

It is not therefore a business venture with its attendant risks for an observatory to “sell time.”
It is rather the utilization of a product which will otherwise be unused.¹

—Leonard Waldo, 1883

INTRODUCTION

At noon on Sunday, 18 November 1883, North American railroads created the modern era of public timekeeping. They discarded the forty-nine different times by which they had been running freight and passenger trains and replaced them with five new ones. Known collectively as Standard Railway Time, these operating times differed from each other by exact hours across the continent and were indexed to the Royal Observatory at Greenwich’s meridian. They were the first elements in what would become the worldwide system of civil time zones that we now call Standard Time.

The process by which time awareness changed in the United States—from local, to regional, and then to national time—provides the background for this book.² Americans today take Standard Time for granted, and it is no exaggeration to say that it has become our culture’s time—the common standard for business and government transactions around the world. But 116 years ago the need for a uniform system of timekeeping was a matter of debate among time-givers. Surprisingly few Americans voiced opposition after the change, yet where these protesters lived demonstrated a subtle link between civil timekeeping and the daily cycle of light and darkness that all of us live by. Even today, on the brink of the twenty-first century, the Greenwich-based system of civil timekeeping is still not universally observed.³

America’s railroads adopted uniform time in 1883, not out of need but to forestall federal intervention. In 1882 Congress had passed legislation that promised to restrict the choice of railroad operating times. Another bill, which

would have forced the inclusion of the city of Washington's time in all passenger-train schedules, had failed to win passage; but the bill was almost certain to be reintroduced in the next Congress. This pressure on legislators came largely from lobbying efforts by American astronomers. Some of these scientists saw national legislation as a route to uniform time for the entire country: having that kind of system would make it easier to conduct research in geophysics, such as studies of tornadoes, thunderstorms, earthquakes, terrestrial magnetism, and the like. Their ranks also included observatory directors who sold time signals to cities and railway companies, and who were then at the peak of their influence on public timekeeping.

The railroads, by adopting their own Standard Railway Time, virtually ended congressional interest in public timekeeping for the next three and a half decades. No national legislation emerged until 1918, when "an act to save daylight and to provide standard time for the United States" became law.

Astronomers first entered the realm of public timekeeping around mid-century. Events smoothed their entry. In 1853 two terrible train wrecks caused by errors in timekeeping alarmed the nation. Seeking to calm public fears, several railroad companies hired astronomers to supply them with accurate time. Using newly developed research equipment, astronomers could demonstrate unequivocally that observatory time was more precise than the time calculated by city jewelers and clockmakers, who had plied the trade for decades. But a close examination of the records reveals that public relations, not public safety, prompted most railroad companies to seek out astronomers as purveyors of time. Within the scientific community, too, there is evidence of mixed motives. Some astronomers saw time services as a way to gain funds for their cash-starved observatories; for others, the goal was direct personal gain. Yet all claimed a disinterested desire to advance pure science while providing the service.

Ironically, even though advanced technologies gave astronomers an edge in the 1850s, most observatory directors ignored later changes in timekeeping technologies once they had established their own enterprises. Believing in their own product, which was accurate time, these astronomers argued that accuracy was absolutely essential in all time-related activities. Yet, for many customers consistency in timekeeping—making sure that all clocks display the same time—was the important consideration. The commercial world responded to this need. As a result, by the late 1880s new timekeeping and time-distribution devices were replacing observatory time services. Frozen out of the commercial world of time services, American astronomers downgraded their interest in public timekeeping.

A few studies have chronicled timekeeping during the nineteenth century at a single institution, drawing largely on annual reports and the archival ma-

terials the directors left behind. But only by examining observatories as a group, within a context that includes both timekeeping technologies and users, can we assess the significance of time services in the development of American astronomy.

Reviewing observatory timekeeping as a whole reveals both the importance of the U.S. Coast Survey in establishing the country's first time services and the contributions made by several long-neglected inventors to America's world reputation as a scientific and commercial power. Examining the associated legislative record exposes the stages by which the U.S. Naval Observatory came to dominate public timekeeping, and illuminates the real achievements of those relatively few astronomers whose efforts—often through words more than deeds—helped make America the first country to adopt a system of uniform time spanning an entire continent.

A handful of key American astronomers participated in public time services during the nineteenth century. At the peak, which came in the 1880s, a dozen and a half institutions were distributing time. No previous study has described the beginnings of the era, detailed the astronomers' actual influence on civil timekeeping, or shown why the country's new technologies displaced observatory directors' dreams of expanded business opportunities.

Considering the rapid growth of the country's railroads and telegraphs in the years following the Civil War, one looks in vain for parallel growth in the number of private observatories selling time signals to those communications links. In fact, the astronomers' influence on public timekeeping was not based on their time services but rather on their publicity campaigns to promote greater time uniformity. Some of these proselytizers demonstrated great skill in lobbying for their cause; others revealed astonishing naiveté when confronted by those—including their own colleagues—opposed to their ideas. How American scientists, initially focused on establishing precise latitudes and longitudes and coordinating data collected from multiple observation points, managed to promote time uniformity and the nationwide adoption of a Greenwich-based time system, offers an object lesson in how science, government, and private interest can interact. It is a lesson that remains important even in our era, in which the task of establishing one's position anywhere on the earth's surface has become routine thanks to Global Positioning System satellites that broadcast the local time of the now-disestablished Royal Observatory at Greenwich.

Once the railroads inaugurated their system of operating times, many American cities and towns embraced it. Via ordinance and statute, a fundamentally different way of reckoning civil time spread rapidly throughout the country. Superficially, the transformation in civil timekeeping was simply a continuation of railroading's influence on the American public. Indeed, one

informed observer even likened the changeover to “a noiseless revolution,” for most Americans simply altered their clocks and went on with their lives.⁴ But here and there a few people objected, and for more than thirty years they prevented the further spread of Greenwich-indexed timekeeping in this country. Their reasons for opposing what was destined to be the nation’s civil time were virtually identical to the ones underlying the protests that now roll in two times a year, when Americans advance or retard their clocks in response to daylight-saving time.⁵

This country’s near-complete acceptance of uniform time would not have occurred without the extraordinary efforts and remarkable good fortune of a small number of nineteenth-century individuals, sometimes vocally defending their public service, often pursuing their own personal agendas, and largely unknown or ignored by the general public. Uncovering the facts concerning opposition to, and support for, national time in nineteenth-century America sheds light on a momentous process in which government agencies, scientific institutions, and private businesses all played roles that would be impossible in America—or the world—today.