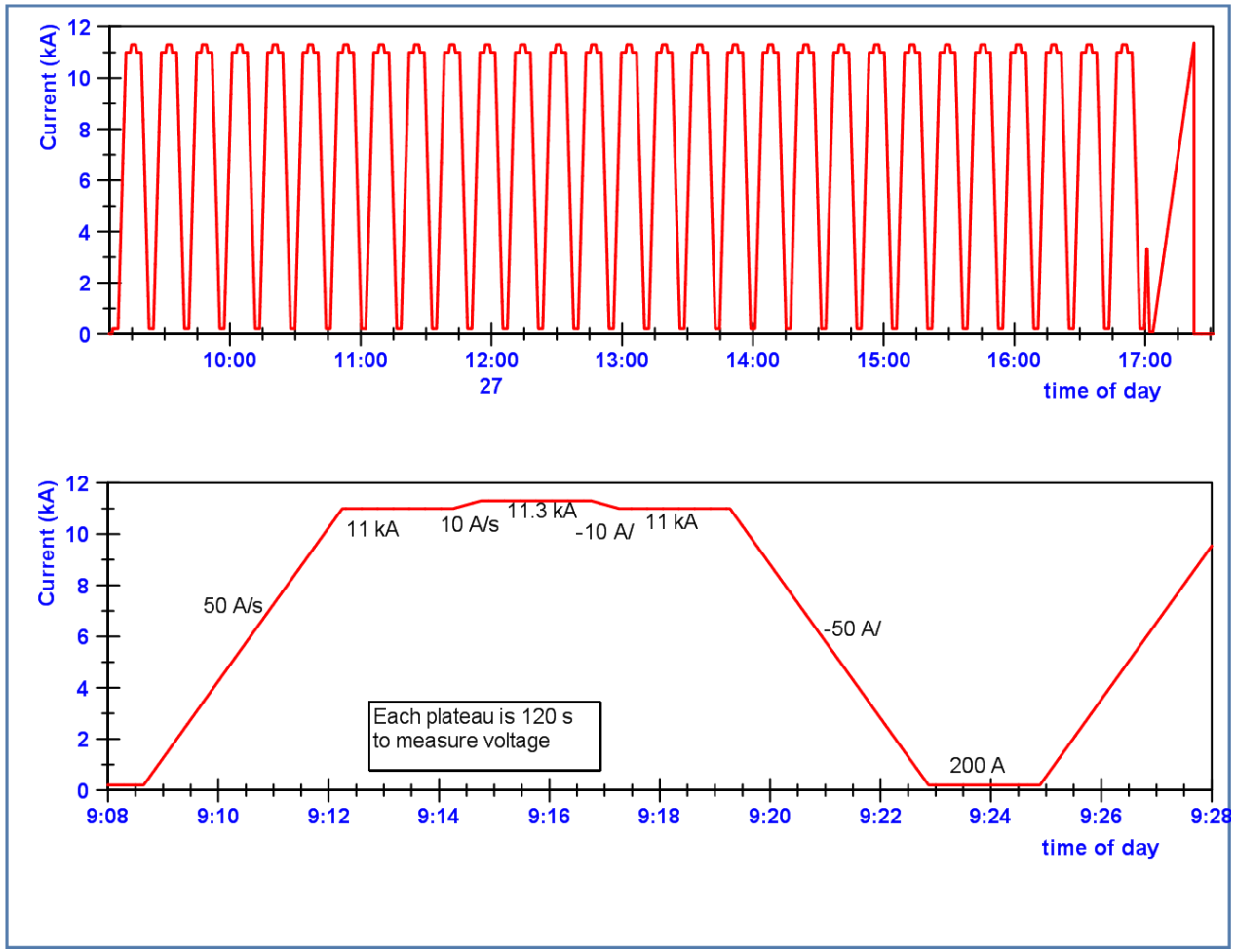
Update – 02-11-2017

MBHDP102

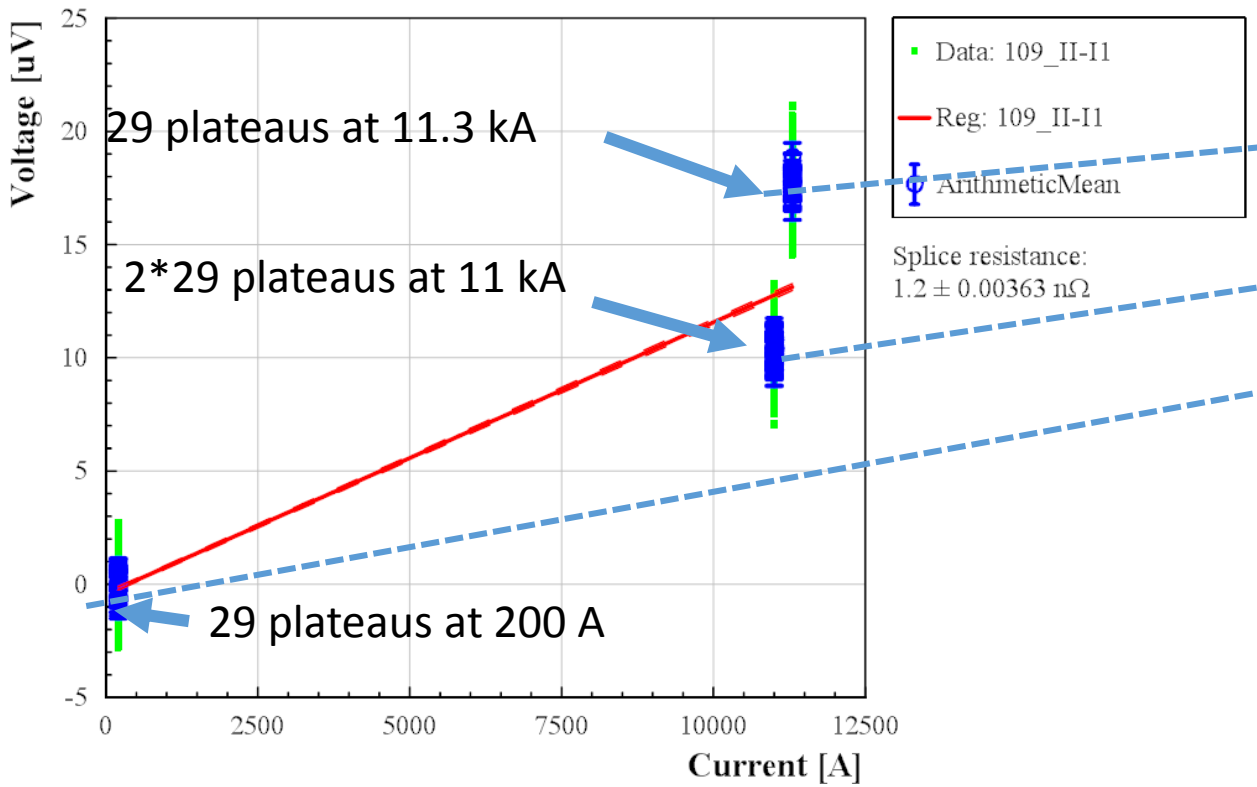


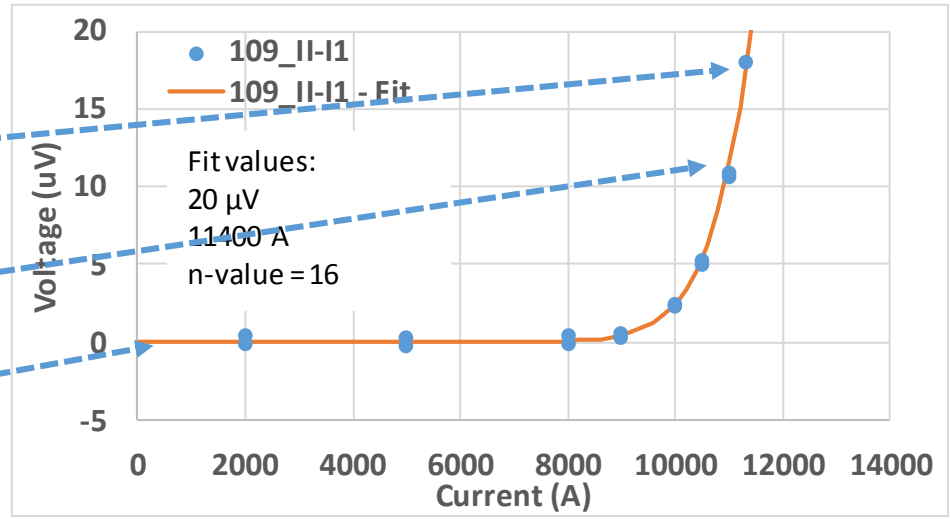
To exclude or confirm any effect of powering on the midplane degradation **two days** of cycling have been performed.

