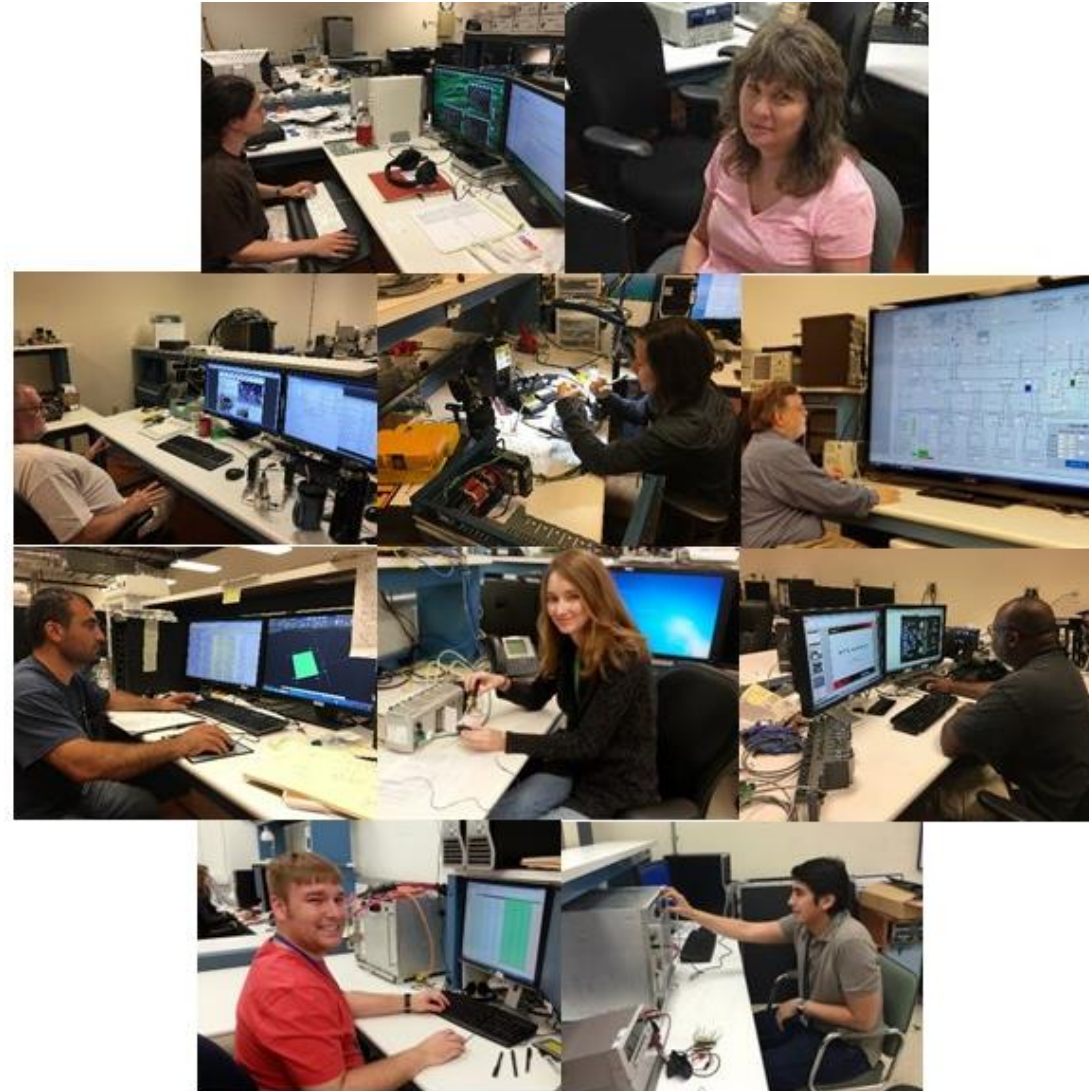


# HDIce Status Report

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# Detector Support Group



# Contents

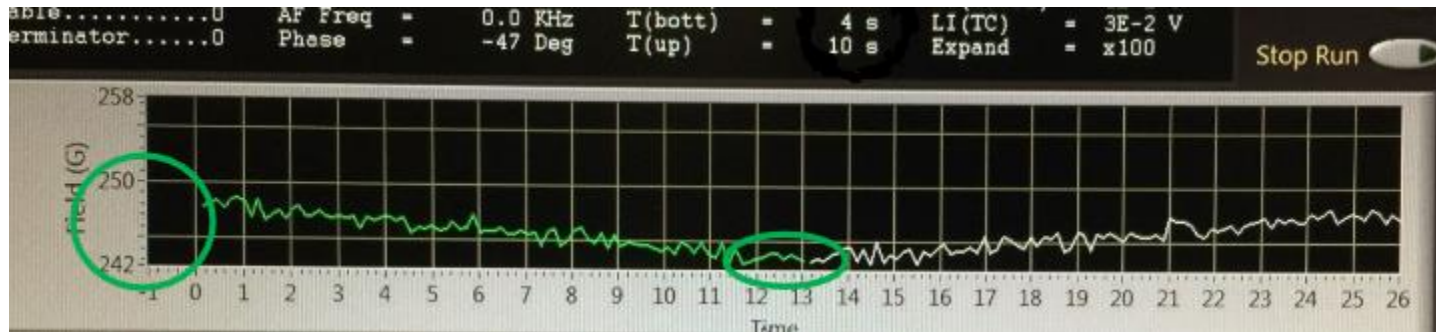
- NMR program problems.
- CT-Box noise test.
- CT-Box and lock-in amplifier synchronization.
- Current work status.

# Program Problems

- Status Report from HDIce sent 1/26/17.
- Outlined 3 problems:
  1. CT-Box noise issue of 2 Gauss.
  2. CT-Box enabled and disabled features not working.
