Swiss Precision for US Mapping – Ferdinand Rudolph Hassler – First Chief of US Coast and Geodetic Survey and US Bureau of Standards

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Key words: Ferdinand Rudolph Hassler, Survey of the Coast, National Bureau of Standards.

ABSTRACT

The Swiss immigrant Ferdinand Rudolph Hassler (1770-1843) initiated geodetic measurement of the early United States of America and participated in the foundation of the US Coast & Geodetic Survey and the US Bureau of Standards.

ABSTRAIT

L'immigrant suisse Ferdinand R. Hassler (1770-1843) a initié la mensuration des Etats Unis d'Amérique et a eu parti à la fondation de la Survey of the Coast (plus tard US Coast and Geodetic Survey) et du bureau des poids et mesures (actuellement US Bureau of Standards).

ZUSAMMENFASSUNG

Der Schweizer Einwanderer Ferdinand Rudolph Hassler (1770-1843) initiierte die Vermessung der eben gegründeten Vereinigten Staaten von Amerika und war massgeblich beteiligt an der Gründung der Survey of the Coast (später US Coast and Geodetic Survey) und des Amtes für Mass und Gewicht (heute US Bureau of Standards).

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Ferdinand Rudolph Hassler was born 6 October 1770 in Aarau, Switzerland. He was the son of a distinguished and wealthy family in the watch making business. He studied mathematics and physics in Berne, capital of Switzerland, under professor Georg Tralles, geodesist from Hamburg, Germany.

1786 Hassler joined an administration bureau in Berne. 1791 5-13 September Tralles and Hassler measured a 7.6 mile long baseline at Aarberg near Berne for the survey of a part of Switzerland using a steel chain by Ramsden. Hassler and Tralles measured also a triangulation net of 50 points. 1793/96 Hassler visited Paris and Gotha, Göttingen and Kassel in Germany and met many notable scientists including Lalande, Borda, Delambre, Lenoir, Cavinet, Lavoisier, Zach.

1794 Hassler ordered a 3 ft diameter azimuth circle from Ramsden. Unfortunately it did not reach Berne until 1797. In March 1798 was the French invasion to Switzerland; Switzerland became the Republic of Helvetien (1798-1804). The Ramsden theodolite was only saved by Tralles cunningly taking it to pieces and the French General Schauenberg considered the single parts to be worthless.

In 1798 Hassler proposed to the Helvetian Government a “General trigonometrical surveying of Helvetien” and the establishment of a “central card depot and surveying office”. The proposal was not accepted. So by 1804 Hassler arranged for large tracts of land to be purchased for him in South Carolina and Louisiana. He encouraged 120 immigrants to accompany him in a venture to establish a farming cooperative, providing much of the needed funds himself. He left Berne May 15 1805 and reached Philadelphia in September.

Unfortunately, his naiveness about money caused him to accept the financial decisions by some of his associates until it was too late, and he lost most of his fortune. Hassler was reduced to great need. In 1806 illness prevented him taking on an assignment to make a survey of the island of New York. When he went to America he took with him the new French unit of measure as a standard metre bar; an iron toise by Cavinet; and two exact copies of two

toises of Lalande made by Tralles and Hassler from the originals lent by Lalande in 1793. Around this time he was reduced to selling some of his vast library to get funds for everyday requirements.

An US law of 1807 authorized the US president to initiate the surveying and mapping of the American coast and ports. President Thomas Jefferson and his treasury minister Albert Gallatin, Swiss origin as Hassler, saw the need of the surveying. The American Philosophical Society was asked to made propositions. Among those who submitted plans were Andrew Ellicott, James Madison and Ferdinand Hassler. Hassler's proposal was selected. President Thomas Jefferson appointed Hassler to be the first Superintendent of the Survey of the Coast in the Department of Finance. Survey of the Coast changed the name: 1836 to US Coast Survey, 1879 to US Coast and Geodetic Survey (USC&GS) and 1970 to National Ocean Survey.

