



BOOK REVIEWS

global reckoning

longitude is dava sobel's deft history of discovering a new tool for commerce and exploration

by Peter Daniel Davis

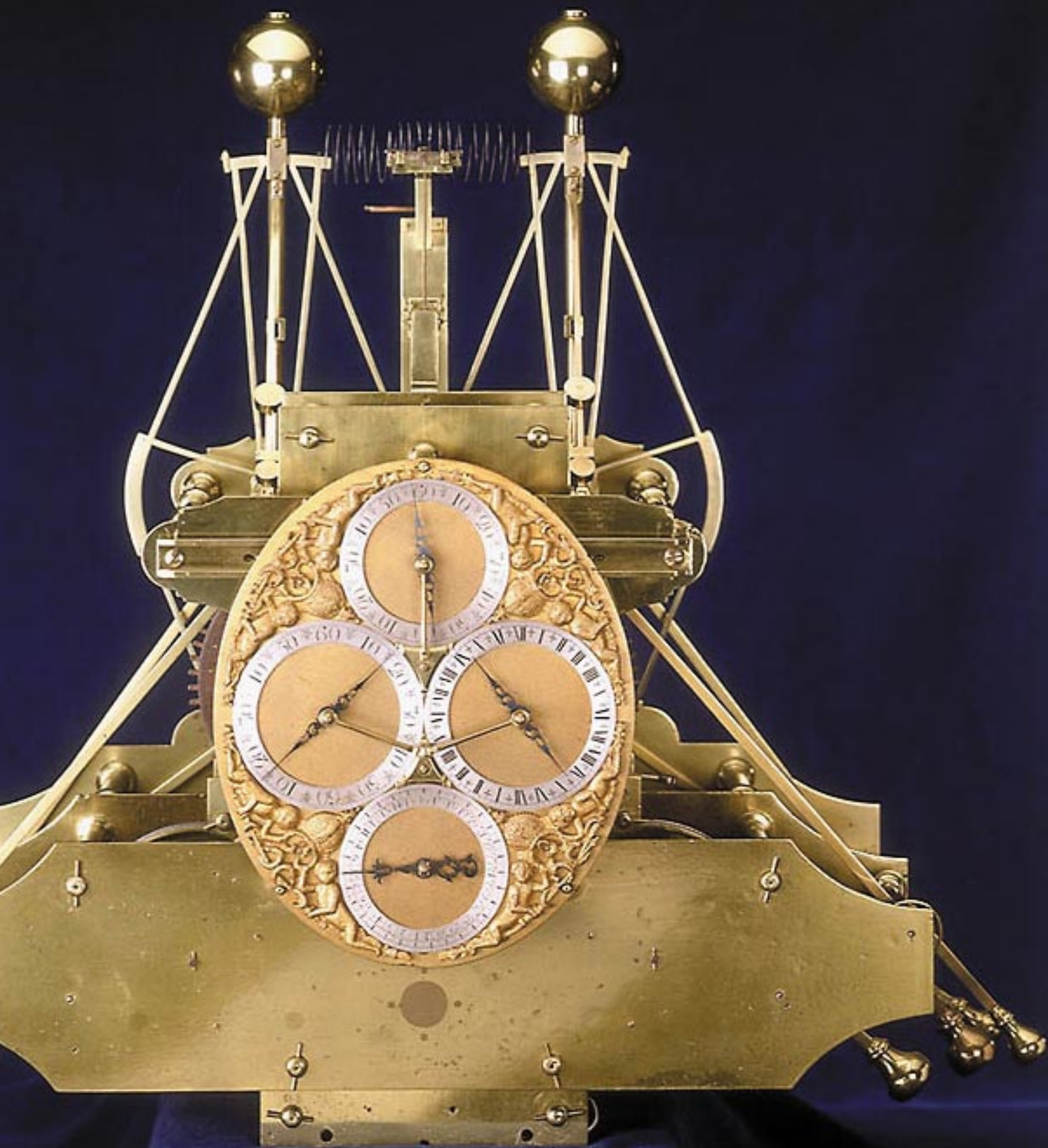
In October 1707, Admiral Sir Clowdisley Shovell, leading a fleet of five warships, hung a sailor for mutiny after he had gone to Sir Clowdisley with the suggestion that their presumed location was incorrect. A day later, four of the five ships had foundered on the shores of the Scilly Isles, roughly 20 miles off the southwest coast of England.

The four wrecks included Sir Clowdisley's flagship, the *Association*. Two thousand men were lost. One of the two men who survived was Sir Clowdisley. He washed up on a beach where he was killed by a woman for his emerald ring. This is the setting for Dava Sobel's short history, *Longitude*, which traces the discovery of a reliable way for a ship to accurately determine its position and thus, be able to plot a dependable course.