  3. Triggering every lock-in data read with separate trigger unnecessary.
    - Single trigger was suggested.

# CT-Box Noise

- Report statement: HDIce report stated field signal noise in CT-Box enabled condition appears way too high, on order of 2 gauss.



- DSG response: CT-Box noise test conducted in control room does not show 2 gauss noise.

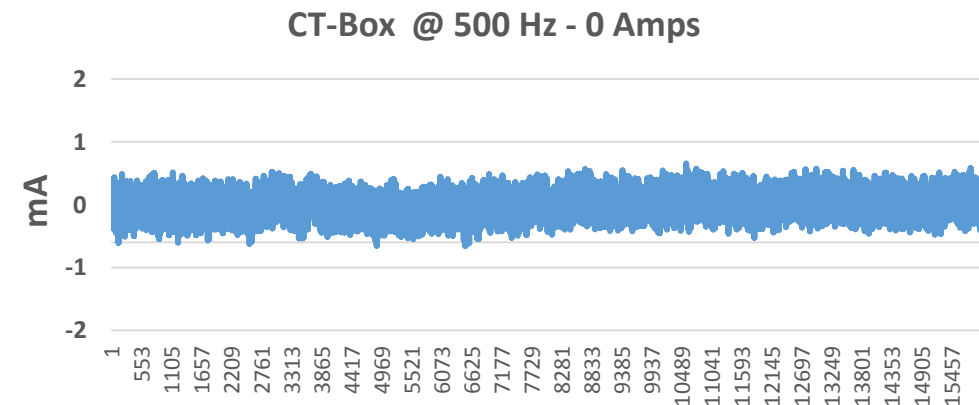
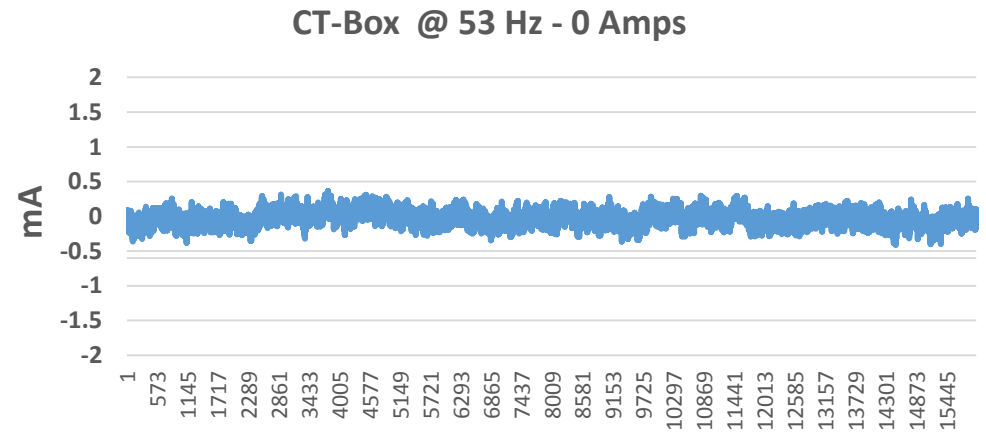
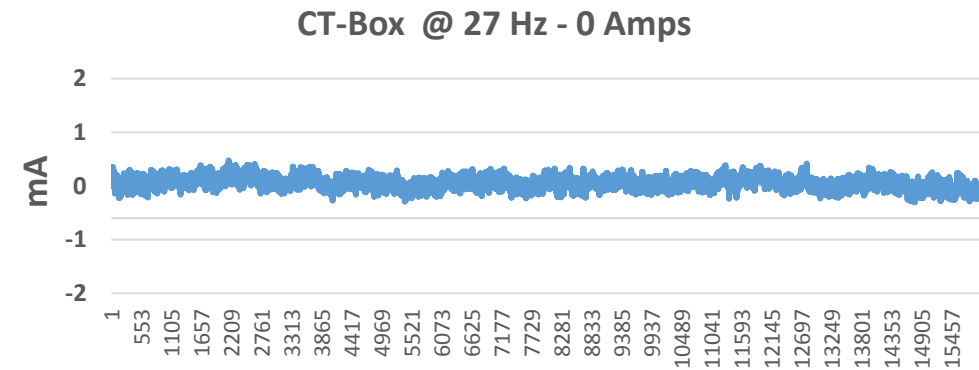
# CT-Box Data Acquisition Program

