

**BURT'S SOLAR COMPASS:  
The Development, Manufacturer and Daily Usage  
By Robert C. Miller**

This book is must reading for anyone interested in Burt's Solar Compass. The book, published by the Michigan Society of Professional Surveyors, in 2011, is the most comprehensively researched book on the conception, development, manufacture and daily use of Burt's Solar Compass. It is available through MSPS, 220 Museum Drive, Lansing, MI 48933-1905, Phone: (517) 484-2413, or Fax: (517) 484-3711. (JB)

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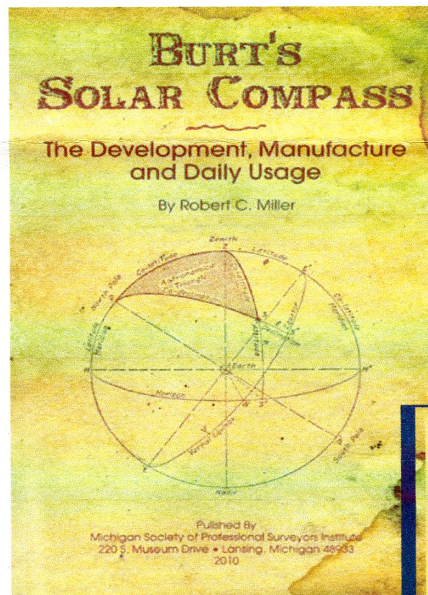
**By Jack N. Owens, LS**

Jack Owens has been surveying for 45 years and has been licensed in seven states. He has served on the Michigan Society of Professional Surveyors Board of Directors, the MSPS Institute, teaches the Michigan Licensing Review, and has been a re-enactor for 23 years.

***Burt's Solar Compass: It Conception,  
Development, Manufacturing,  
Marketing and Daily Use*** by Robert C. Miller

**E**xperience with navigational trigonometry in high school led Robert Miller to a lifelong interest in the astronomical triangle and the equipment used in defining its values. A broader interest in the history of technology and continuing research led him to the work of 19th century Philadelphia survey instrument maker William J. Young. Many of Young's letters had been preserved in the William A. Burt family records at a research library in Michigan. Burt's invention of the solar compass overcame the problems of local attraction that affected the readings of a magnetic compass in an area rich in mineral deposits. Miller's studies revealed that later accounts of Burt's invention written late in the 19th century did not seem to reflect some of the facts he had been uncovering in his research, or presented apparent fabrications. He therefore began writing a more accurate account of the invention of the instrument that would define the direction for much of the surveys of the Public Land Survey System.

Miller presents the development of Burt's invention from words taken from actual documents contemporary with the history as it unfolded, eschewing speculation as much as possible. He is careful to note when making assumptions necessary to fill in gaps in the record and tie documents together.



The story highlights the interaction and collaboration between the inventor, William A. Burt, and William J. Young, the survey instrument maker chosen by Burt to make both versions of his solar apparatus (the first version was called the variation compass) that would readily determine the true meridian for the surveyor.

Burt's talent for invention is evident. He had earlier sought a skilled tradesman to produce his first patented device, the typographer, considered by most authorities to be the first typewriter. It is not hard to conclude he wanted to obtain the best survey instrument maker for his second invention, a more complicated and intricate device, but Miller doesn't make such speculation. Following a biographical sketch of both

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*Owens, continued from page 56*  
men, he begins with Burt's first written complaints about local attraction affecting his laying out of public land survey townships in Wisconsin. Burt was as frustrated as other surveyors by the problem but determined to do something to overcome it. Seeking someone who could produce his solar apparatus for determining the true meridian that could be attached to a surveyor's compass, Burt traveled to Philadelphia to seek out Young, inventor and patent holder of an improved surveyor's compass that is now considered the forerunner of the first transit. John Mullett, another Deputy Surveyor and one of Burt's good and lifelong friends, had earlier bought one of Young's improved surveyors compasses. Burt was a mill builder and likely recognized the quality, good design and workmanship in Young's instrument.


