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Article Summary: The daily time ball descent at Doane College made it possible to synchronize local clocks to nationwide Standard Time. This was a sophisticated form of timekeeping in the nineteenth century.

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Photographs / Images: (Fig 13) Boswell Observatory, c. 1884; (Fig 14) Doane College campus about 1900; (Fig 15) Professor Loyd C Oleson with the retired time ball in the attic of the Carnegie Science Hall, Doane College

SPACING TIME

The Time Ball at Doane College

By Janet L. Jeffries

The advent of nationwide Standard Time in 1883 necessitated the establishment of methods to synchronize clocks because local real time would not equate with local standard time. Thus, innovative procedures to spatially mark time emerged prior to the widespread availability of electronic clocks. The most common means of synchronization on the Plains was the noon railroad whistle, an outgrowth of the railroads' need for standardization to establish and meet schedules. At Doane College in Crete, Nebraska, however, an unusual method of marking time was established in the late nineteenth century. This involved the dropping of a time ball, a device most often found in major seaport harbors and in large cities.¹

That Doane College would be home to up-to-date timekeeping systems is not surprising when one understands the history of the institution. The college was founded in 1872 by progressive New England Congregationalists led by Burlington and Missouri River Railroad (BMRR) civil engineer Col. Thomas Doane. Colonel Doane was sent to Nebraska in 1869 to build 241 miles of railroad through the eastern half of the state. During this time, Doane was also involved with the General Association of Congregational Churches, an organization whose mission, among others, was to build a Congregational liberal arts college on the Nebraska frontier "in

the tradition of our Yankee forefathers."² Doane convinced the BMRR to donate an entire section of land on a hill just east of Crete to build a college. Colonel Doane also built a home in Crete in 1871, making this town his western residence and Doane College affairs a life-long concern.

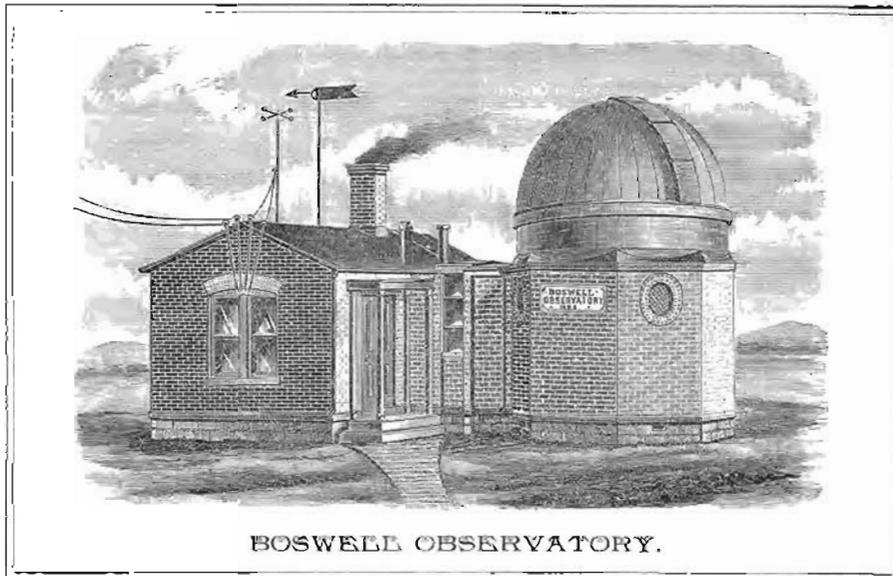
Colonel Doane and the other college founders added an overlay of eastern urban culture to the infant community, and actually seemed to make Crete, Nebraska, an "outpost" of New England. Doane was originally from Cape Cod, Massachusetts, and all early college officials and faculty were also from the East.³ Much late nineteenth-century networking took place between Doane College personnel and philanthropists on the eastern seaboard, and reminders of the school's New England heritage and financial support have been ever present. The official college catalogues articulated the mission and regulations of the school very clearly. Doane was to be a refined and honorable institution. A large section of the 1877 issue of the *Catalogue of the Officers and Students of Doane College* was devoted to the need for financial support from out-of-state sources. The catalogue emphasized the urgency: "Only those who have experience in frontier life can realize the difficulties of frontier college building. . . . Will not the East, which has inherited institutions of learning of all kinds, many of them richly endowed, extend a helping hand to the frontier West?"⁴ Eastern donors responded favorably to solicitation on numerous occasions, advancing the college at a more accelerated rate than would have been possible otherwise.