The screenshot displays the CT-Box Data Acquisition Program interface, which is divided into several functional areas:

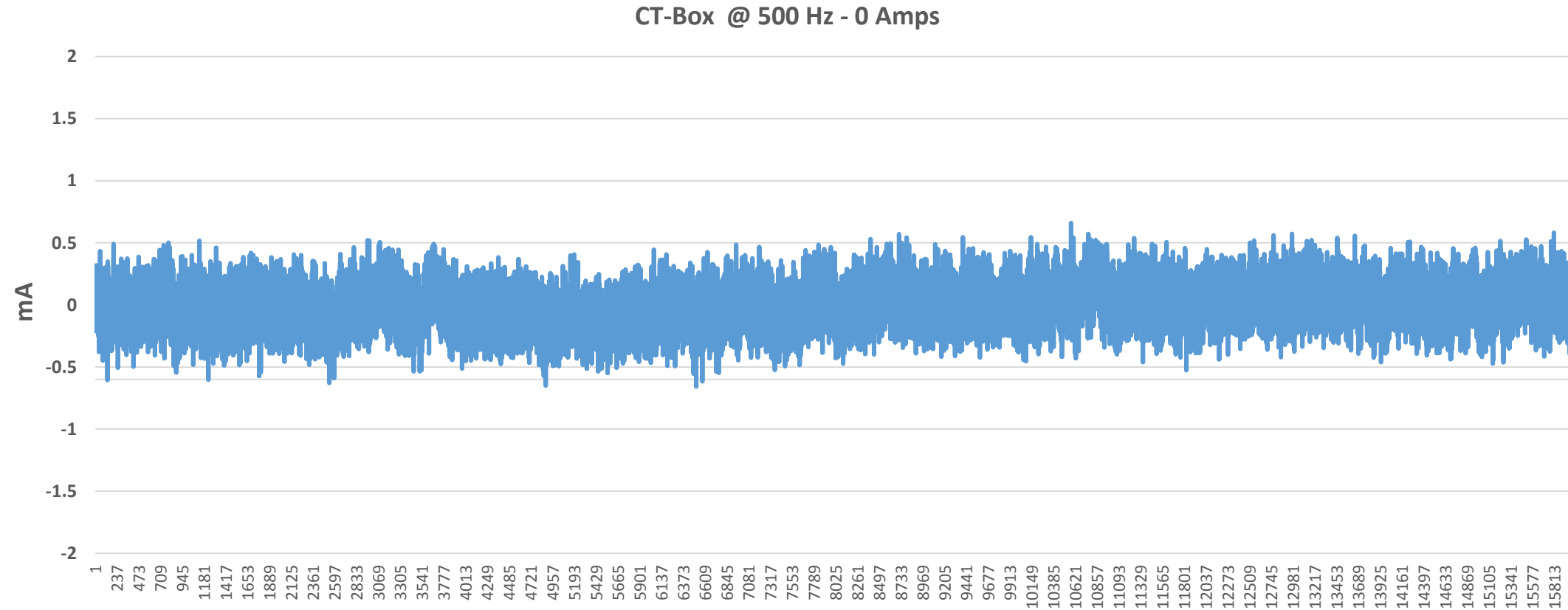
- Communication Channel:** A dropdown menu set to "ETH".
- Connect via COM Port:** Includes "CONNECT" and "DISCONNECT" buttons, a "COM Port Number" dropdown set to "COM17", and a "COM Port Connected" indicator.
- Connect via Ethernet:** Includes "CONNECT" and "DISCONNECT" buttons, an "IP address" field set to "192.168.1.101", and an "ETH Connected" indicator.
- Correct Offset:** An "Offset" button and a note that "Current MUST = ZERO".
- Choose File Option BEFORE Program Start:** Includes "File Control" options for "Write to File?", "Delete old Files?", and "Continuous Sequence #?".
- Identification:** An "IDENTIFY" button and a text field containing "CT-BOX\server\sl.040\r".
- EXIT:** A large red "EXIT" button.
- Trigger Controls:** Includes "Input Trigger", "Output Trigger @ Acq Freq", "Output Trigger (10Hz)", and "Trigger Off", each with a play button and status indicator.
- ACQ Controls:** Includes "ACQ ON", "ACQ OFF", "ACQ Running", and "Abort ACQ" buttons.
- Exit After First Cycle?:** A button set to "OFF".
- Graph length:** A numeric input field set to "16000", circled in red. A note below it states "6000 max for 100KHz (Single Data sequence length)".
- % Acquisition Complete:** A numeric input field set to "0".
- % Processing Complete:** A numeric input field set to "0".
- TS (Sampling Time Interval) Range:** 10us to 1000000us (1 Sec) in incremental steps of 10us. Frequency Range: 100KHz to 1Hz. 2000us = 500Hz (Lock-in Amp max).
- TS:** A checkbox labeled "TS".
