Voltage Tap Database in SQLite

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This note describes the voltage tap database generated for the Hall D solenoid.

There are 31 voltage taps that measure voltages in the four coils of the Hall D solenoid. When the magnet is in the superconducting state, voltage taps should have values close to 0 V.

A PXI-based DAQ system samples the voltage taps signals at 250 KHz and writes them at a rate of 10 KHz. Signals are monitored for sudden increases in voltage, signifying a non-superconducting state such as a quench.

The voltage tap tags are listed as VTT3–VTT21 and include a quench detection channel and several b and s tags (such as VTT4b), as shown in Fig. 1. The b values for voltage taps are sent to a 30 dB attenuator, so that signals during a quench are not off-scale. The s values were created to measure the voltage across the splices.

When testing the voltage taps, a test voltage is provided and the voltage tap values are recorded in an Excel spreadsheet; however, recording in a database would provide a dynamic method to analyze the values. Dynamic methods would include selecting part of, or whole rows, pertaining to values of a certain parameter, such as retrieving the date and location of voltage tap values within a given range.

SQLiteForExcel is a program found on GitHub that can input data from a range of cells in an Excel spreadsheet into a database in SQLite. This is done by enabling and running the SQLiteForExcel macro in a spreadsheet and selecting Create/ Add SQLite table from the XLSQLite tab on the ribbon. The Create SQLite table pop-up allows a user to select a range of data to store in SQLite. The user would then select the data type and click the Execute button.

SQLiteForExcel uses a specific cell arrangement in order to select values for the database. The program expects column titles to be in the first row and all values to follow, essentially as it shows in the database itself. To obtain this format, a program from Visual Basic for Applications (VBA), Excel's programming language, was written. The program prompts the user to enter specific data from the table, which is then copied and placed, in the correct format for SQLite database adaptation, into a new spreadsheet tab. From the new tab, the program SQLiteForExcel can be executed where the user will highlight all values in the sheet, creating the database shown in Fig.2 (which is viewed using the Firefox add-on SQLite Manager).

SQLiteForExcel is a useful tool for technicians who are familiar with Excel to create SQLite databases. For the purpose of the voltage tap spreadsheet, a VBA script was written to organize the contents of the sheet in the correct format used for creating a database. SQLiteForExcel and VBA scripts could be used in the future for other projects.