The account stretches from Burt and Young's first collaboration and continues over the next 30 plus years. As fate would have it, Burt did not make much money

from his clever invention. Miller gives some of the accounting of the government's failure to recognize and pay Burt a rightful amount for the order it brought to the Public Land Survey System.

As a surveyor, I only disagree with Mr. Miller on one issue. He notes a shortcoming of the variation compass in which the variation (magnetic declination) could change between the time the meridian was determined and the compass turned to obtain any other bearing by the needle. This was not the type of local attraction which frustrated Burt and other surveyors. Such a type of rapidly changing location attraction would render a compass useless for determining direction. This was the type he encountered with his 1844 discovery of iron ore in the Upper Peninsula of Michigan. By then he was using the improved solar compass, the final version of his invention.

The solar compass is an immediate mechanical solution for solving the P-Z-S triangle (the astronomical triangle that

first drew Miller's attention so many years earlier). Even John Herschel, whom many thought the greatest English mind since Newton, gave Burt due credit for conceiving such a device. The solar compass, and its successor the solar transit, were used to lay out much of the Public Land Survey System, especially west of the Mississippi River. BLM surveyors report both were regularly used in BLM surveys up until the 1960s. As one who has retraced some of the lines laid out by the solar compass, it worked well achieving the accuracy attainable with the altitude method incorporated into its design and functioning.

At 135 pages, Burt's Solar Compass is compact but thorough. For anyone who enjoys the linking of original documents with surveying history, I recommend it. A companion CD provides transcribed copies of many of Miller's sources that history buffs will appreciate. The book may be ordered from [beau@mpsinsti-tute.org](mailto:beau@mpsinsti-tute.org) for \$30. 

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## Foreword

At age 41, William A. Burt's lifelong dream of becoming a U.S. deputy surveyor finally came true in 1832. He was well prepared to become a success. An insatiable appetite for knowledge led to a unique blend of mechanical genius, a quest for accuracy, and a Yankee determination. Still, he must have had serious doubts. Although the Surveyor General was impressed with his work, his first contract north of Port Huron was a financial failure and couldn't be completed until the following year.

A bigger challenge occurred in December of 1834 during Burt's second contract in Wisconsin Territory, near present-day Milwaukee. He encountered a problem that had plagued surveyors since the land surveys began. The surveying lines would not close. Indeed, Burt discovered that some of his intersections varied by as much as a full chain, or 66 feet, from the corner post. Whenever iron was nearby, the needle of the magnetic compass was attracted and resulted in inaccurate readings. This was not only embarrassing for the surveyor, it produced unacceptable work and all that could be done was to re-run and re-measure the lines and hope for the best. For Burt, with the rest of the country yet to be surveyed, there had to be a more accurate solution to this problem.

Returning to his home in Mount Vernon, Michigan, Burt applied his knowledge of astronomy to test an idea he had to accurately determine the variation of the compass without depending on the magnetic needle. In this book, author Bob Miller explores Burt's idea, using an extensive collection of letters and documents to follow it from creation of a "variation device" through the trial-and-error stages with instrument maker William Young to the solar compass that eventually became one of the principal instruments used in the public land surveys.

I was introduced to the author in 1983 through a mutual friend who identified Bob Miller as an expert on William Young. I had just acquired a Burt solar sundial from a relative and took it to

Miller who confirmed it had been made by Young. He had copies of letters between the manufacturer and Burt to prove it, as well as numerous other documents that held a story waiting to be told. In the quarter-century since then, Miller has transcribed this and with other material delicately blended it into a fascinating account of the effort to develop, market, and sell this new surveying instrument to surveyors and government agencies.

As the solar compass gained in usage and popularity, additional manufacturers built and sold the instrument and other surveying devices. The author identifies many of them, mostly in the Old Northwest Territories, and provides the reader with their place of business as well as how to locate remaining "collectable" devices. This book preserves an important story in American history and is a valuable resource for anyone interested in the development of instruments that had a significant impact on our country's land surveys.

John S. Burt  
Author, *They Left their Mark:  
A Biography of William Austin Burt and his Sons*