- Set Sampling period (us):** A numeric input field set to "2000".
- PRINT-ON:** A button labeled "PRINT:ON".
- Set period -Text (us):** A numeric input field set to "2000".
- ETH bytes to read:** A numeric input field set to "100000".
- Set Acquisition Rate (Hz):** A numeric input field set to "500", circled in red.
- Set Acquisition Rate (KHz):** A numeric input field set to "0.5".
- Command Response:** A text field containing "ACK\r".
- return count:** A numeric input field set to "0".
- Base path:** A text field containing "O:\DSG\_Slow\_Controls\HDice\CAENels Current Shunt CT-Box\LabVIEW\Datafiles".
- filename:** A text field containing "testdata 50 kHz @ 0V - 16K - 3-01-2017 -V1.txt".
- Y Scale, Offset and Multiplier:** Includes "Offset" (0), "Multiplier" (1), "Y Scale, Range: Maximum" (2), and "Y Scale, Range: Minimum" (-2).
- Output Units:** A dropdown menu set to "mA".
- Start of Run Sequence #:** A numeric input field set to "0".
- End of Run Sequence #:** A numeric input field set to "0".
- Current Cycle #:** A numeric input field set to "1".
- First Run Cycle:** A green indicator light.
- Data Array Size:** A numeric input field set to "16000".
- CT-Box Data Array:** A list box showing "0 16001 -0.056244".
- Graph:** A central plot showing "Current (Output Units)" on the y-axis (ranging from -2.0000 to 2.0000) versus "Acquisitions" on the x-axis (ranging from 0 to 16000). The plot displays a noisy signal fluctuating around zero.

# Noise Test for Varying Frequency

- Tested at 27 Hz, 53 Hz, and 500 Hz.
  - Frequency chosen due to min and max scan times.
- Signal shown to center 0 mA and not exceed 1 mA.



