**Linac BPM Commissioning**

Elliott McCrory

January 31, 2013

# Observations

Here is what I learned today about the Linac BPM modules.

* Several individual modules had failed in the following manner: The Gate LED on the front would not illuminate during beam, whereas the Beam LED would. The scope signals confirm that behavior: no gate when there was beam. I found no software adjustments to fix this. This *was* fixed by power cycling this module (pulling it out of the NIM crate and pushing it back in). The modules that showed this behavior were:
  + D74 (BPM hardware module #46)
  + D34 (#28). This one is a master, so I power cycled the entire crate.
  + D11 (#39)
  + BP204 (#38). This is in the 400 MeV line (it is the “momentum” BPM), and it is the master of this crate. Again, power cycling the crate fixed it.
* D21 (#50) was not connecting to the Ethernet. A power cycle did not fix it. Moreover, I could not connect to it via the USB either. (!) I replaced it with module #32 (being very careful to configure the new module with the correct Ethernet parameters). Now, all the modules are making a gate and seeing beam. However, there remains odd behavior here:
  + When connected via the USB, I see a “SOCK\_CONNECT” message for port 5002 (which is how the OAC connects) approximately every 30 seconds.
  + This module cannot be “ping’ed” from outback.fnal.gov (the other modules respond, as expected).
  + The UDP socket is connected (according to the SOCK command, internally), but the readings through ACNET for all the devices in this crate are zero. (The internal reckoning of the readings is not zero.)
  + The binary status/control for D21BPH shows “tripped”. I can cycle the On/Off bit, to no avail. When I turn off the L.A., the local command indeed shows that the UDP listener is gone, and it returns when I turn on the L.A..
* The cables marked “D75” do, in fact, have beam signals on them. I plugged these cables into the module for D32 and:
  + The internal reckoning of the readings correspond to beam values (most notably, the intensity channel)
  + The scope traces show beam within the gate.
  + As of this moment, the “D75” signal cables remain plugged into the D32 BPM module.
* The BP203 BPM shows no beam. This is expected, since this BPM only sees beam when the Spectrometer is off.
* The BP201 BPM also shows no beam. I reconcile this as follows: The signals from this BPM are connected to the “D75” cables, which Matt and I confirmed in the tunnel last week. It is not clear where the signal cables marked “BP201” go.
* All the BPMs that trigger on Booster event $52 needed re-timing. I adjusted the gate to be 102 milliseconds later (changed from a delay of 1.905 msec to 2.008 msec) in order to get the beam signal within the gate.

# Summary

There is a common failure mode wherein a module is incapable of creating a gate. A power cycle fixes this problem.

There is something going on with the master of the crate containing D21, D22, D23, D31 and D32 that I do not understand. This Ethernet node cannot be seen from outback.fnal.gov. Also, the OAC reconnects to it regularly.

D75 is the BPM just after the Lambertson, which is also known as BP201. The cables marked BPM201 are not connected to a BPM.