29 cycles per day, followed by a quench at 10 A/s ramp rate.

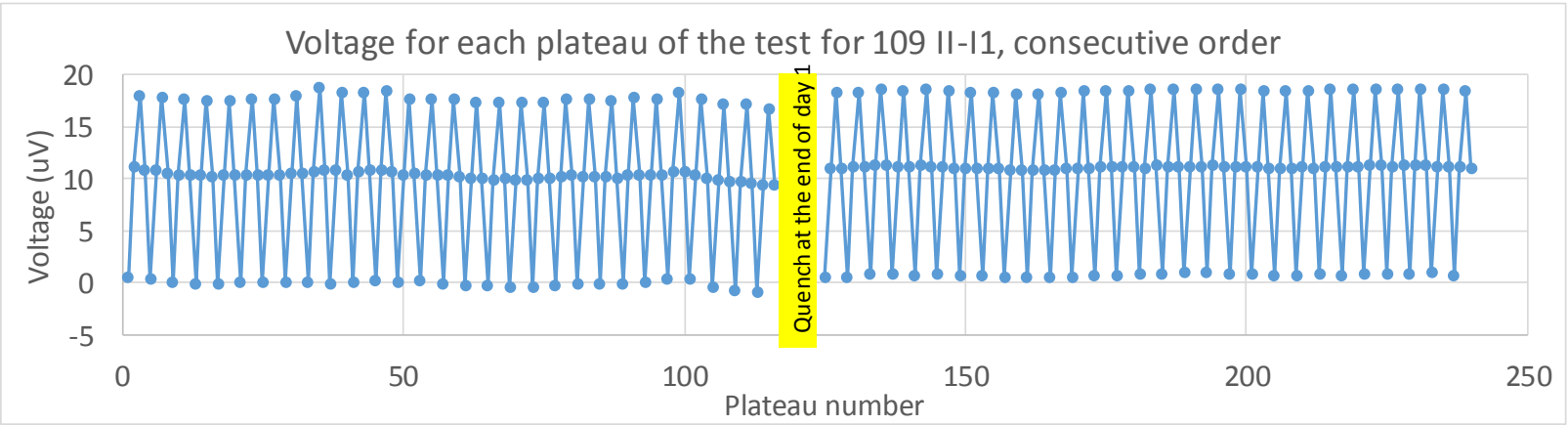
A cycle consists of 4 plateaus.
200 A, 11 kA, 11.3 kA, 11 kA.
Ramp up goes with 50 A/s to the first plateau, and 10 A/s to the 11.3 kA to avoid quench.

On each plateau the voltage is measured.