# Noise Test at 0A, 500 Hz

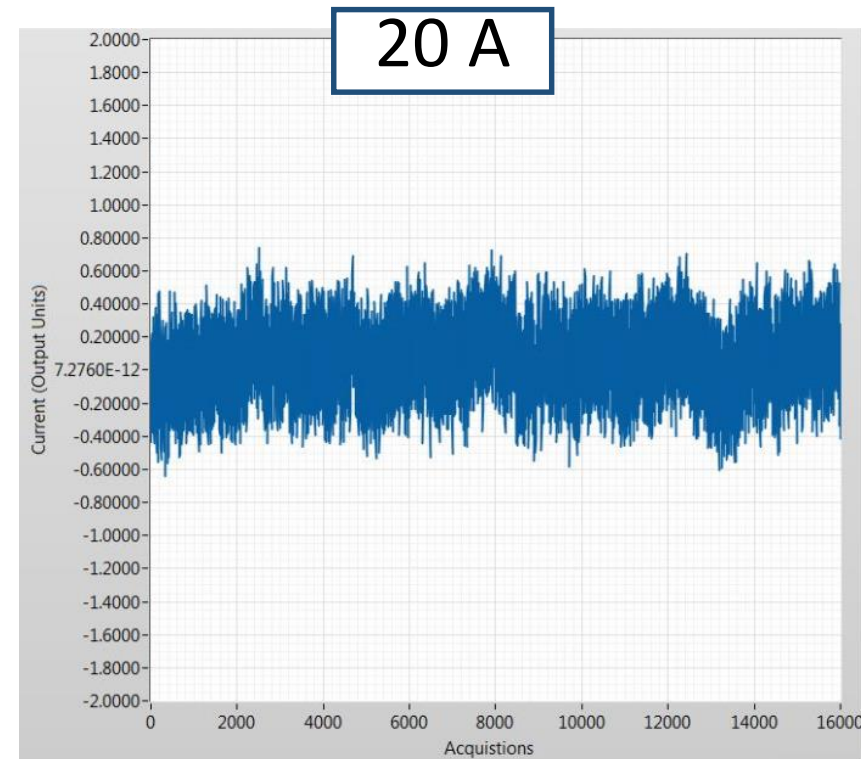
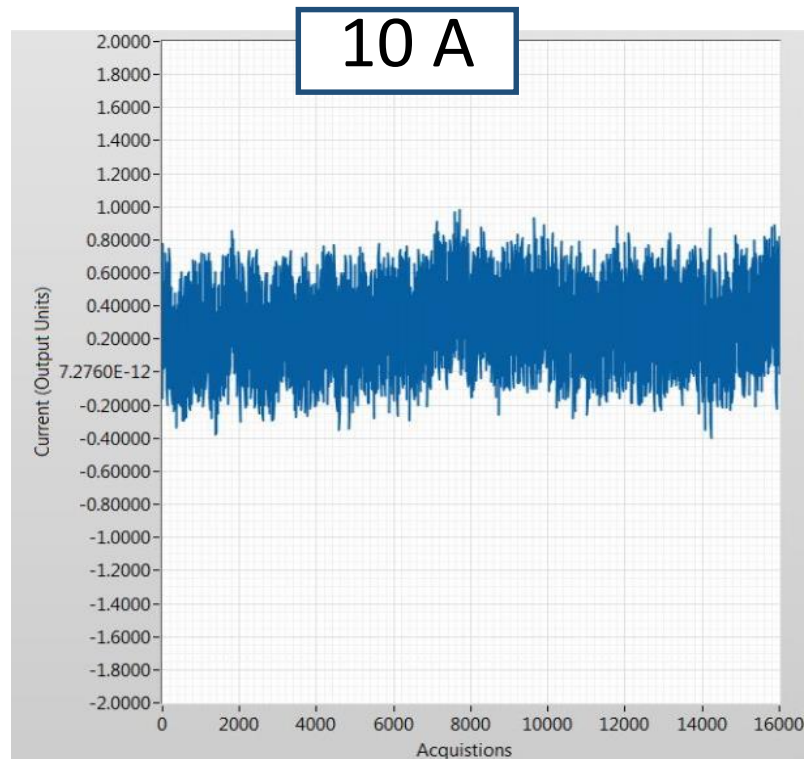


