Article Title: Spacing Time: The Time Ball at Doane College

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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.

Cataloging Information:

Names: Thomas Doane

Nebraska Place Names: Crete

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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
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 method 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 lifelong 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 Doone 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 Brainard 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 mean time 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
ball is thr ow 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 en-
ables 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 observer stations give
time to railroads these second 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 minute 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 inter-
val one can obtain the time exactly by a
sounder far away from the clock, pro-
vided his watch is not so far out of the
way that he mistakes which 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 stan-
dard 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 naviga-
tors 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 Observ-
atory in Washington, D.C., erected a
time ball in 1845, and New York’s West-
ern Union building received one in
1877. Crete’s time ball was installed just
six years later. This interesting and un-
usual transference of material culture
from East to West is likely the direct re-
sult of Thomas Doane’s worldliness and
eastern seaboard heritage.

Several inland time balls were
erected in this country during the late
1890s in cities that had observatories,
but their importance faded soon after
the turn of the century when time sig-
als could be transmitted via radio. In
1897 only ten operational time balls re-
main ed worldwide. Doane’s is the only
one known to have existed in Ne-
braska. A date etched in the ball sug-
gests 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 obser-
vatory 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 appreci-
cated by townspeople and the campus
community as a means to synchronize
individual timepieces to the new Stan-
dard Time. It was also an interesting ad-
dition to the other timing equipment
found in the observatory. An April 1884
issue of the Doane Owl carried this re-
port: "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."

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 dis-
tance (Fig. 14). Thomas Doane also em-
braced 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 col-
lege, with telegraph instruments and a
telescope.
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; chapel, 8:30; 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 afternoon study hour, 5:00; supper, 6:00; evening study hours, 8:00.

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

5 Doane Owl, Apr. 20, 1883.
7 Boswell Observatory,” four-page brochure, ca. 1884, Doane College Archive.
8 Ibid.
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, 1883. The archaic word m for midafternoon 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.