Object of the month

out 2017

Museum Atrium

Planimeter, the instrument that skirted mountains and valleys.
The IV Mathematics Fair is appraching, this year it will take place on November 11. With this historic object, MUHNAC begins the program of activities associated with this event. The World Statistics Day (October 20) is also celebrated this month.

The calculation of areas of uneven plane figures, before the emergence of computer programs that have tools that quickly perform this task, could be arduous. It was not easy, for example, to determine the area of a piece of land or a region, as illustrated here by a Charter of Boavista Island, produced in 1921 by the Geographical Mission of Cape Verde[1]. However, with the instrument that we highlighted this month in the MUHNAC, the planimeter, it was enough to follow the curve that bounds the region that was intended to measure.

The first references to this instrument reach us from the beginning of the past century and were introduced by the Swiss mathematician Jakob Amsler Leffon in 1854. This first device became known as the polar planimeter, and gained popularity due to its properties and small dimensions, which made it more suitable to frequent use.

There are several models in the MUHNAC&'s collections, the one in exhibition in the lobby of the Museum came from the Faculty of Sciences of the University of Lisbon. In 1931, Professor Victor Hugo de Lemos, of the Mathematics section, published an article on the operation of the Amsler polar planimeter and the method used in teaching it in this college. Its most current application was the measurement of the surface of land represented in topographical and cadastral charts[2].

This mechanical structure has been improved with the introduction of accessoriesadapted to different types of applications, namely for engineering calculations of various specialties, as is the case of the exposed model, also known as the integrator. In addition to the value of the area, this Amsler model allows us to determine the static moments and their relations with the center of gravity of the figure.

The results are obtained by taking into account the length of the rods of the planimeter, the diameter of the wheel placed perpendicular to the movable rod and the number of turns given by that wheel, which is marked by the counter as it traverses the curve. This invention was received with great enthusiasm at the time and to this day the planimeter is seen as a very innovative instrument.

(1) Published in 1937 by the Board of Geographical Missions and Colonial Investigations, which directed the Portuguese geographical studies and the delimitation of frontiers with the neighbouring colonies (which originated in the Cartography Commission established in 1883 and is currently a specialized unit of the University of Lisbon, the IICT-Institute for Tropical Scientific Research, which has integrated management with MUHNAC.
(2) Lemos, V. H. (1931). Planímetro polar de Amsler. Magazine part *Revista de Artilharia*, 1-14