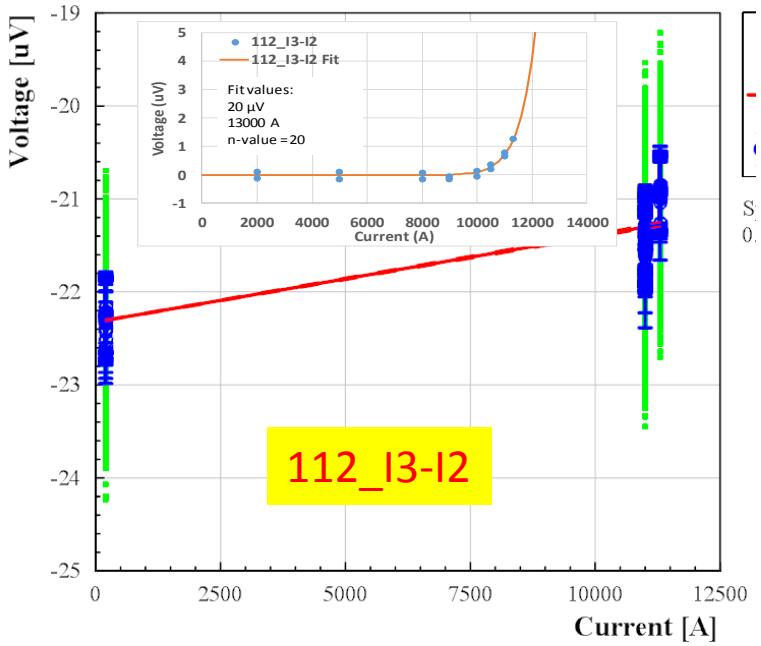


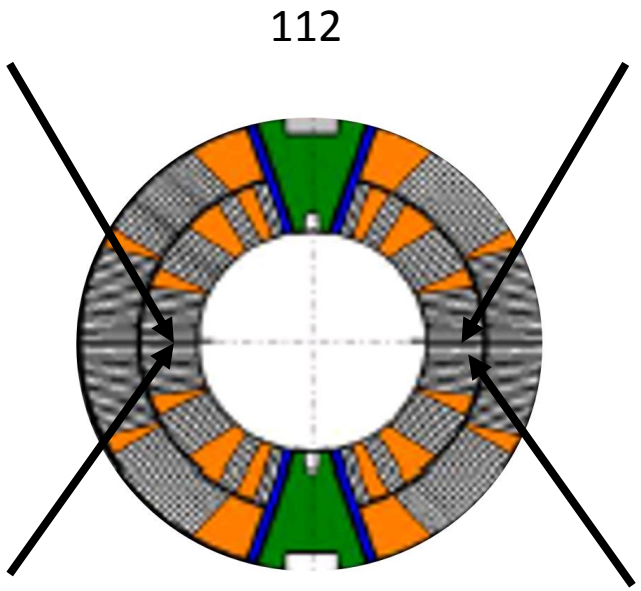


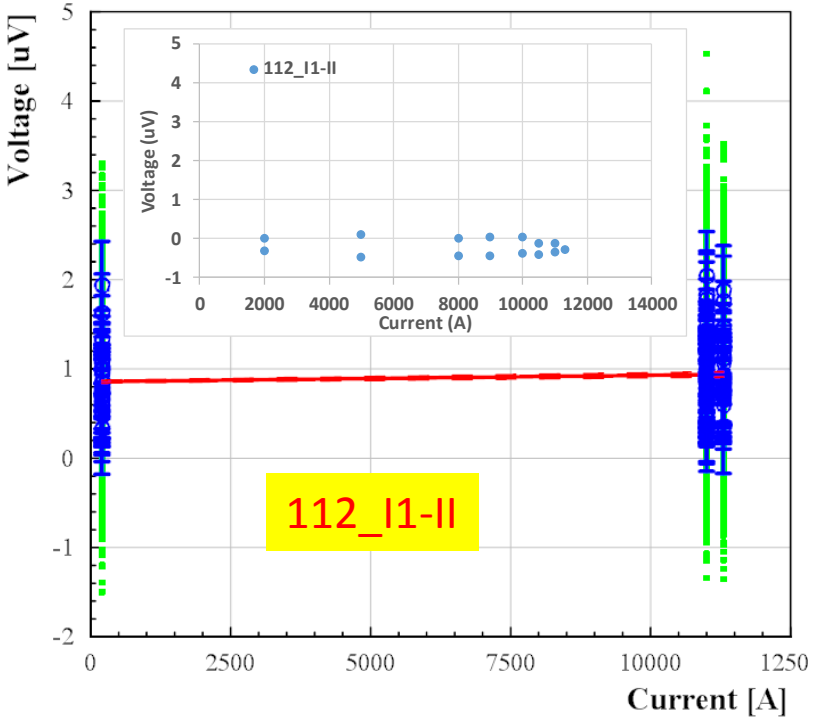
Measurements confirm earlier shown Voltage-Current data

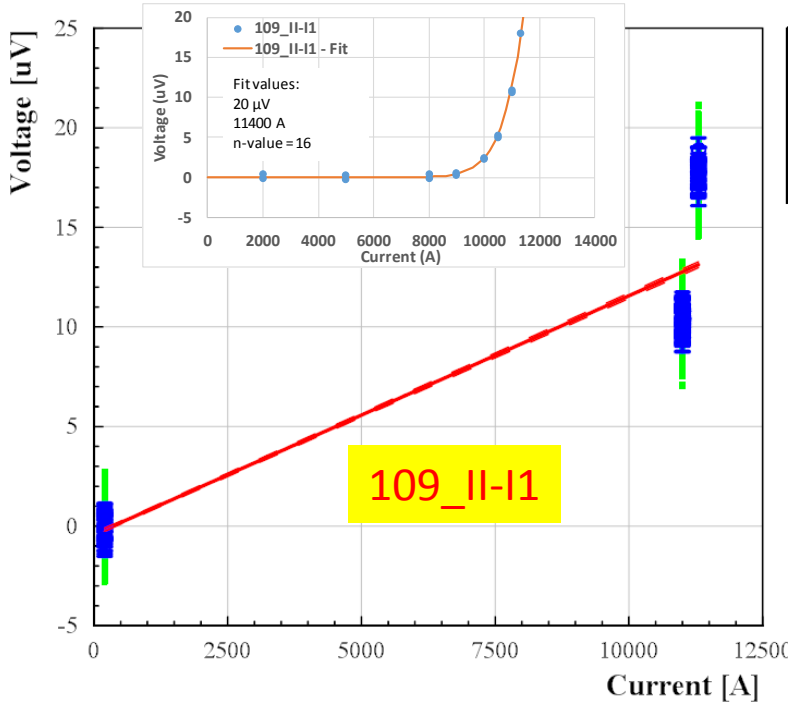


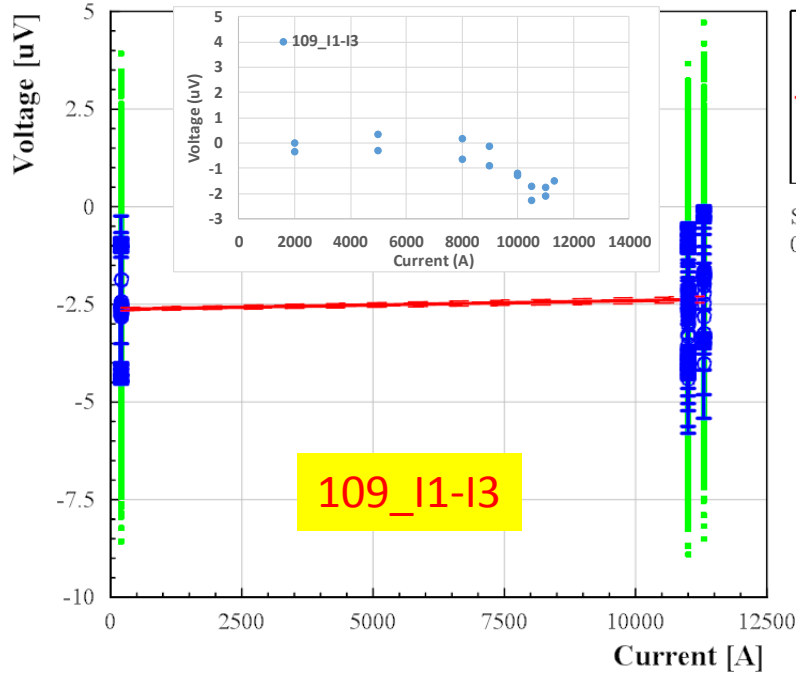
The voltages for all the plateaus (of quenching segment 109_II-I1) shows:
No significant change in voltage level (some drift of DMM)
No hysteresis between up and down at 11 kA
Confirmation of measurement accuracy and repeatibility.

