

Helicity Magnets' Control Upgrade

December 27, 2011

Today's Controls

- I. Both nHelicity Flip and T_Settle fibers are sent to Controls. T_Settle is not used.
- II. DAC of -8000 \rightarrow 8000 gives -50 mA \rightarrow 50 mA
- III. Slopes of about 0.1 $\mu\text{m}/\text{DAC}$ in the 5 MeV region

`/cs/opshome/edm/hel_mag/hel_mag.edl`

5 MeV Helicity Magnets Control (Ops) Help Screen ->

	MHE0L01V (Ch.1)	MHE0L02H (Ch.2)	MHE0L03V (Ch.3)	MHE0L03H (Ch.4)
Even Setpoint	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Odd Setpoint	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Manual	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Channel Output	<input type="button" value="Off"/> <input type="button" value="On"/>	<input type="button" value="Off"/> <input type="button" value="On"/>	<input type="button" value="Off"/> <input type="button" value="On"/>	<input type="button" value="Off"/> <input type="button" value="On"/>
Load Select	<input type="button" value="Magnet"/> <input type="button" value="Resistor"/>	<input type="button" value="Magnet"/> <input type="button" value="Resistor"/>	<input type="button" value="Magnet"/> <input type="button" value="Resistor"/>	<input type="button" value="Magnet"/> <input type="button" value="Resistor"/>

Output Select:

Hel State Asymmetry:

Emmulation mode delay Above values scaled by and then biased by adding prior to 12-bit DAC out.

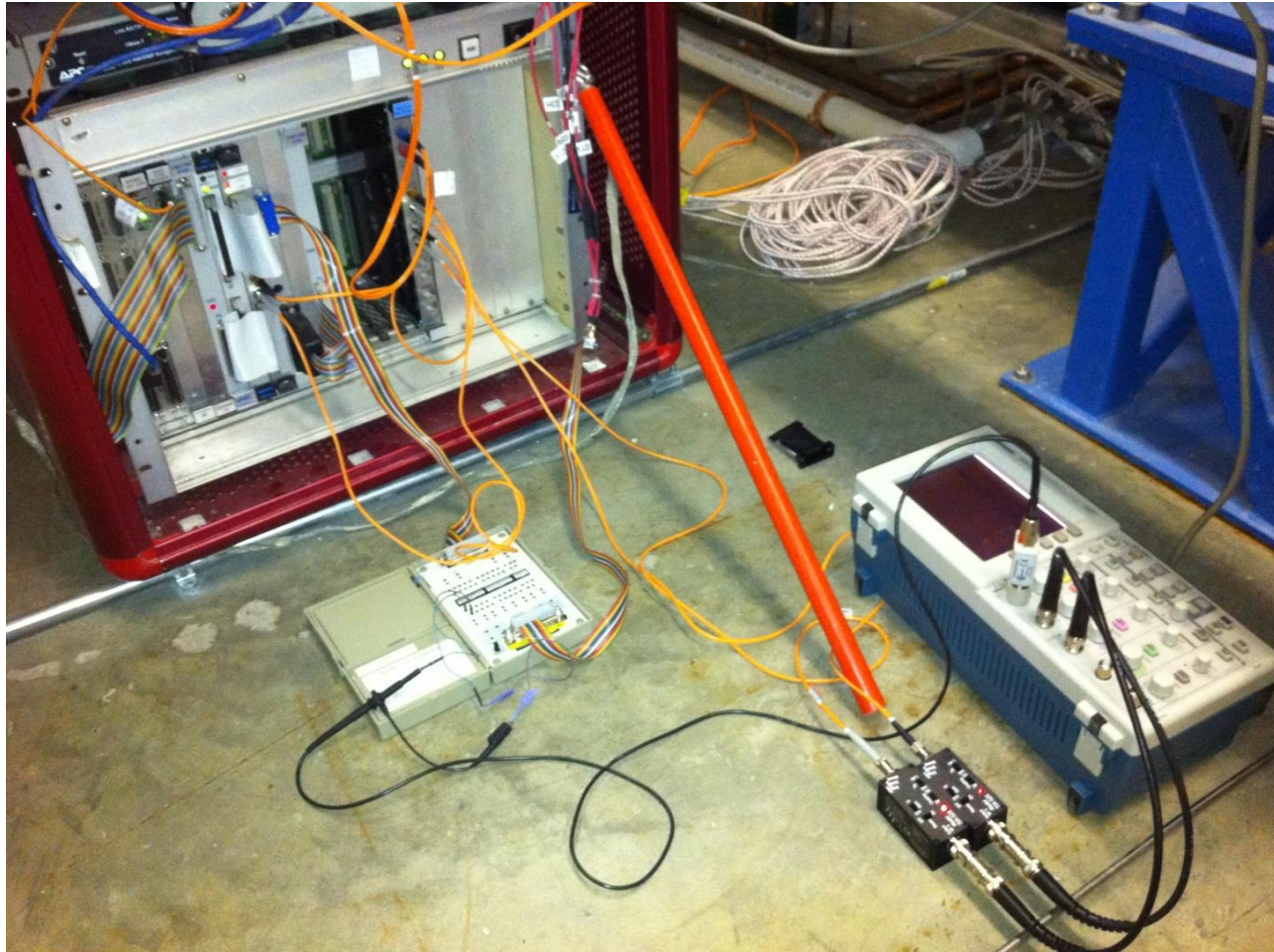
! Helicity Magnets Control 30 hz Mode -> Loop delay after MPS before reading helicity state (0 - 1000)->