1807 10 February Hassler was appointed at First Superintendent of the US Survey of the Coast. 1807 17 April Hassler was elected member of American Philosophical Society.
Initially there was no money and no instruments for the surveying. To earn money for his life and his growing family (in the end nine children) Hassler became 1807-10 Professor of Mathematics at the new Military Academy of West Point. From March 1810 to July 1811 he was at Union College in Schenectady NY.

In April 1811 minster Gallatin granted US$ 25 000 for the surveying project. In August 1811 Hassler sailed to Europe to obtaining the necessary surveying instruments in London and Paris. 1812 began the war between USA and Great Britain, so Hassler had to stay in Europe until 1815. In the end there was no money left, so he had to pay his passage back to the US out of his own pocket.

Edward Troughton undertook to make a 24 inch theodolite with new features to Hassler's design. In addition, an achromatic telescope, two transit instruments for observatories, base line equipment of his own design, mountain barometers, thermometers, a fine balance and a brass scale. Hassler also used William Hardy to make two astronomical clocks, and two time pieces resolving 1/300 second. Dollands were asked to make a five ft and a six ft achromatic telescope; Grimaldi & Johnson a box chronometer; Tully a four ft and a five ft telescope; Broekbank a box chronometer and silver pocket chronometers.

Back in the US Hassler started 1816/17 the triangulation in New York bay. His party consisted of himself, three US Army officers, one he had taught at West Point, one or two coachmen and a number of woodsmen to clear the lines of brush and trees. The first point occupied for geodetic observations in the United States was identified as Weasel located on a low mountain about two miles south of Patterson, New Jersey on July 16, 1817. In 1987, the American Society of Civil Engineers placed a plaque at the approximate location of original station Cranetown, north of Montclair, New Jersey, declaring the site a National Historic Civil Engineering Landmark.

Hassler complained the worse support of the authority. In 1818 Surveying moved from the Department of Finance to the Navy. Hassler and his civil personal could not continue their work. The new navy surveying made measurements of ports and rivers but the quality was bad.

Hassler worked as an assistant on the United States-Canada northeast boundary surveys from 1818-19 where his knowledge of the two definitions for latitude contributed to a favorable resolution of the boundary. Then he made an unsuccessful attempt at farming in a remote site on the Saint Lawrence River where his wife Rosalie, unable to cope with the isolated country life, left him. They reconciled later. After that he took a position as a gager at the New York Custom House, followed by a period of unemployment during which he wrote several books on advanced mathematics and developed the polyconic map projection still used today.
1830 Hassler became Superintendent of the new office for weights and measures, today the National Bureau of Standards.

When Florida joined the USA in 1832 the insufficient coast surveying of the navy was evident. Surveying was moved back to the Department of Finance. Hassler became again Superintendent. Hassler began to build a staff of both military and civilian personnel. US Navy officers and US Army topographic engineers were detailed to the Survey and after receiving extensive training, did excellent work. Among the earliest, were Army Captain W.H. Swift and Lieutenant Thomas R. Gedney of the Navy. The first civilian hired was James Ferguson in 1833.

Prior to October 18, 1836, the observations were made using the 24 inch theodolite mentioned previously. From that day and until his death in 1843, Hassler employed a 30 inch instrument that he proudly called the Great Theodolite. Designed by himself, built by Troughton, the finest instrument of its day, was used first at station WEST HILLS on the northern shore of Long Island, a point that remains in place even now. Its weight of 300 pounds was of little concern to Hassler, having used a 36 inch Ramsden theodolite, an instrument of similar weight to that in the trigonometrical survey of Switzerland. He simply strengthened the oversize carriage used for transporting the 24 inch instrument, a fairly heavy piece in itself weighing perhaps 200 pounds.

In November 1843 in a severe storm while he was at station Burden in Delaware he fell while trying to protect his instruments and was badly injured. He returned to Philadelphia but did not recover. He died on 20 November. His grave is in Laurel Hill cemetery in Philadelphia where are also three of his children: Rosalie (Mrs. S. Norris, 1808-1892), Charles (1810-1846) and Edward (1813-1844). On a marble stone his work is appreciated. The tomb was renewed 1987.