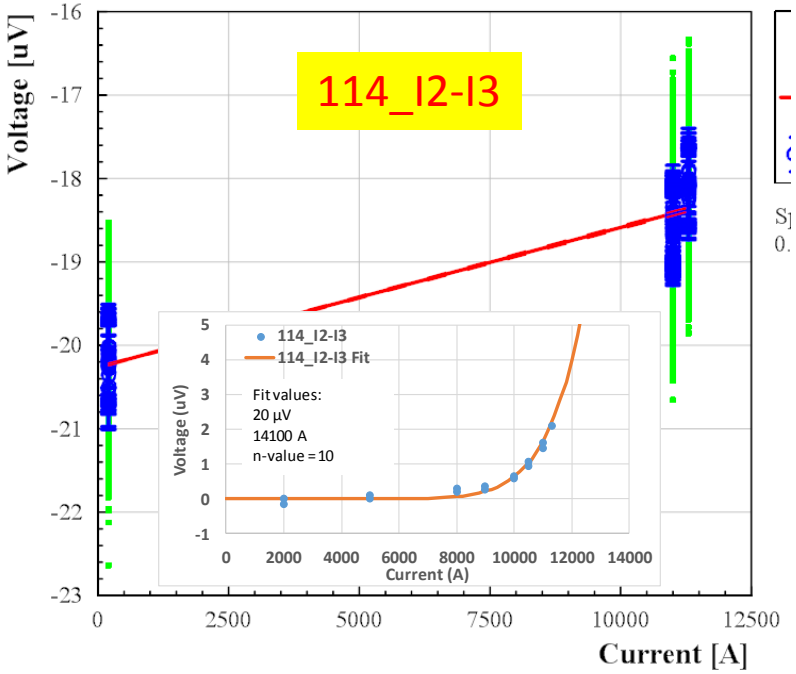

112_I3-I2
112_I3-I2 Fit
Fit values:
20 µV
13000 A
n-value = 20
Voltage [uV]
Current [A]
Voltage (uV)
Current (A)
112_I3-I2

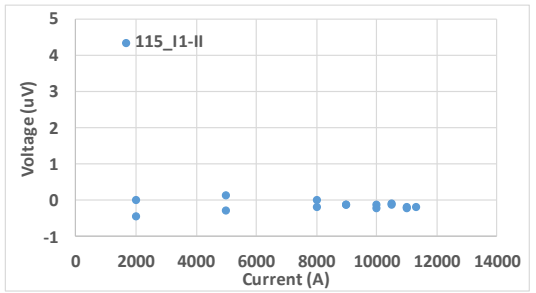

112
109


112_I1-II
Voltage [uV]
Current [A]
Voltage (uV)
Current (A)
112_I1-II


109_II-I1
109_II-I1 - Fit
Fit values:
20 µV
11400 A
n-value = 16
Voltage [uV]
Current [A]
Voltage (uV)
Current (A)
109_II-I1


109_I1-I3
Voltage [uV]
Current [A]
Voltage (uV)
Current (A)
109_I1-I3

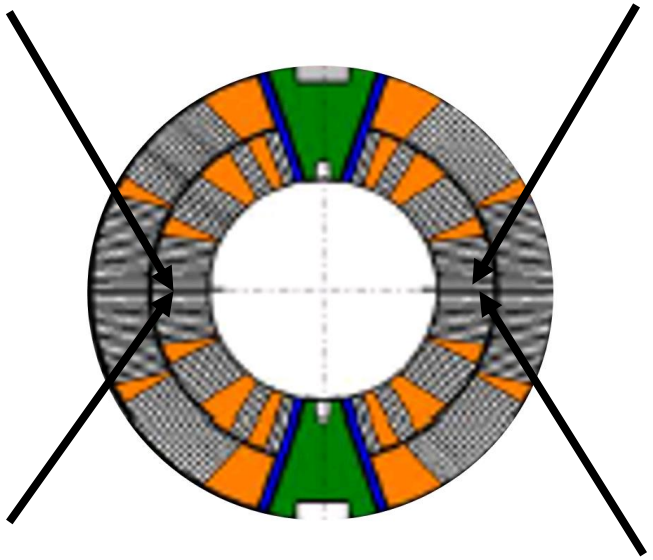




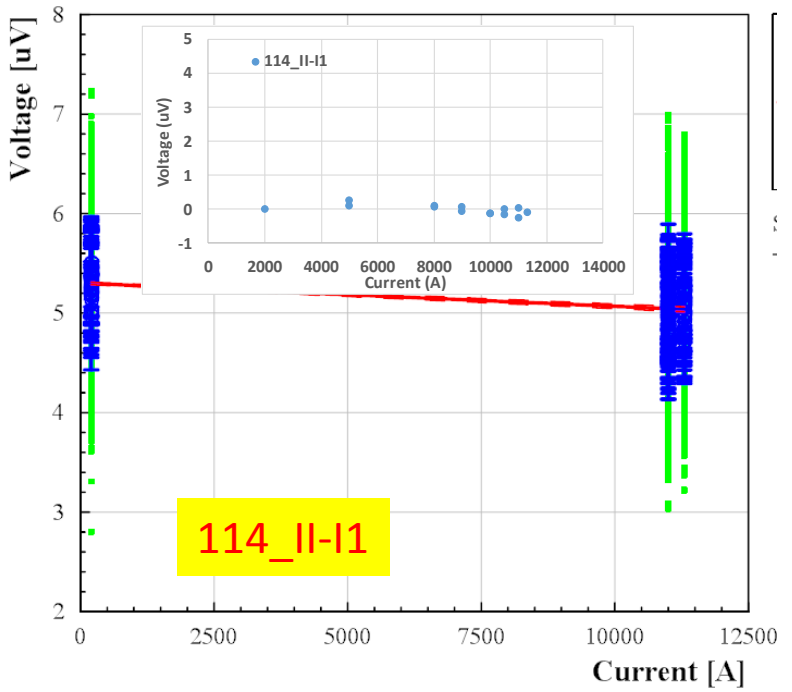
115_I1-II
(was excluded to use the channel for 109 I3-I4 measurement)