Boswell Observatory, whose clock triggered the college's time ball, stands as a significant product of this New England-Nebraska association. Connecticut financier Charles Boswell, the stepfather of Doane College professor Charles Stearns, was the observatory's benefactor. In April 1883 the college newspaper, the *Doane Owl*, carried a student editorial that urged the college to construct an observatory. The students had grown weary of using opera glasses to see moon spots and the rings of Saturn.⁵ The observatory was erected on campus during 1883 and 1884, largely as a result of the editorial, which Stearns shared with Boswell. The Connecticut philanthropist donated \$5,000 for the project.⁶

State-of-the-art when completed, Boswell Observatory was designed by Colonel Doane, first President David Brainerd Perry, and Professor of Natural Sciences Godwin Swezey (Fig. 13). Swezey subsequently taught at the University of Nebraska for many years. The observatory featured the latest astronomical, weather-recording, and timekeeping equipment. The structure was primarily used as a student laboratory.

The mounting of the time ball, which was thirty-two inches in diameter and weighed fifty-six pounds, coincided directly with the construction of the Boswell Observatory. Soon after the building's completion, the metal time ball was placed on a shaft on the roof of nearby Merrill Hall (Fig. 14). A brochure, published by the college about 1884, describes the building and equipment in detail. The following excerpt describes how the time ball functioned

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in conjunction with the observatory's Greenwich meantime clock:

The Greenwich clock which gives time to all England is intended always to be kept within one-tenth of a second of true time. This clock has also numerous other electric connections. One of these is for dropping the time ball. The mechanism is as follows: in the garret of Merrill Hall is placed the releasing apparatus, which is somewhat like a gun-lock whose trigger is pulled by an electric current from the observatory clock. The ball is run up by a windlass and detained by what we might call the hammer of this gun lock and which locks into the windlass. When the current from the clock passes it pulls the trigger, the stiff spring of the hammer releases it from the windlass, and so the ball falls. When about half way down it automatically applies a brake to the windlass to prevent a shock on the roof.

Thus is solved the problem how a force so feeble as an electric current can drop a fifty-six pound ball, also how a ball can be started with a sudden motion enough to make it a sharp signal and yet "fetch up" so as not to act like a battering ram. The

Fig. 13 Boswell Observatory, from an undated (c. 1884) brochure (digitally modified). All illustrations courtesy of Doane College Archives, Crete, Nebraska



Fig. 14 Doane College campus about 1900, showing Boswell Observatory at center, and Merrill Hall, with the time ball, at right.

Time Ball at Doane College

ball is thirty-two inches in diameter, and painted black so as to be visible a good distance.

The current from the clock is sent by a pin on the second hand wheel which presses a spring exactly at the sixtieth second. This it would do every minute but a "cut out" in the minute hand wheel prevents it acting at any minute except the sixtieth and another on the hour hand cuts out in the same way every hour but the twenty-fourth. So it acts but once a day, yet acts with all the preciseness of the second hand.

The brochure also reported on other functions of the Greenwich clock:

Another electric current in the clock enables it to beat its seconds on a sounder like those used in a telegraph office. This is for giving continuous time signals in Merrill Hall, but where observatories give time to railroads these seconds signals are sent out direct from the clock along the lines and are heard beating in every office on the road.

In our clock, this break circuit acts every two seconds, indicating the end of each minute however by omitting the last beat, and indicating each five minutes in the same way by an interval of ten seconds of silence, the first beat being the exact minute or hour. By listening for this interval one can obtain the time exactly by a sounder far away from the clock, provided his watch is not so far out of the way that he mistakes which five minutes it is.

Although the clock face keeps local time these circuits for giving the time signals and dropping the time ball are set to standard time by turning the hands the right number of minutes and seconds back.

The time ball was actually a nautical device used to provide shipboard navigators with an accurate visual signal that marked the exact instant of noon. The navigator could then synchronize the ship's chronometer before heading out to sea. Invented in 1829 in England, time balls once stood high over many of the world's largest cities and harbors. In the United States, the U.S. Naval Observatory in Washington, D.C., erected a time ball in 1845, and New York's Western Union building received one in 1877. Crete's time ball was installed just six years later. This interesting and unusual transference of material culture



Fig. 15 Professor Loyd C. Oleson with the retired time ball in the attic of the Carnegie Science Hall, Doane College.

from East to West is likely the direct result of Thomas Doane's worldliness and eastern seaboard heritage.

Several inland time balls were erected in this country during the late 1880s in cities that had observatories, but their importance faded soon after the turn of the century when time signals could be transmitted via radio. In 1987 only ten operational time balls remained worldwide.⁹ Doane's is the only one known to have existed in Nebraska.¹⁰ A date etched in the ball suggests that it may have been removed from the Merrill Hall roof on June 20, 1897, however, at this writing there is no corroborating evidence. The ball spent many years in a campus attic (Fig. 15), and is now on exhibit inside the observatory on an especially designed post.

