

The Double Stars of Abel Pourteau

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Abstract: This article considers the double stars discovered by M.A. Pourteau. The article includes biographical material for M. Pourteau. The historical background of his work is covered. Discussion of his double stars and opportunities for study of his doubles by amateur astronomers is discussed.

Background

During my efforts in 2011 to measure double stars from the WDS catalog, I ended up imaging a number of stars discovered by Abel Pourteau (designation POU). The WDS "Top 25 Observers List" ranks him fourth in number of systems discovered with 5,718 doubles bearing his POU designation. The "references and discoverers codes" section of the Washington Double star Catalog (Mason+2001-2012) shows all of Pourteau's discoveries come from a single reference, his 1933 publication: "*Catalog des étoiles doubles de la zone +24° de la Carte Photographique du Ciel*" (Pourteau 1933).

An internet search produced no biographical material and no other references about him other than those related to his catalog. Intrigued, I decided to see what could be discovered about Mr. Pourteau. This article reports my results.

The Star Catalog

Abel Pourteau was deeply involved as both a "computer" and observatory assistant in one of the great efforts of Victorian science, the *Astrographic Catalog* and the related photographic charts program, the *Carte du Ciel*. The two programs were the result of an 1877 Astrographic Conference chaired by the Paris Observatory (1912 Turner). Twenty obser-



Figure 1: Sidney Observatory's Cart du Ciel measuring engine. Collection: Powerhouse Museum, Sydney. Photo: Chris Brothers.

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vatories agreed to use a standard telescope to photograph the entire sky down to the 11th magnitude and to determine positions of stars to better than 0.5 arc.

A second goal was to repeat the sky survey in another set of plates reaching to 14th magnitude. Both programs were a huge investment in money and labor. Central to the data analysis were "computers." Prior to modern electronic devices, a "computer" was a person employed by a scientific institution to perform the mathematical computations by hand.

The labor of taking the plates was long and challenging. Each section of the sky had to be photographed several times and the plates had to be well matched in limiting magnitude to be useful. If producing the plates was difficult, the labor of reducing the data was brutal. Each of the plates had to be examined by a "computer" with a microscope. The position of each star was measured against a "reseau" (ruled grid). Then to control errors, after each plate had been measured, it was rotated 180 degrees and all the stars measured again!

The *Carte du Ciel* project was intended to produce star charts by transferring the images on the glass plates to copper engraving plates. Most observatories did not complete their assigned areas and a number never started. The scientific returns from both projects were limited by difficulty in using the data and the size and cost of resulting publications. The *Carte du Ciel* printed charts, if completed by all the observatories would have resulted in 887 volumes weighing two tons.

Double Star Catalogs Derived from the Carte du Ciel Project

In addition to M. Pourteau's work, the *Carte du Ciel* was the basis for three other double star catalogs: *Catalogo di Stelle Doppie* by Stein (Daley 2006), *Double Stars in the Greenwich Astrographic Catalogue* by H. Groot and a catalog by Andre Chatelu of the Algiers Observatory's zone covering the +04 to -02 degrees. (Pourteau 1933). In addition, catalogs *I/96 Astrographic Catalog*, +01 to +31 Degrees (Freasneau 1983) and *I/303 Bordeaux Carte du Ciel catalog* (Rapaport+ 2006) are derived from scans of *Astrographic Catalog* and *Carte du Ciel* plates.

While not a double star catalog per se, the *I/275 The AC 2000.2 Catalogue* (Urban+ 2001) is a reduction of the complete *Astrographic Catalog* Plates and could offer opportunities for amateur data-miners through VizieR catalog access tool, CDS, Strasbourg, France.

Biographical Information on Porteau

Abel Pourteau was born on September 17, 1862 in Etaules (Charentes-Maritime), a coastal town on the Bay of Biscay. In 1890 he joined the Paris Observatory. He was hired as an auxiliary employee of the Observatory's Office of Calculations. Pourteau worked for twenty-nine years (1890 to 1919) in that position (Barbet 2011).