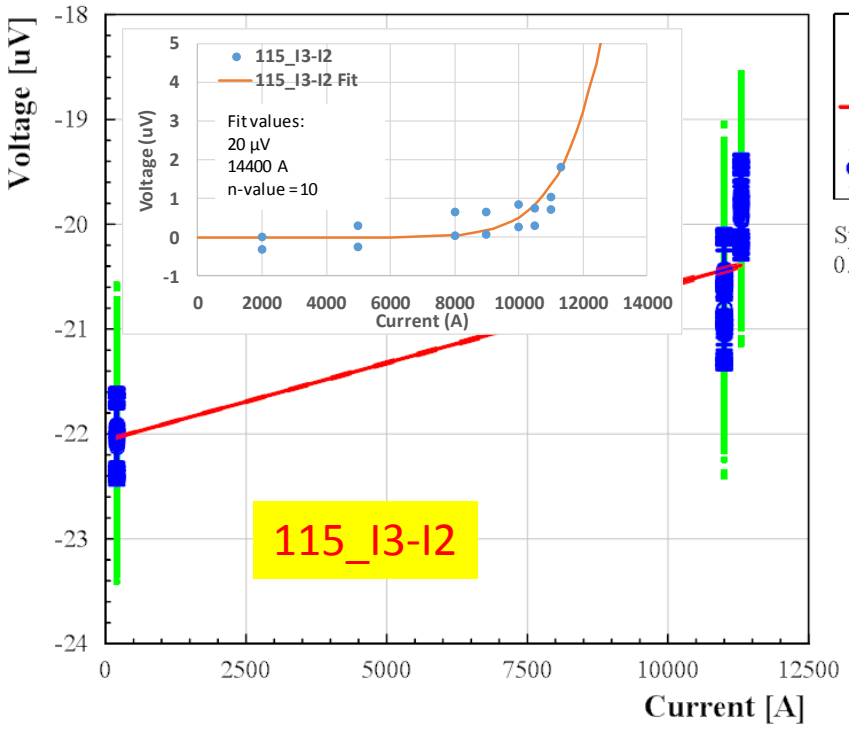
View from connection side

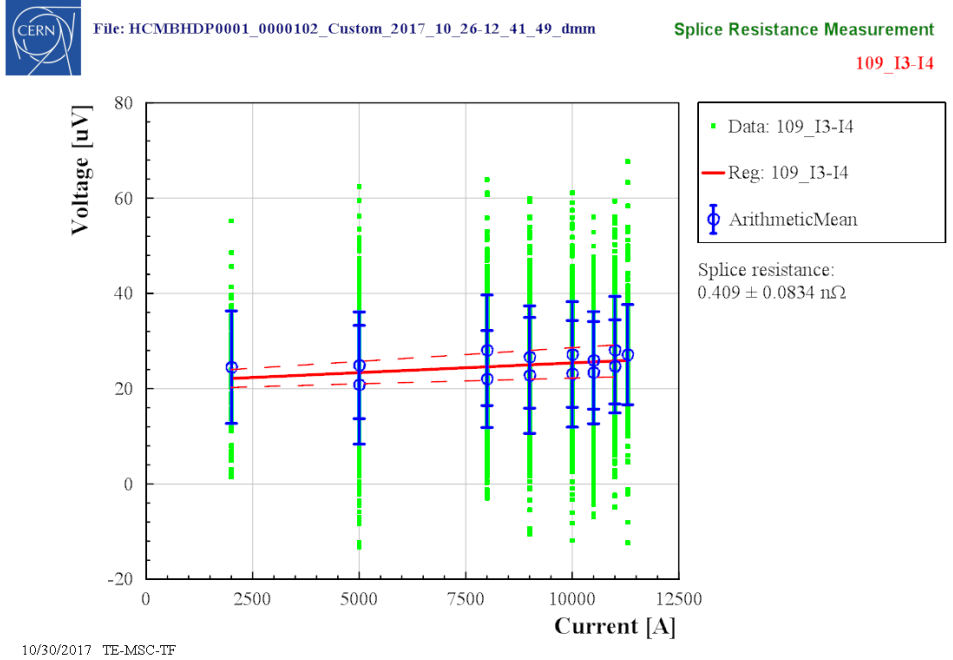
114



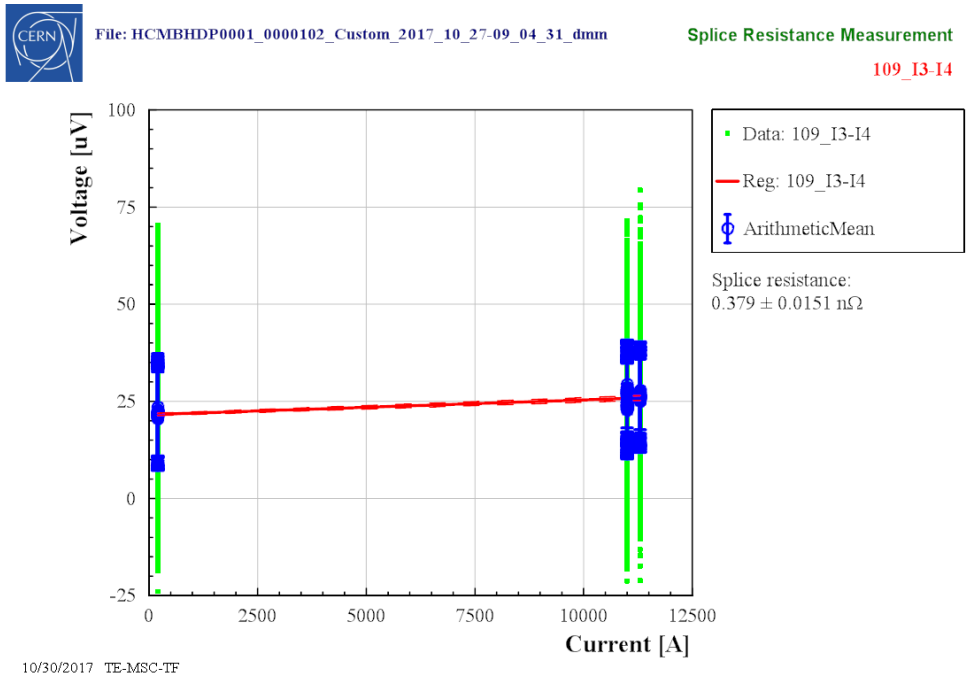
115





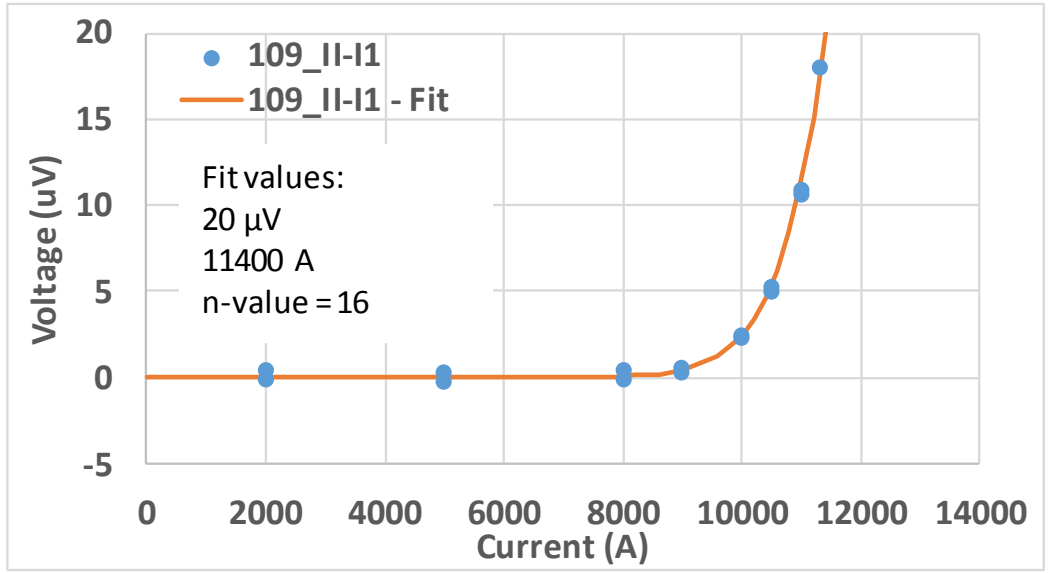


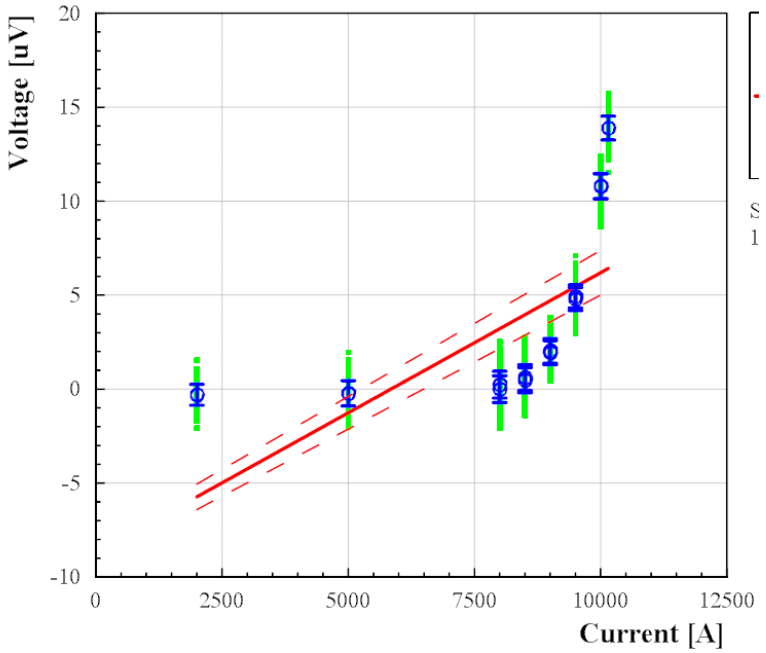
Multi turn block adjacent to quenching segment was measured too. (109-I3-I4)