Changes to Controls

- I. Output Select: Helicity Mode, 30 Hz Beam Mode, Manual
- II. Remove few features – marked by X

The screenshot shows the control interface for the 5 MeV Helicity Magnets. The window title is `/cs/opshome/edm/hel_mag/hel_mag.edl`. The main title is **5 MeV Helicity Magnets Control (Ops)**. The interface is organized into four columns for channels **MHE0L01V (Ch.1)**, **MHE0L02H (Ch.2)**, **MHE0L03V (Ch.3)**, and **MHE0L03H (Ch.4)**. Each channel has a set of controls: **Even Setpoint** and **Odd Setpoint** (both set to 0), a **Manual** control (set to 0), **Channel Output** (Off/On), and **Load Select** (Magnet/Resistor). On the right side, there is an **Output Select** section with buttons for **Helicity Pattern** and **Manual**, and a **Hel State Asymmetry** section with a **Reset** button marked with a red X. At the bottom, there are several fields: **Emmulation mode delay** (Set to 0 for normal in!) marked with a red X and a red box containing 0; **Above values scaled by** marked with a red X and a blue box containing 1000; and **Loop delay after MPS before reading Helicity state (0 - 1000)** marked with a red X and a blue box containing 0. A status bar at the bottom shows **Helicity Magnets Control**, **30 hz Mode -> Off On**, and a blue box containing 0.

