Scientific Instrument Collection

by Stu Ryan

Memories of Nielsen Hall undoubtedly include: colleagues, equation-filled chalkboards and labs stuffed with apparatus. Over the years, as new research and teaching lab instruments were acquired, the "old" were saved – 'cause they might be useful! Nielsen Hall's cabinets became a "museum" of physics pedagogical and research apparatus. As electrical measuring techniques and instruments improved significantly during the past quarter of the 19th century, research in physics began to rely on electrical instrumentation.

After the Physics Department's founding in 1909, its new faculty invested heavily in: potentiometers, bridges, meters and galvanometers as well as resistance, capacitance and inductance "standards" for both research and student labs. Much of this early instrumentation – typically lacquered brass in polished wooden cases – was acquired from Central Scientific, a manufacturer and importer of scientific equipment, and companies such as Leeds & Northrup and Weston Instruments.

Fast forward to present day. As you may know, one of OU's "Crown Jewels" is the ***H**istory **of S**cience Library.* With nearly 100,000 books, it is the third-largest collection of its kind. It is the only library with all 12 of Galileo's published books, four of which are annotated by Galileo! If you have not yet visited the ***HoS** Library*'s remarkable *Galileo's World* exhibit, there is still time to see it before it closes in September.

In a casual conversation with Kerry Magruder, curator of the *HoS Library*, I asked if the library had any interest in the *antiques* stored in Nielsen Hall's cabinets. His answer was a resounding YES! So with the blessing of Greg Parker, chair of the Homer L. Dodge Department of Physics and Astronomy, these instruments joined some chemistry equipment at the library to form a permanent *Scientific Instrument Collection,* now on display in the foyer of the *HoS Library* through September 2017. As funds become available for additional display shelves, this *Collection* will expand to include instruments from other scientific disciplines. When you are on campus, come visit your old laboratory friends!

The photographs below show the collection of scientific instruments now displayed prominently in the entrance lobby of the *HoS Library*, located on the fifth floor of Bizzell Memorial Library. An enlarged photo of the potentiometer found in the bottom section of the middle panel in the right photo below is shown on page 15 along with the accompanying text and circuit diagram.

A Plea: As you may know, William Peter Haseman, the first Physics Department chair, and his student J. Clarence Karcher invented the technique of reflection seismography. The *Collection* needs a Haseman-Karcher geophone! If you know where one is or how we could acquire one, please let me know by contacting me at dr.indestructo@gmail.com.

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A view of the entire Scientific Instruments Collection currently on display in the entrance lobby of the History of Science Library, located on the fifth floor of Bizzell Memorial Library. Each panel contains one or two related instruments along with a description of the instrument on display.

An enlarged view of the Scientific Instruments Collection, showing five of the 13 panels.

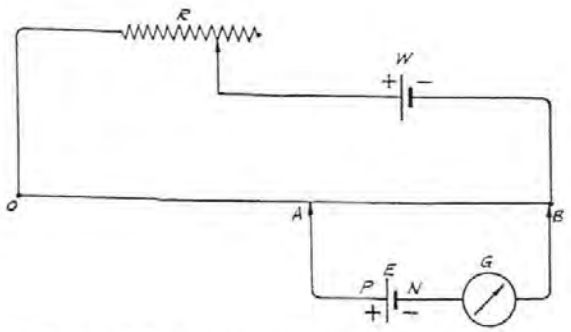

Diagram of an elementary potentiometer circuit
Courtesy of Leeds & Northrup Co.

Potentiometer
Otto Wolff, Berlin
Sold by Central Scientific Co
circa 1915

A potentiometer measures an unknown voltage E_X by comparing it to a known Standard Cell. This particular instrument measures a voltage of 15 volts with an accuracy of 0.0001 V. It uses switches instead of the slide wire discussed below, as its high resistance minimizes switch problems. It is just one of the many variations of the elementary circuit described below. In 1909 this instrument cost $185, the equivalent of $4,740 today.

The elementary potentiometer circuit consists of a long, uniform conducting wire (line "OB" in the diagram) on a graduated scale. Battery W supplies the current that flows through both "OB" and resistor R (used to adjust current). The sliding contact "A" selects a length "AB" of wire "OB".

To calibrate the instrument, a Standard Cell with voltage "E_S" is connected between A and B. Galvanometer "G" compares the difference between E_S and V_{AB}, the voltage difference between points A and B. Resistance R adjusts the current until the deflection of the galvanometer is zero. The voltage difference per unit length of wire V_{UL} equals E_S divided by the distance between A and B.

The unknown E_X now replaces E_S and the galvanometer is checked for a deflection. Point A is moved until any deflection is zero. Thus, E_X equals V_{UL} times the new distance between A and B.

Students Observe at Apache Point Observatory

The astronomy group entered into its third year of a three-year lease arrangement with the Apache Point Observatory (APO) 3.5m telescope consortium. As mentioned in the chair's column, we will join the APO consortium as full partners in 2017. Access to OU's share of observing time on the 3.5m telescope has been distributed amongst many research groups in the department, and has provided data used in five refereed papers and one Ph.D. thesis to date. A group of five undergraduate and graduate students visited the observatory in April for a three-day on-site observing run as part of Wisniewski's Advanced Observatory Methods class. All students gained hands-on experience using the 0.5m and 3.5m telescopes, and each is now qualified to run these telescopes remotely from Nielsen Hall.

Members of the Observatory Methods class who traveled to APO in April are shown in the photo at right with the 3.5m telescope in the background.

From left: Saloni Bhatiani, Josiah Purdum, Ang Liu, Renae Wall, and Shaun Steele