Due to the large inductance of the block this is more noisy and has more side effects.



One can conclude:
V < 5 µV at 11.3 kA. This statement cannot be made much more precise due to lack of precision.

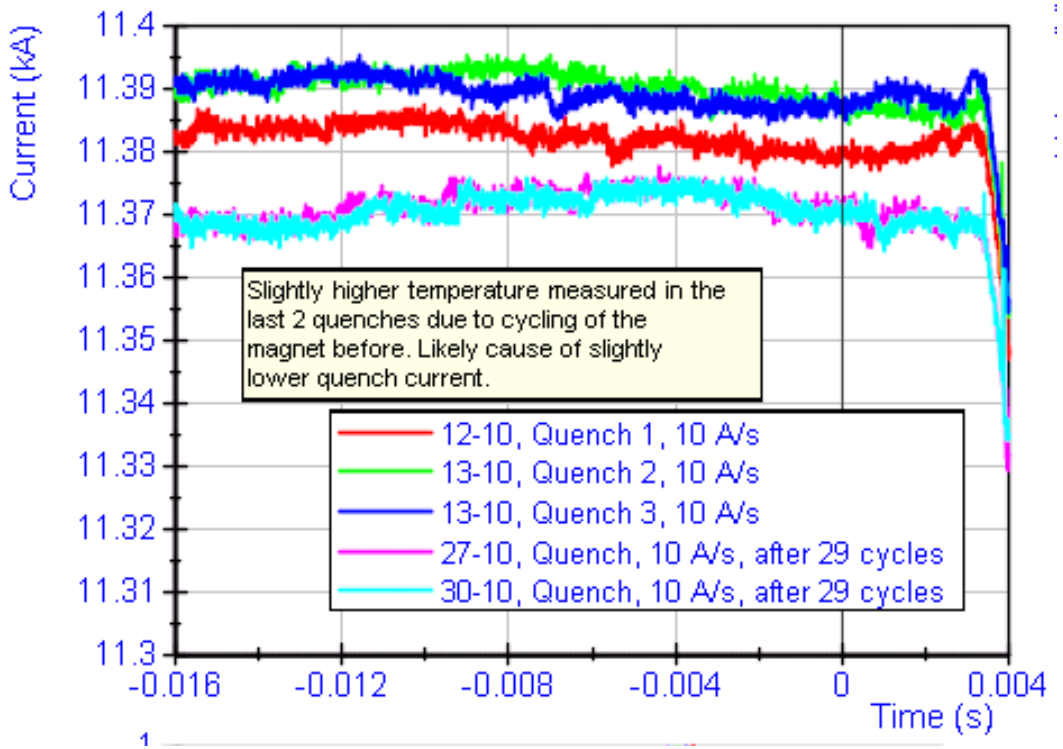
Resistance buildup at 1.9 K compared to 4.5 K