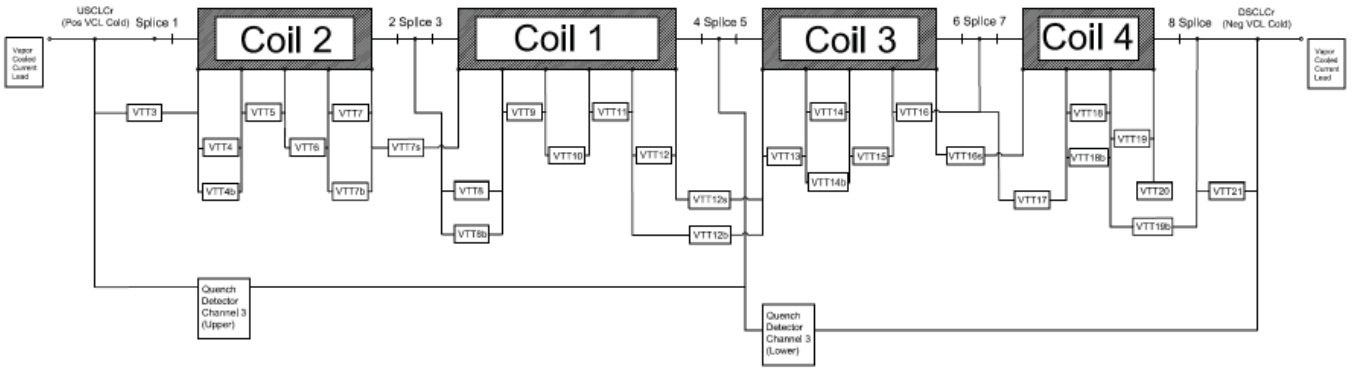
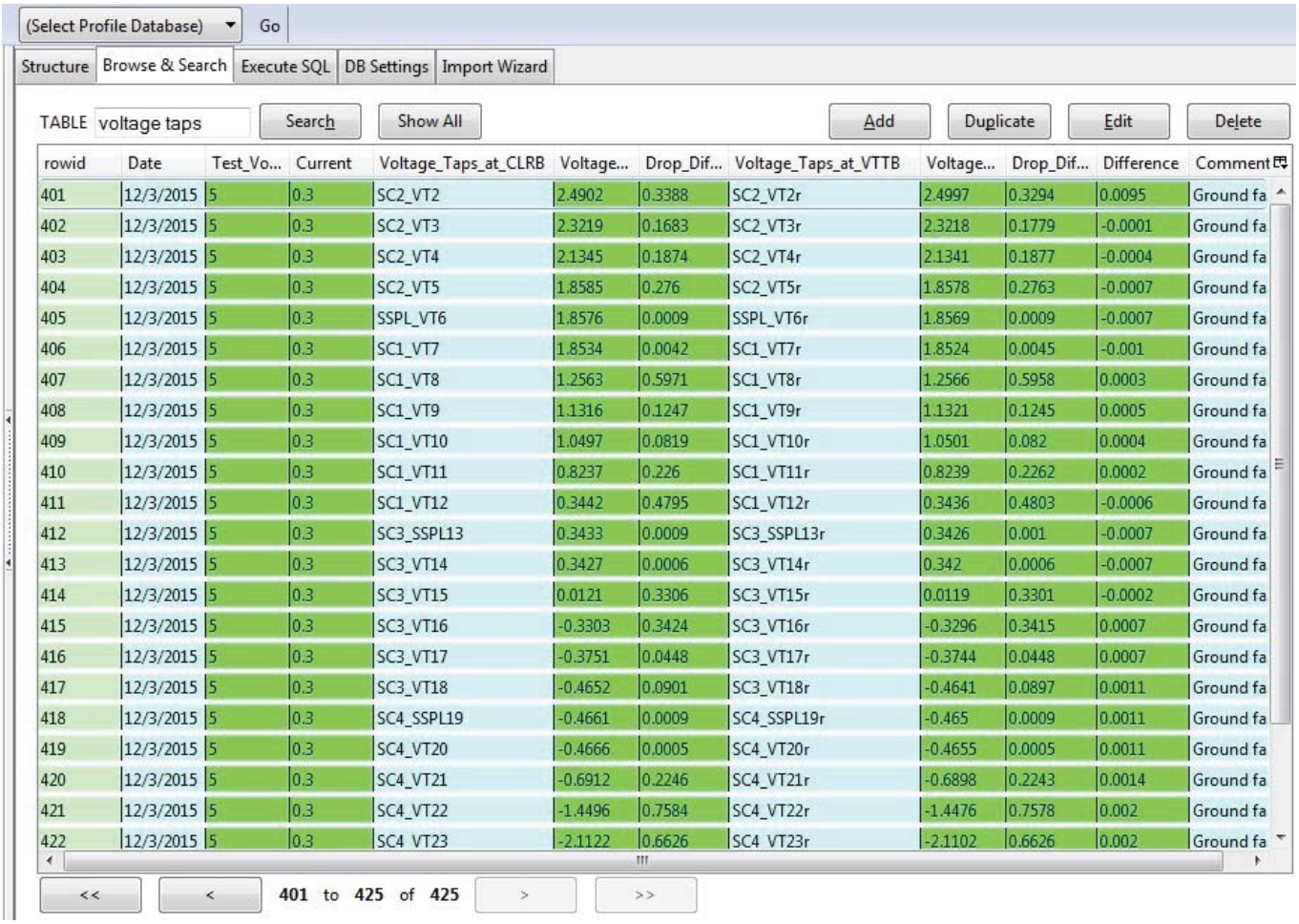


