

# INDIANA'S NEWEST SUNDIAL

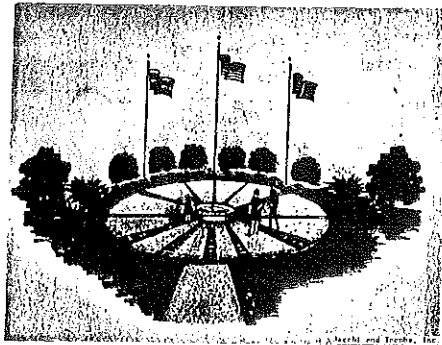
By James N. Vaughn

Indiana's newest sundial is located at the entrance to Lapping Memorial Park in Clarksville. It is the focal point of a 40-foot diameter plaza being constructed by the Clarksville Bicentennial Commission. The funds being used to build the plaza were collected from bicentennial activities sponsored by the Commission in 1976. The sundial is dedicated to George Rogers Clark who founded Clarksville in 1781.

A sundial is an instrument for measuring time by the motion of the sun's shadow. Historically, the sundial was in general use as a timekeeper before clocks and watches became common. A sundial consists of two parts, the gnomon and the dial. The gnomon is usually a plate of metal set parallel to the earth's axis and pointing toward the north pole. The gnomon casts a shadow from the sun onto a dial which has lines to mark the hours, half hours and quarter hours of the day. When the dial is level it is called a horizontal sundial; when perpendicular to that plane it is called a vertical sundial. Sundials can be of any shape including square and rectangular.

The Clarksville sundial is a round horizontal sundial measuring 4 feet in diameter. The standard size of prefabricated sundials range from about 9 inches to 2 feet in diameter, therefore, this sundial had to be specially made. The material chosen for the sundial was Georgia marble. The 4-foot diameter stone is 4 inches thick and weighs about 650 pounds. The gnomon is solid bronze, one-half inch thick, measuring about 18 inches long and weighing nearly 30 pounds.

The gnomon was precisely aligned with the meridian after first making a series of observations on the sun with a transit. The altitude angle and the horizontal angle from a reference line were recorded. After a lengthy calculation involving the sun's altitude, the sun's declination, time of day, and the latitude of the location, the true azimuth of the reference line was derived. The gnomon was then aligned by transit using the azimuth of the reference line.



*An artist's rendering of the George Rogers Clark Bicentennial Plaza in Lapping Memorial Park in Clarksville, Indiana.*

The angle the gnomon makes with the dial is controlled by the latitude of the project site. (The gnomon angle in prefabricated sundials is generally controlled by the latitude at the factory site.) The width of the shadow cast by the gnomon controls the accuracy of the time read on the dial. The average width of the shadow on the Clarksville dial is estimated to be about 10 minutes, based on test results with models. Keep in mind that the width of the shadow varies according to the angle of the sun. The shadow at 12:00 noon E.S.T. is narrowest and the shadow is widest at sunset. The shadows at sunset are so wide that accurate reading of time on the dial is not possible past 7:00 p.m. Eastern Standard Time (E.S.T.).

Lines that were cut into the stone to mark the hours, half hours, and quarter hours were based on a trigonometric progression using the precise latitude of the project site and the hour angle from the Greenwich Meridian. Hour angle calculations require that the sundial be set according to Eastern Standard Time. (A sundial of this size and weight can not be changed to accommodate daylight savings time.)

The hours marked on the sundial begin at 5:00 a.m. E.S.T. in the morning and at 7:00 p.m. E.S.T. in the evening. Traditionally, these are the hours shown on a sundial face. These hours not only allow for a symmetrical layout on the dial, but also allow for most of the fluctuations in sunrises and sunsets throughout the year. For instance, on the longest day of the year, June 21, the sun will rise at 4:31 a.m. E.S.T. and set at

7:32 p.m. E.S.T. On the shortest day, December 21, the sun will rise at 7:18 a.m. E.S.T. and set at 4:38 p.m. E.S.T., according to mathematical projections.

A sundial can be used not only for indicating time, but also to indicate directions. The gnomon is always set to geographic north, so 6:00 p.m. indicates east, 12:00 noon indicates north and 6:00 a.m. indicates west. The directions are marked on the face of the dial and north is marked with an arrow set in bronze on the gnomon.

It is often the custom to inscribe a sundial with an appropriate motto or saying. The Clarksville sundial is inscribed with the words, "Dedicated to George Rogers Clark" and emblazoned in full color with the United States Bicentennial Emblem. Historically, these following mottos have been commonly used:

"The light guides me, the shadow you."

"The hour passed can not be recalled."

"I mark the time, do'st thou?"

"Hour passes into hour."

"I show none but sunny hours."

"Time waits for no man."

"Light follows darkness."

"Time takes all but memories."

"Let others tell of storms and showers, I'll only mark your sunny hours."

"Grow old along with me, the best is yet to be."

The stonecutters have finished the stone dial and it has been set on its pedestal. The foundry has completed the casting of the gnomon in bronze. Construction of the plaza is almost completed. Why not visit Lapping Memorial Park in Clarksville sometime this summer and see the sundial at the George Rogers Clark Bicentennial Plaza?



*Mr. Vaughn is a landscape architect with Jacobi and Toombs, Inc., Consulting Engineers in Clarksville, Indiana, and is the designer of the project. Jacobi and Toombs, Inc. are contributing members of IPRA.*