Because of its nautical origins, the Doane College time ball was an oddity on the landlocked prairie campus, but was useful nevertheless. In Crete, the time ball's noon "signal" was appreciated by townspeople and the campus community as a means to synchronize

individual timepieces to the new Standard Time. It was also an interesting addition to the other timing equipment found in the observatory. An April 1884 issue of the *Doane Owl* carried this report: "The great clock is regulated and the time ball drops at 12 m. [meridian] precisely. Now all Crete and vicinity may be seen each day, watch in hand and windows open toward Merrill Hall, waiting for the signal that old Sol sits smiling on the ridge pole of the sky."¹¹ It was a student's task to raise the ball each morning using a rope and pulley system. The time ball's position atop three-story Merrill Hall, which itself was situated high on College Hill, assured that it could be seen from a great distance (Fig. 14). Thomas Doane also embraced the phenomenon of nationwide Standard Time at his Crete residence, and made certain that he had proper timekeeping tools at his home. He equipped his country home, The Grange, located just south of the college, with telegraph instruments and a telescope.¹²

Boswell Observatory is now the oldest building on campus. Merrill Hall succumbed to fire in 1969. The observatory houses a collection of the college's historic scientific instruments, most of which were used for astronomical observations, timekeeping, and weather-recording. Several pieces of equipment are mounted in their original positions, including three large clocks that were part of the campus-wide, timekeeping system.

The Greenwich meantime clock and the sidereal clock are mounted on the same isolated pier, and still function. A program clock, which regulated the Merrill Hall bell to sound the schedule of the day, is also in its original location. An 1885 *Doane Owl* gave an interesting account of this clamorous action:

The almost constant ringing of the bell at Merrill Hall reminds one of a railroad depot or an auction store. Fifteen bells are struck during the day at the following hours: rising bell, 6:30 a.m.; breakfast, 7:00; beginning of study hours, 8:00; chapel, 8:55; recitations, 10:00, 10:45, 11:30; end of morning study hour, 12:00 m.; dinner, 12:30 p.m.; recitations, 1:30, 2:15, 3:05; end of the afternoon study hours, 5:00; supper, 6:00; evening study hours, 8:00.¹¹

Other significant nineteenth-century equipment is housed in the observatory, including the original eight-inch equatorial refractor telescope. Installed in September 1884, the scope was manufactured by the H. W. Pennock Company of Madison, Wisconsin. It is

equipped with an achromatic doublet objective made by the premier lens manufacturing firm of Alvan Clark and Sons, Cambridge, Massachusetts. The telescope is still used regularly by Doane's astronomy class and for special evening events.

Several of Colonel Doane's survey instruments are also on exhibit in the observatory. His training as a surveyor and civil engineer was apparent in all aspects of the college's design, including the observatory project. Doane had a reputation as a perfectionist, a trait that led him to have quality instruments especially made throughout his career to ensure accurate problem analysis and precise completion of complicated construction projects. During his lifetime, Thomas Doane donated several of these instruments to the observatory to be used in classroom instruction. For example, a special meridian transit, which he had built for the difficult New York-Massachusetts Hoosac Tunnel drilling project in the mid-nineteenth century, is at home on a pier in the transit room.

The many functions conducted at Doane College's Boswell Observatory, particularly the daily time ball descent, show the sophistication of nineteenth-century timekeeping. The outward simplicity of the Boswell time ball's action belied the complicated technology needed for it to operate precisely. The ball, a relic of past cutting-edge technology, played an important role in Crete's transition from prairie village to college

town, and from local to nationwide Standard Time.

Notes

¹ Michael O'Malley, *Keeping Watch. A History of American Time* (Washington, D.C.: Smithsonian Institution Press, 1990), 87, 98.

² Donald J. Ziegler, *A College on a Hill: Life at Doane College, 1872-1987* (Lincoln, Nebr.: Media Publishing, 1990), xv, 10.

³ Janet Jeffries Spencer, "Meet Thomas Doane," *Doane Family Association of America 1994 Report of Proceedings* (Crete, Nebr.: Doane College, 1995), 49-52.

⁴ *Catalogue of the Officers and Students of Doane College* (Crete, Nebr.: Saline County News Book, Card and Job Printing Office, 1877, 1878, and 1880).

⁵ *Doane Owl*, Apr. 20, 1883.

⁶ Thomas Doane Perry, ed., *History of Doane College, 1872-1912* (Crete, Nebr.: Doane College, 1957), 60.

⁷ "Boswell Observatory," four-page brochure, ca. 1884, Doane College Archives.

⁸ *Ibid*.

⁹ Jan R. Bartky, "The Bygone Era of Time Balls," *Sky and Telescope* (January 1987): 32-35.

¹⁰ Nebraska Historic Buildings Survey (NeHBS), documents, field notes, and unpublished manuscripts on file at the Nebraska State Historical Society.

¹¹ *Doane Owl*, Apr. 20, 1884. The archaic word for midday is meridian, hence the single initial "m" following the 12 noon time reference from the *Doane Owl*.

¹² Perry, *History*, 198, 212.

¹³ *Doane Owl*, Jan. 20, 1885.