPCs and disconnect cables from WIB adapter
9. Replace the shorting caps on the PSL adapter
10. Pass CE box and traveler to Ken to prepare for shipment