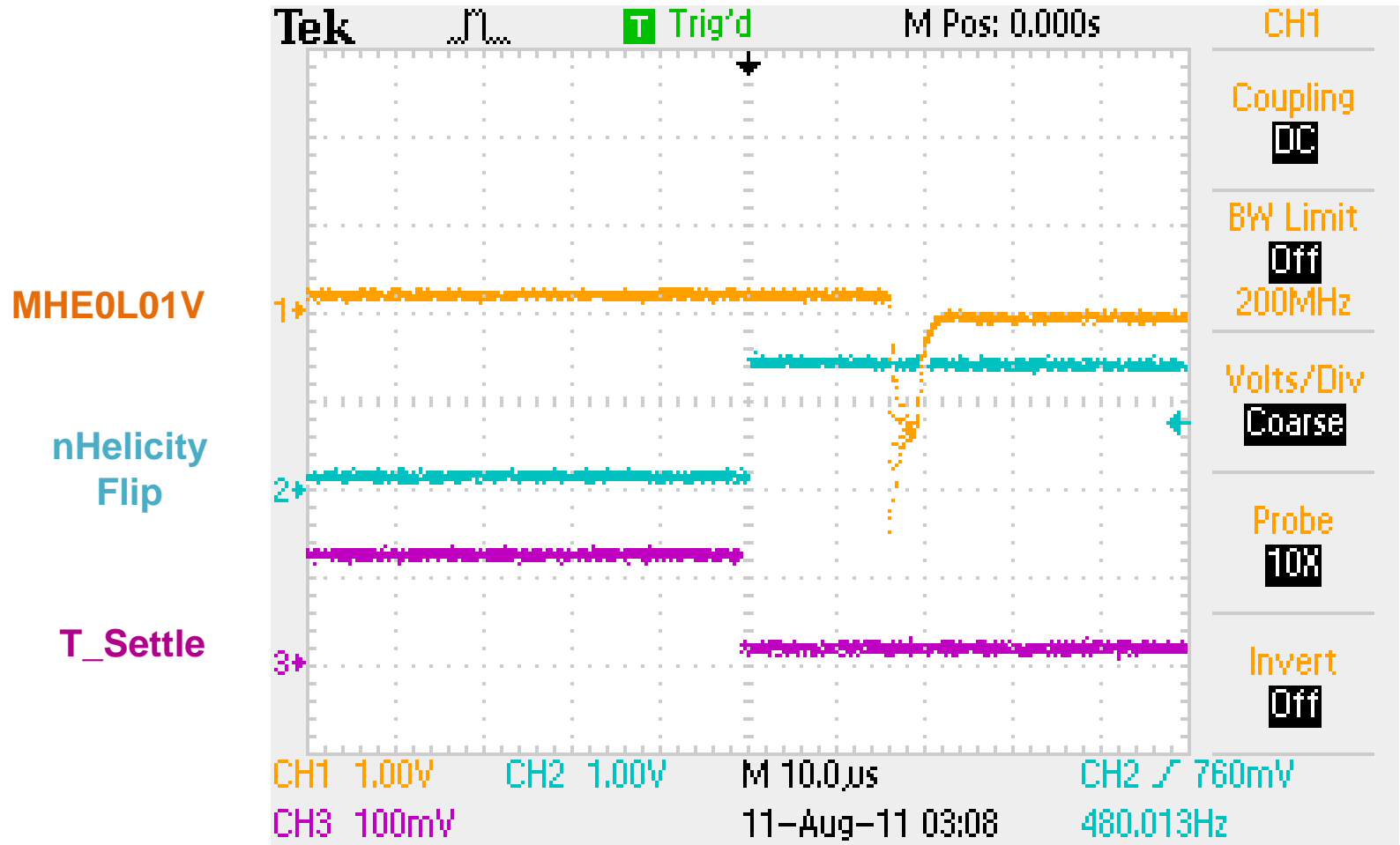
Checked Magnet's Voltage on Scope



Overshoot, Rise Time & Delay

Even Setpoint = 8000

Odd Setpoint = -8000



Output Noise

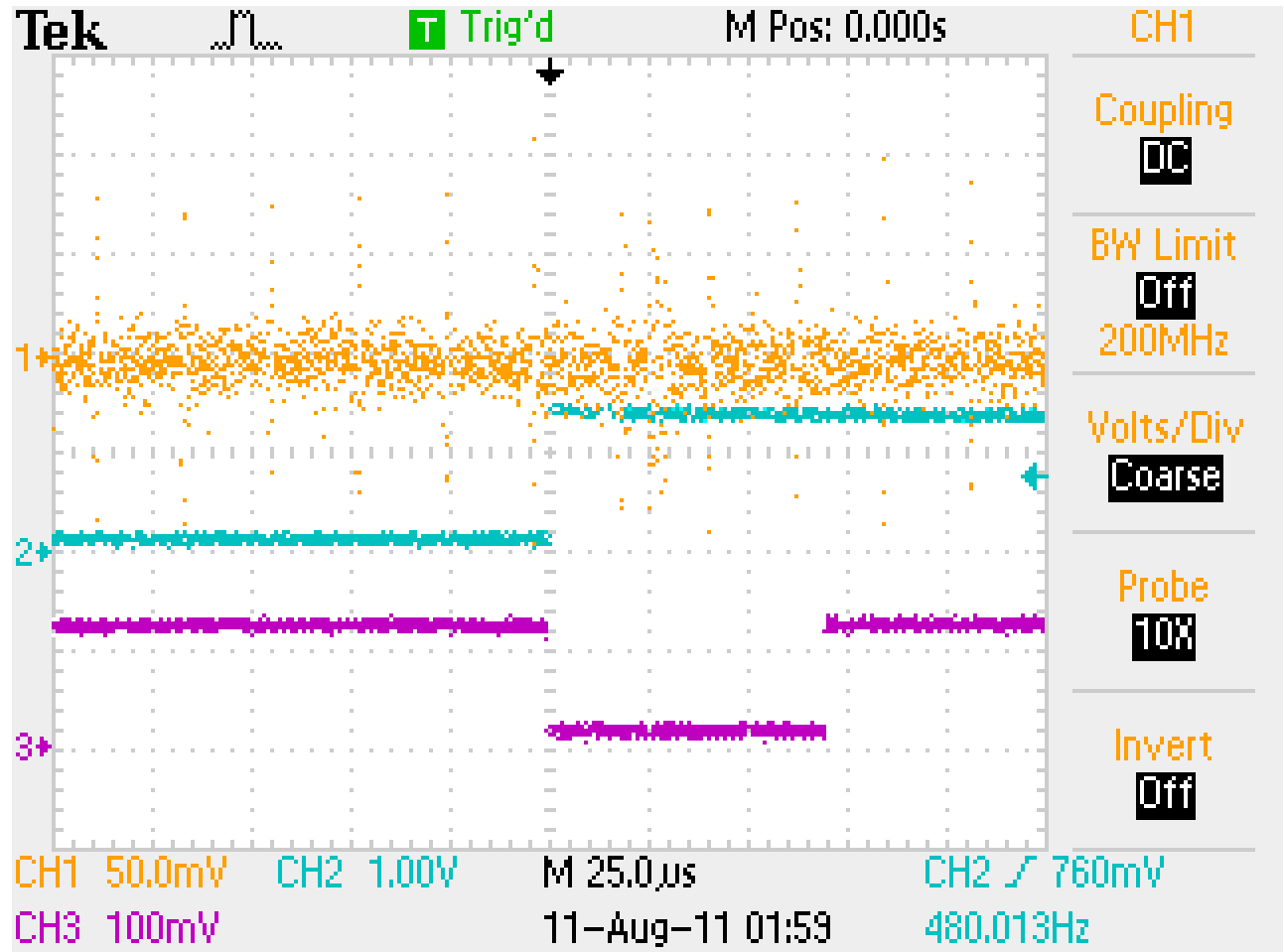
Even Setpoint = 0

Odd Setpoint = 0

MHE0L01V

nHelicity
Flip

T_Settle



Changes to Controls

- I. Overshoot: Reduce Overshoot to be less than 10% of the Setpoint
- II. Rise Time: Increase Rise time from about 4 μs to 10 μs
- III. Reduce the delay between the nHelicity Flip and magnet output from 17 μs to less than 1 μs
- IV. Output Noise: Reduce output noise to less than 1% of the setpoint at all frequencies
- V. Change to 16-bit DAC to reduce slopes to be about 0.01 $\mu\text{m}/\text{DAC}$