FIG. 1. The voltage tap locations of the four coils of the solenoid.



rowid	Date	Test_Vo...	Current	Voltage_Taps_at_CLRB	Voltage...	Drop_Dif...	Voltage_Taps_at_VTTB	Voltage...	Drop_Dif...	Difference	Comment
401	12/3/2015	5	0.3	SC2_VT2	2.4902	0.3388	SC2_VT2r	2.4997	0.3294	0.0095	Ground fa
402	12/3/2015	5	0.3	SC2_VT3	2.3219	0.1683	SC2_VT3r	2.3218	0.1779	-0.0001	Ground fa
403	12/3/2015	5	0.3	SC2_VT4	2.1345	0.1874	SC2_VT4r	2.1341	0.1877	-0.0004	Ground fa
404	12/3/2015	5	0.3	SC2_VT5	1.8585	0.276	SC2_VT5r	1.8578	0.2763	-0.0007	Ground fa
405	12/3/2015	5	0.3	SSPL_VT6	1.8576	0.0009	SSPL_VT6r	1.8569	0.0009	-0.0007	Ground fa
406	12/3/2015	5	0.3	SC1_VT7	1.8534	0.0042	SC1_VT7r	1.8524	0.0045	-0.001	Ground fa
407	12/3/2015	5	0.3	SC1_VT8	1.2563	0.5971	SC1_VT8r	1.2566	0.5958	0.0003	Ground fa
408	12/3/2015	5	0.3	SC1_VT9	1.1316	0.1247	SC1_VT9r	1.1321	0.1245	0.0005	Ground fa
409	12/3/2015	5	0.3	SC1_VT10	1.0497	0.0819	SC1_VT10r	1.0501	0.082	0.0004	Ground fa
410	12/3/2015	5	0.3	SC1_VT11	0.8237	0.226	SC1_VT11r	0.8239	0.2262	0.0002	Ground fa
411	12/3/2015	5	0.3	SC1_VT12	0.3442	0.4795	SC1_VT12r	0.3436	0.4803	-0.0006	Ground fa
412	12/3/2015	5	0.3	SC3_SSPL13	0.3433	0.0009	SC3_SSPL13r	0.3426	0.001	-0.0007	Ground fa
413	12/3/2015	5	0.3	SC3_VT14	0.3427	0.0006	SC3_VT14r	0.342	0.0006	-0.0007	Ground fa
414	12/3/2015	5	0.3	SC3_VT15	0.0121	0.3306	SC3_VT15r	0.0119	0.3301	-0.0002	Ground fa
415	12/3/2015	5	0.3	SC3_VT16	-0.3303	0.3424	SC3_VT16r	-0.3296	0.3415	0.0007	Ground fa
416	12/3/2015	5	0.3	SC3_VT17	-0.3751	0.0448	SC3_VT17r	-0.3744	0.0448	0.0007	Ground fa
417	12/3/2015	5	0.3	SC3_VT18	-0.4652	0.0901	SC3_VT18r	-0.4641	0.0897	0.0011	Ground fa
418	12/3/2015	5	0.3	SC4_SSPL19	-0.4661	0.0009	SC4_SSPL19r	-0.465	0.0009	0.0011	Ground fa
419	12/3/2015	5	0.3	SC4_VT20	-0.4666	0.0005	SC4_VT20r	-0.4655	0.0005	0.0011	Ground fa
420	12/3/2015	5	0.3	SC4_VT21	-0.6912	0.2246	SC4_VT21r	-0.6898	0.2243	0.0014	Ground fa
421	12/3/2015	5	0.3	SC4_VT22	-1.4496	0.7584	SC4_VT22r	-1.4476	0.7578	0.002	Ground fa
422	12/3/2015	5	0.3	SC4_VT23	-2.1122	0.6626	SC4_VT23r	-2.1102	0.6626	0.002	Ground fa

FIG. 2. The database created from the SQLiteForExcel program and VBA script.