Over the centuries, there had been hundreds of such wrecks. It was simple enough for a sailor to calculate a ship's latitude—how far

north or south it was. This could be done using the date in conjunction with the length of the day, the height of the sun, or the position of specific stars. But once it was out of sight from land, there was no known way of calculating a ship's longitude—how far east or west it was. Ship captains would use “dead reckoning,” an assortment of crude methods for estimating longitude. But the results of these rough calculations were often tragically inaccurate. Lives were routinely lost either from shipwrecks or from voyages prolonged by wayward navigation, leading to scurvy, a





BOOK REVIEW: GLOBAL RECKONING

vitamin C deficiency that resulted from a lack of fresh fruits and vegetables.

Prompted in part by the disaster of Sir Clowdisley's fleet, the English Parliament passed the Longitude Act of 1714, offering a prize of £20,000 (several million dollars in modern currency) for anyone who could solve the question of how to determine longitude. The Board of Longitude was established to review applications for the award and to decide if one fulfilled the requirements for winning.

Many astronomers, including Galileo Galilei and Sir Isaac Newton, believed there was a way to calculate longitude based on the positions of the heavenly bodies. Longitude *could* be calculated by the event of a lunar eclipse. But such occasions were too few and far between to be of any practical use. Galileo thought he had come up with a solution by noting the eclipses of the moons of Jupiter, which occurred on a frequent basis. He even devised a helmeted device for sighting the moons. But it was difficult enough to use on land, let alone on a rocking ship. Eventually, work on celestial navigation led to the development of the sextant, which could be used to determine latitude and longitude by measuring the angular distances between celestial bodies.

But there was another approach to the problem. If a clock could be built that would accurately keep the time of a ship's homeport, then it would be possible to calculate longitude based on the difference between that time and the shipboard time. But that was not yet possible. A clock pendulum would not swing back and forth with the same consistent regularity on a rolling ship, and temperature, barometric pressure, or minor variations in the earth's gravitational field in different places would speed up or slow down the workings of a clock.

A self-educated clockmaker named John Harrison developed a series of chronometers—highly accurate clocks—that included works with reduced friction and ball bearings. He used winding mechanisms that eliminated pendulums. And he introduced the use of different metals in combination that countered the effects of their natural tendency to expand and contract.

In 1731, John Harrison presented a seventy-five pound timepiece called the H-1. It was followed by refined and redesigned versions; the H-2 in 1741 weighing in at 86 pounds, the H-3 in 1759 at 60 pounds; and later the H-4 in 1760, and the H-5 in 1770, both chronometers the size of a pocket watch. Finally — a size that could be easily carried and used on shipboard.

But preferring to see the prize go to an astronomer, the Board of Longitude saw fit to change the rules time and again to the detriment of Harrison. In his old age, Harrison was finally awarded the balance of the prize money after years of wrangling with the Board. Although there were some sea captains who immediately recognized the immense value of Harrison's chronometer, for a long time the sextant remained the more popular device. Eventually, the chronometer won out. As more watchmakers began building chronometers, the price became more affordable. The advantages of the chronometer's accuracy and simplicity of use became apparent as declared by Captain James Cook when he voiced his admiration of the device after sailing with it in the Pacific.

Along with longitude, scurvy was also conquered by including sauerkraut, which included vitamin C and did not spoil on ship, in seaman's diets. Later on, the Royal Navy would substitute lemon juice, and eventually limes.

John Harrison's first four chronographs are now housed in the National Maritime Museum in London. In 1920, Lieutenant Commander Rupert T. Gould began the task of carefully restoring them, a task that would take him years. Chronographs H-1, H-2, and H-3 are actually kept running, a testimony to Harrison's perseverance and ingenuity.

Dava Sobel's book, *Longitude*, is available on GSA Schedule 76, Publication Media.

For more information, please contact:

Lloyd Brown
(212) 264-0943



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by Janis Freeman

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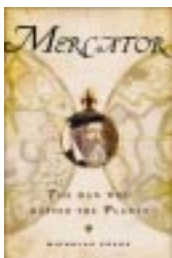


BOOK REVIEWS

GLOBAL NOTIONS

by Brian Insolo

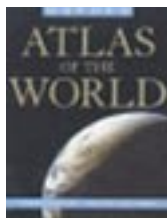
Are you able to name the countries that border Iraq? How about Afghanistan? GSA Schedule 76, Publication Media, offers a wide selection of atlases, maps, and books so you can answer these questions as well learn more about the world, history, and the many places in which GSA Global Supply serves its customers. A sampling of the atlases, maps, and books available under Schedule 76 are listed below.