Hassler set standards of the highest accuracy for these early surveys that remain the hallmark of American geodetic work. He personally made all the observations at the primary stations, yet at the same time trained his principal assistants, James Ferguson and Edmund Blunt on the secondary surveys so that they could step in when necessary to do his job and they did. In

the year after Hassler's death in 1843, Ferguson measured the KENT ISLAND base line in Maryland, Blunt the MASSACHUSETTS base, and they shared his role in observing the primary triangulation.
As for Hassler personally, he annoyed many people by his actions. One of his idiosyncrasies was wearing white woollens, in winter and summer, arguing that they warded off both cold and heat. He infuriated Philadelphia merchants by importing copper plates from Hungary, and American engravers by recruiting Germans from Hamburg for the job. And, to the dismay of native vintners and dairy people, insisted on importing Swiss wines and cheeses. To many, it seemed the old Swiss viewed nothing American as good. However, we must note that Hassler, by birth and inclination was first, a European gentleman, ever a prude, and nothing was going to change him in that regard.

Hassler's vanity would not allow him to admit to being very near sighted, and for many years he needed eye glasses or spectacles, as they were known at that time. Early on he stimulated his vision by sniffing snuff, and in due course this treatment failed him. Determined to retain his role as the sole observer of the principal triangulation, he accepted help from an assistant in pointing the telescope, but only he could make the refined pointings and read the micrometers.

IN MEMORY OF
FERDINAND RUDOLPH HASSLER
BORN AT AARAU IN THE CANTON OF AARGAU, SWITZERLAND
OCT. 6, 1770.
HAVING FILLED WITH HONOR BOTH IN HIS NATIVE & ADOPTED COUNTRY
OFFICES OF HIGH TRUST AND RESPONSIBILITY
DIED IN PHILADELPHIA
NOV. 20, 1843.
IN THE MIDST OF HIS LABORS AS SUPERINTENDENT OF
THE UNITED STATES COAST SURVEY
AND
STANDARDS OF WEIGHTS AND MEASURES,
BOTH GREAT NATIONAL WORKS FROM THEIR ORIGIN ENTRUSTED TO
AND CONDUCTED BY HIM WITH DISTINGUISHED REPUTATION & SUCCESS.
STRICT INTEGRITY AND LOVE OF TRUTH, WITH STRENGTH
AND ACTIVITY OF INTELLECT, CHARACTERIZED HIM AS A MAN,
WHILST HIS VARIOUS SCIENTIFIC WRITINGS AS WELL AS
THE TWO NATIONAL WORKS PROJECTED BY HIM ARE ALIKE
MEMORIALS OF HIS LABORIOUS LIFE AND OF HIS CONTRIBUTIONS
AS A MAN OF SCIENCE TO THE INSTRUCTION AND IMPROVEMENT
OF HIS FELLOW MEN.

Epitaph in Laurel Hill cemetery in Philadelphia.

SUMMARY OF KEY DATES

1770 (6th October) Ferdinand Rudolph Hassler born in Aarau/Switzerland

	Study in Berne under professor Johann Georg Tralles
	Involved in a triangulation net of 50 points in Switzerland
1798	Proposal to Helvetian Government for "General trigonometrical surveying of Helvetien" and the establishment of a "central card depot and surveying office"
1805	Hassler's emigration to USA
1807	US law authorizes the US President to initiate the surveying and mapping of the American coast and ports
	American Philosophical Society makes propositions (Hassler and others)
	President Thomas Jefferson appoints Hassler to be the first Superintendent of the Survey of the Coast in the Department of Finance
1807-10	Professor of Mathematics at the new Military Academy of West Point
1811-15	In London and Paris obtaining the necessary surveying instruments (1812 war between USA and Great Britain)
1816/17	Triangulation in New York Bay
1818	Surveying was moved from the Department of Finance to the Navy
1818/19	Boundary survey USA-Canada
	Post at the New York customs, school books for higher mathematics, development of the polyconic map projection of the USA
1830	Superintendent of the new office for weights and measures, today the National Bureau of Standards
1832	Surveying moved back to the Department of Finance, Hassler again Superintendent
1834	First maps in the scale 1:100 000
1843	(20th November) Death of Hassler

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