1 gauss is 1.994mA for PDI and 1.937mA for PDII



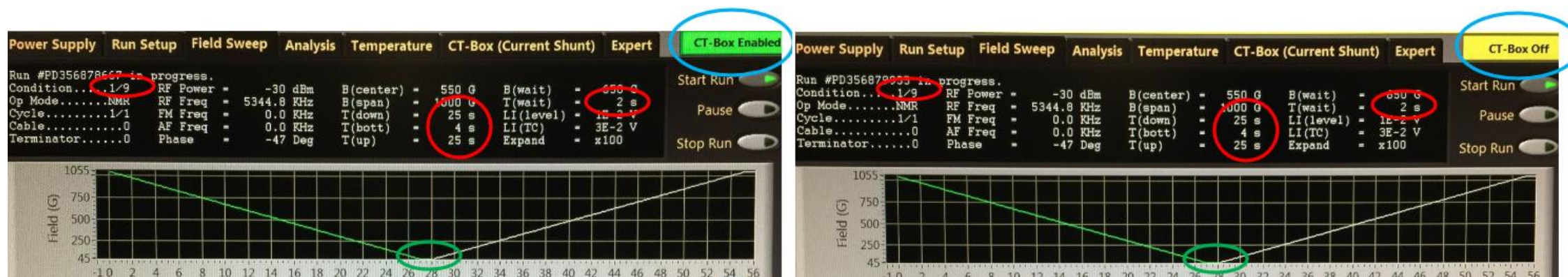
# Noise Test for Varying Current

- Signals for 10A and 20A at 500 Hz (in mA).
  - Signals are offset to 0A for comparison.



# CT-Box Enable/Disable

- Report statement: No difference in graphs with CT-Box enabled vs disabled.



- DSG response: CT-Box Enable and Disable features must be selected before running VI.