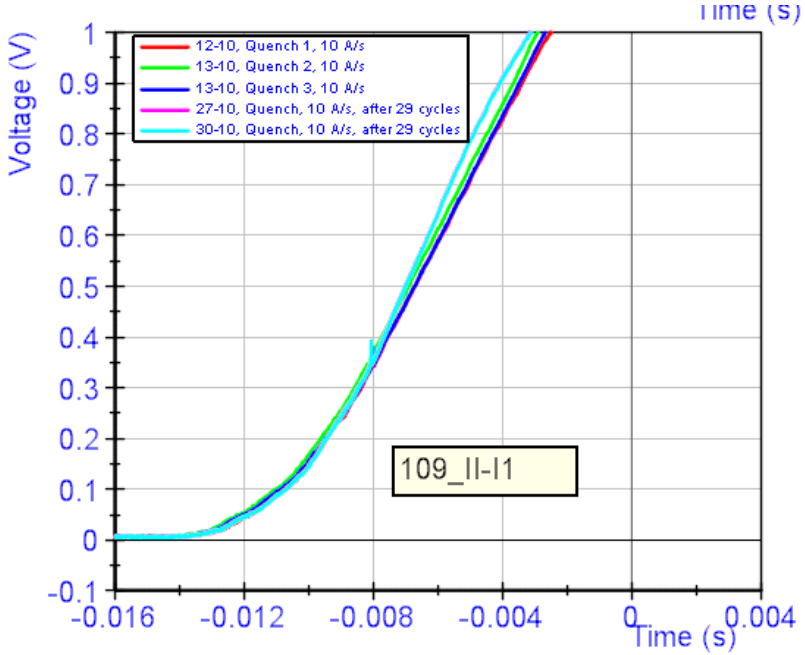


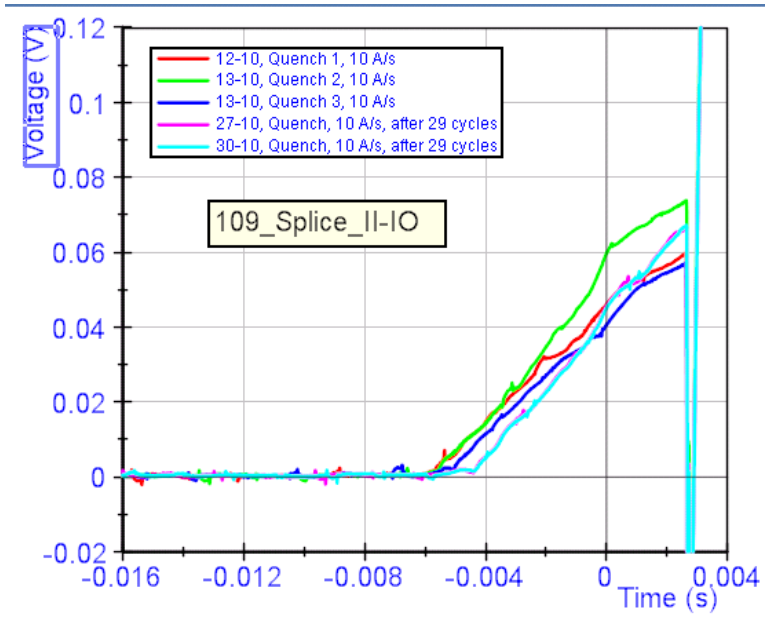
5 natural quenches at 10 A/s

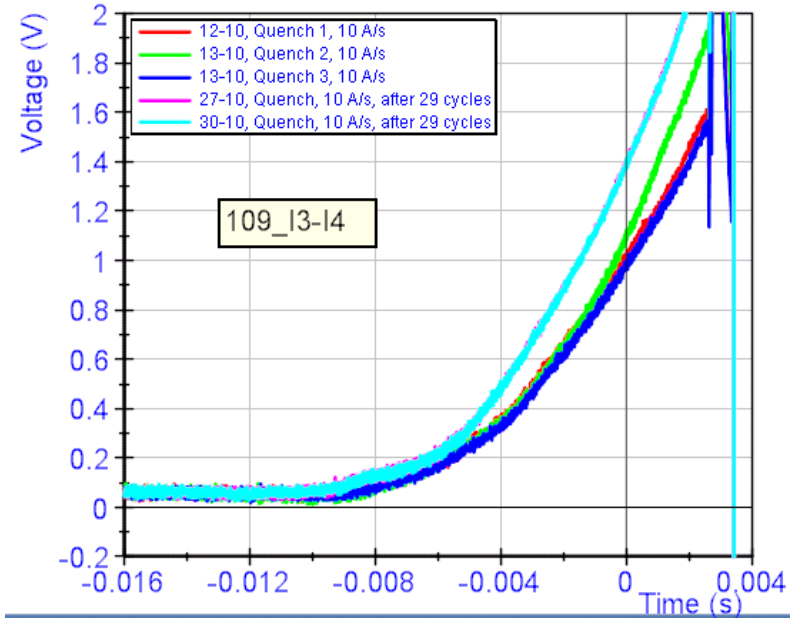
- First 3 training quenches were done at 10 A/s
- On Friday 27-10 after 29 cycles a quench cycle was done at 10 A/s
- On Monday 30-10 after 30 cycles a quench cycle was done at 10 A/s
- Quench current level between 11370 and 11390, dependent on bath temperature.

