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