From 1919 to 1927 he assisted in the photographic work of the *Carte du Ciel*. The Paris Observatory measured and photographed 1261 plates between October 1891 and November 1927.

The Paris Observatory's photographic zone for *Carte du Ciel* was between declinations +18 and +24 degrees. The observatory's telescope was the original Henry brothers instrument that was intended to be the pattern for the entire project (Urban+ 1998). Porteau was apparently hired to assist in the workload generated by the project.

Pourteau was also involved in the data reduction of plates. This included calculation of tables to transform the Cartesian positions of the star images on the plates to equatorial coordinates. Production of the copper engraving plates for the Sky Charts was another one of his duties. Porteau advanced to Associate Astronomer during this period.

In 1923 in addition to all his other duties, Pourteau began a project to discover and measure new double stars in the Paris Observatory's zone down to 14.5 magnitude. He eventually found and measured over 5,000 new binary star systems. Besides his future catalog of double stars, the Paris Observatory records show only one other publication, a catalog of photographic reference stars with M. Jules Baillaud, which appeared in "*Journal of the Observers, March 15, 1927*".

Abel Pourteau reached the mandatory retirement age of 65 in September of 1927, but was allowed to stay until December 31st of that year to complete his double star measures. The former director of the Paris Observatory, M. Baillaud, described his career as full of "honor, hard work and devotion."

In 1933 Porteau published his *Catalog des étoiles doubles de la zone +24° de la Carte Photographique du Ciel*. He promptly received the Laland Prize in Astronomy that same year.

The Paris Observatory did not have an image of Porteau or his date of death.

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Pourteau's Doubles as Basis for Further Work

Seventy-eight years after the publication of his catalog, Pourteau still holds 25th place in "means" (lines of data in the WDS measurement database) and 4th in number of discoveries in the WDW Top 25 Observer List (Mason+ 2001-2012).

In my own, necessarily limited survey of his doubles, I found his measures to be accurate in both position and separation.

In his catalog, Pourteau claimed standard deviations (root mean square errors) of:

Separation PA SEP

<7 arcsec 3.1 0.41

7 to 11 arcsec 2.5 0.51

>11 arcsec 1.9 0.57

To obtain a representative sample of his work, I extracted all his doubles from the 06-12 hr section of the WDS catalog and found 2,241 systems. The separations ranged from a low of 0.8 to a maximum of 26.8 arcseconds. The average separation was 10.4 arcseconds and the average magnitude was 12.78.

A separation of 10.4 arcseconds and 12 to 13 magnitude falls into a "sweet spot" for modern amateurs equipped with CCD cameras. In the above sample, the average number of measures of Pourteau's doubles was only 2.3. Some have only the discovery measure.

The blue sensitive plates that Pourteau worked with seem to have recorded stars much deeper than he realized, often reaching 15+ magnitude. This leads to discrepancies with the WDS catalog's default V magnitudes. The WDS entry for POU 2324 lists 11.54 magnitude for the "A" star and 12.20 for "B". Those two stars appear to be UCAC3 226-078117 and 226-078126 with catalog magnitudes of 14.46 and 15.56. They were too faint to measure on my 15 second CCD image with a 300 mm telescope! Many other of his pairs are fainter than the listed magnitude.

Pourteau apparently only measured new doubles in his catalog. Dr. Brian Mason pointed out that Pourteau apparently was not totally familiar with double star nomenclature as he gave different designations to triple stars, for example, POU2341AB and POU2342AC. Because Pourteau's designations were published in his book, they were retained in the WDS catalog (Mason 2011).

A number of Pourteau's measurements are now

over 100 years old. There is plenty of opportunity for amateurs to continue his work.

Acknowledgments

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Any errors or misunderstandings in this article are solely the fault of the author.

This research has made use of the Washington Double Star Catalog maintained at the U.S. Naval Observatory.

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