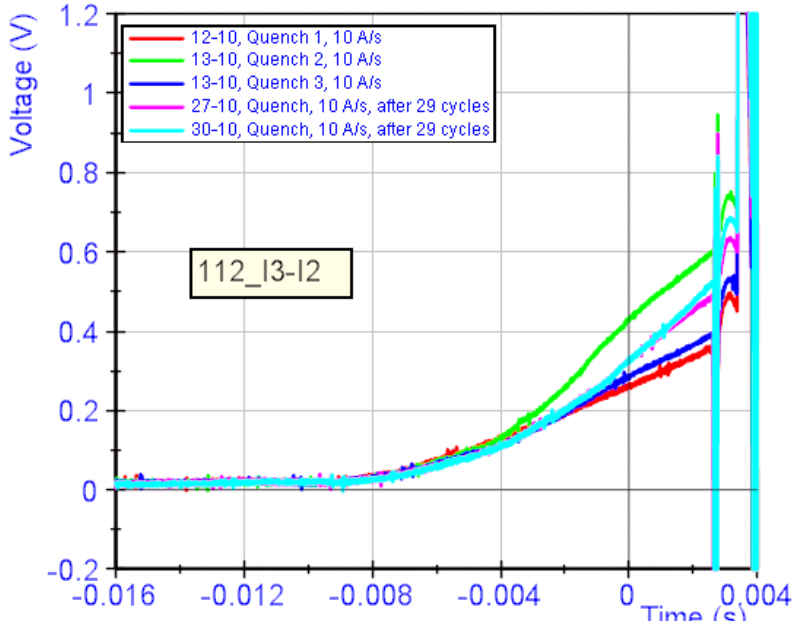


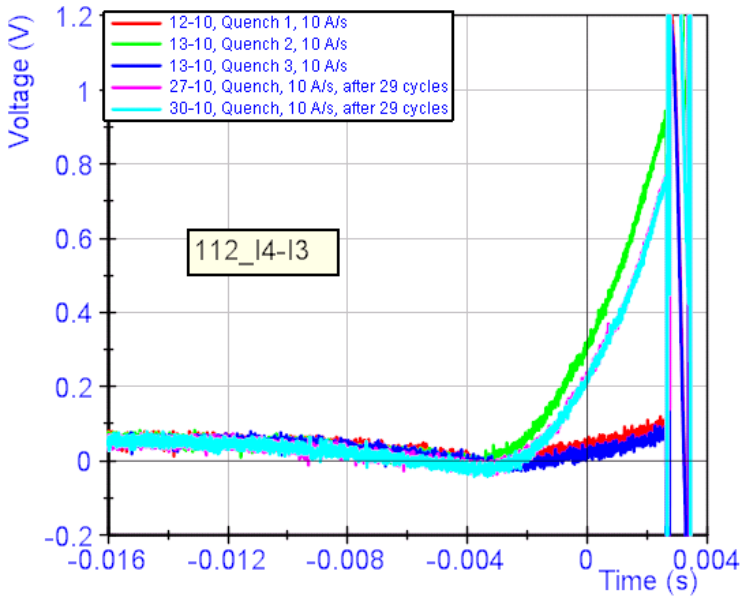
Comparison various signals during quench:





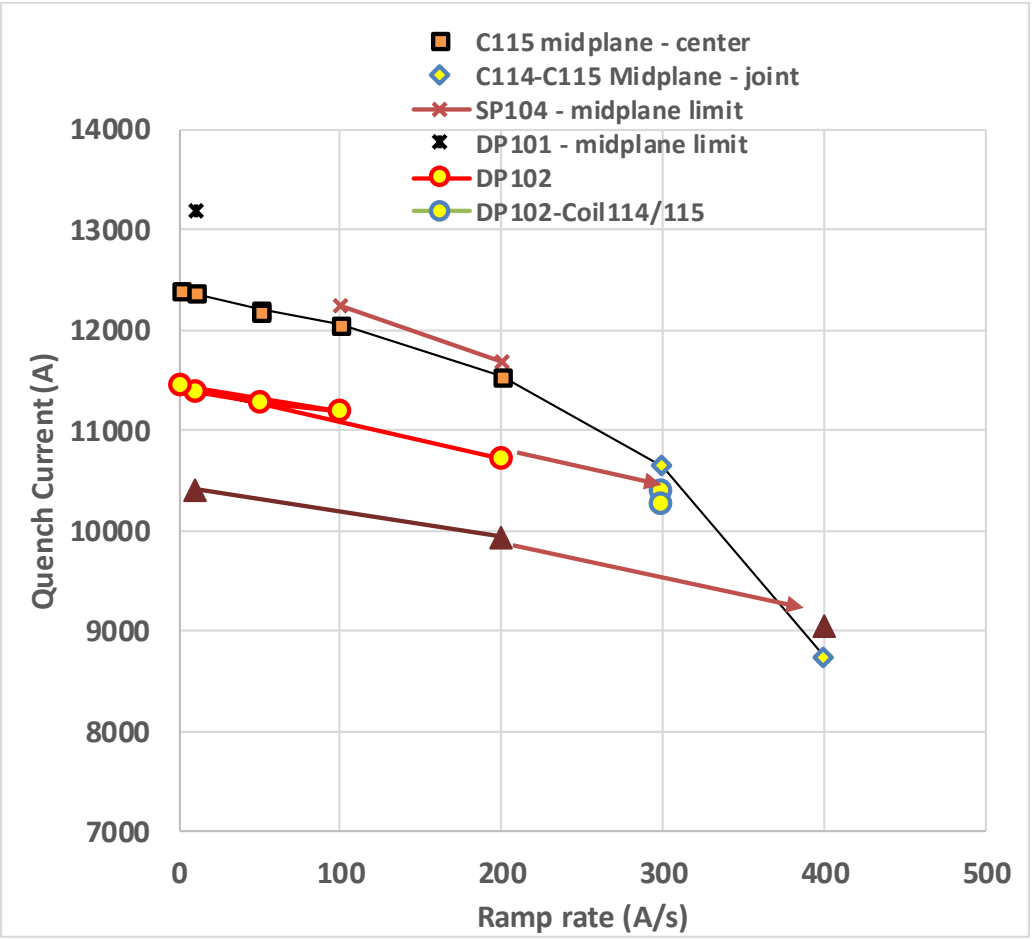






Observation:
No variation in quenching segment
Some variation in coil 112 segments.

Difficult to link the variations to an increased or reduced conductor performance.
Quench Antenna show differences, possibly due to different propagations in coil 112.



Ramp rate studies:

At 300 A/s at 1.9 K the quench location shifts to coil 114-115

At 400 A/s at 4.5 K the quench current of DP102 is higher than at 1.9 K of SP105

To be continued

Quick conclusion

- 58 current cycles confirm start of resistive transition in 4 out of 8 midplane segments.
- Accuracy and repeatability of the resistance measurements confirmed.
- No visible degration after two times a day with 29 cycles to 11.3 kA, followed by a quench at the end of each day.

Program

To do at 4.5 K

RR 200 A/s

Magnetic measurement, 1 cycle.

Additional test

Add an AC current at high current to generate loss and verify the temperature of the conductor.

Warmup Thursday afternoon – Friday ???