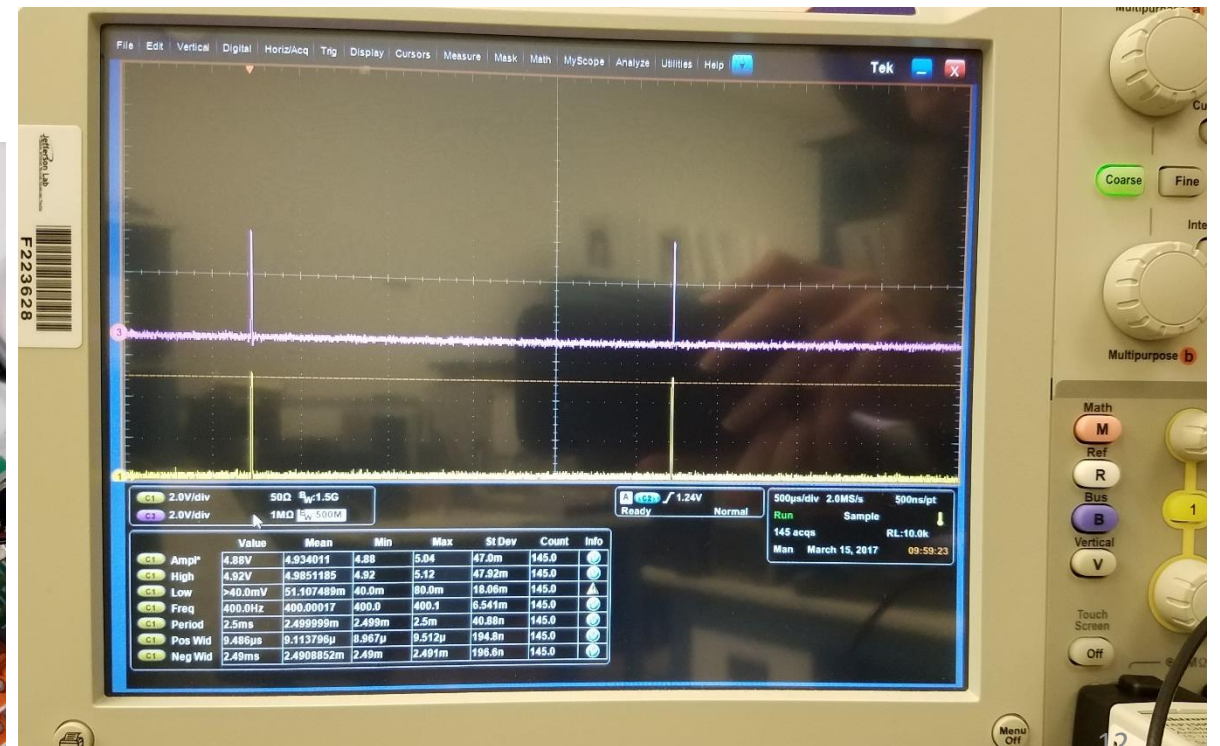
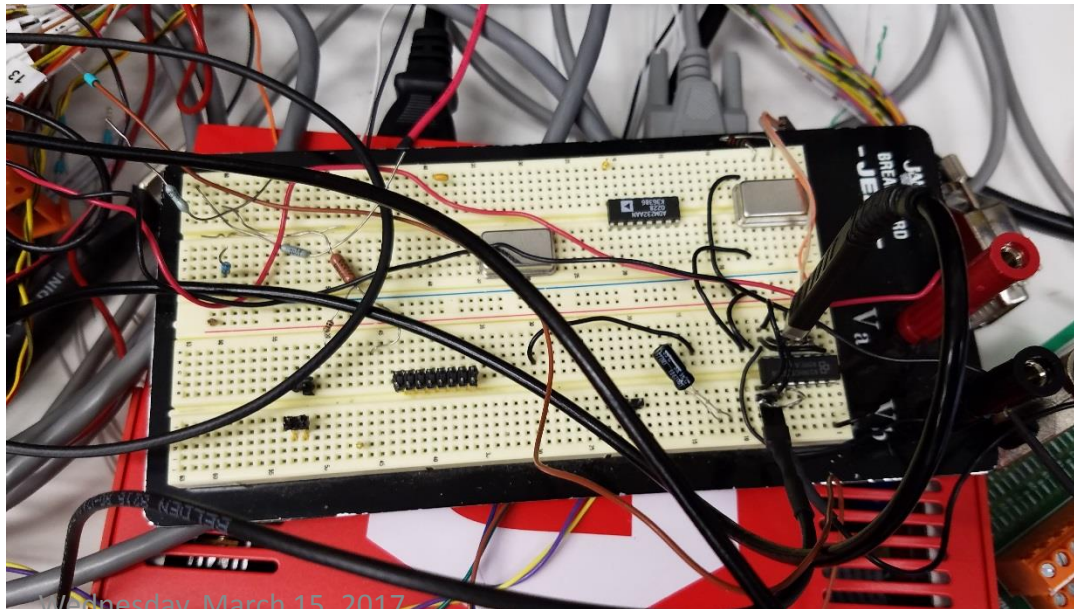
# Synchronization

- Report statement: Trigger lock-in scan and field sweep when CT-Box current crossed threshold, once for every IPS sweep.
- DSG response: CT-Box has to send trigger signal to Lock-In Amplifier for every data point required.
  - Single trigger will not work.
    - Requires instruments to use own acquisition clocks and run asynchronously.
    - Both instruments required to have same or integral multiple of the other's frequency.
      - The lock-in amplifier fixed sample rate intervals of 64 Hz, 128 Hz, 256 Hz, and 512 Hz.
      - The CT-Box's acquisition frequency is programmable from 1 Hz to 100 KHz in 10  $\mu$ s steps.
    - Misalignment between CT-Box and lock-in amplifier measurements will occur.



# Triggering Progress

- Signal from CT-Box too weak to drive trigger input of Lock-In Amp.
- Driver chip was used to buffer signal.
- Scope signals: CT-Box output (pink) and Lock-In input (yellow) at 400 Hz.



# Current Work

- FRS and NMR programs updated to LabVIEW 2016.
- Creating flow charts for FRS, NMR, and RTP programs.
- Working on synchronization.
  - Test program being written to read data from both CT-Box and Lock-In Amp.
  - Single data array.
- Waiting for testing and verification of NMR program by HDIce group.

Thank You