Mercator: The Man Who Mapped the Planet

Nicholas Crane
Henry Holt & Company, Inc.
January 2003

Gerard Mercator, who was born Gerard Kremer in 16th century Europe, created the first modern map and coined the word “atlas.” The importance of Mercator's map is that it solved the question of how to portray the three-dimensional globe on paper while retaining accurate compass bearings. Crane's engrossing, well-researched biography follows Mercator through university, as he is incarcerated for seven months on charges of heresy, and as he works on his groundbreaking map. This book is a must read for anyone interested in historical biographies of exploration.



Atlas of the World
Oxford University Press
Tenth Edition,
September 2002

This edition includes work by some of Europe's top cartographers as well as new maps for the world's islands, “stunning” satellite images, and maps of the world's major metropolitan areas. According to *Publisher's Weekly* “...the heart, and strength, of this atlas remains the hundreds of colorful, beautifully detailed maps, conveying not only topographical features but also disputed boundaries, railways, and principal roads.” *Atlas of the World* is a reliable tool and useful reference for government agencies.



Degrees of Latitude: Mapping Colonial America

Margaret Beck Pritchard, Henry G. Taliferro (Foreword by Ronald Hurst)

Henry N. Abrams, Inc., September 2002

Degrees of Latitude illustrates American history through several unpublished maps of colonial America from the 16th to 18th centuries that were used to improve trade and travel and define land claims. Knowing when these maps, taken from the Colonial Williamsburg Foundation, were created allows us to see what really mattered to our ancestors.

For more information, please contact:

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the electronic graveyard

old technology proposes new challenges

by Dennis Blood and Emily LeDuc



According to the Institute for Local Self-Reliance, approximately 75 percent of **obsolete electronics** are currently being stored or warehoused until there is agreement on the best way to manage this material. As **stockpiling continues**, there is **growing concern** about the volume of used or obsolete electronic equipment that will need to be **managed responsibly** when it emerges from storerooms or attics...

Obssolete electronics are quickly becoming the world's most voluminous waste problem. With technology improving at lightning speed, the need to dispose of old equipment within 3-5 years of purchase has become a major concern, and this lifespan is steadily decreasing. A number of issues characterize this dilemma, including the simple fact that discarded electronics represent a rapidly growing waste stream. Of the estimated 20 million computers that were disposed of in 1998, fewer than 6 percent were recycled. By the year 2005, it is estimated that more than 63 million computers will be disposed of, according to the National Safety Council.

In addition to the sheer volume of equipment, there are resource and environmental concerns as well. Electronic components are comprised of a variety of valuable resources including metals (some precious), engineered plastics, glass, and other materials which require energy to obtain and produce. Re-useable components in many electronic products can be easily harvested and utilized in other applications. Discarding this equipment without using these parts and materials to their full potential is harmful to the environment when energy and resources are spent producing the same or similar components using virgin materials.

Many electronic components contain hazardous or toxic substances including mercury, cadmium, chromium, and some types of flame retardants in amounts that can be harmful and are deemed hazardous by Federal law. The glass screens, or CRTs, in computer monitors and televisions can contain as much as 27 percent lead. Electronic products are the leading source of heavy metal contamination in the solid waste stream. This could result in potential environmental risks, if these items are not disposed of properly.

accountability and cercla

So what does all this mean for the average electronics disposer? It means quite a bit. Once those outdated electronic components leave your possession they are no longer your problem right? Wrong. CERCLA, the Comprehensive Environmental Response, Compensation, and Liability Act (also known as the SuperFund Act) has determined that an individual waste generator has liabilities through the entire duration of the product.

potentially responsible parties (prp)

Under CERCLA, those who can be held liable for the costs of responding to a release, or the threat of a release, of hazardous substances are considered to be PRPs. PRPs are defined as:

- Current owners or operators of the facility or vessel;
- Former owners or operators of the facility or vessel, if they owned the property at the time of disposal;
- Those who arrange for treatment or disposal of hazardous substances at a facility (in most cases, the generators); and
- Transporters of hazardous substances who selected the disposal site.

CERCLA liability is retroactive, meaning that parties may be held liable for releases that occurred prior to the enactment of the statute in 1980.

Federal agencies can now utilize proper hazardous waste disposal services through GSA's Environmental Services Schedule. Don't take chances for your agency or our environment. Select your electronic waste or hazardous material recycling contractor from those listed specifically for Reclamation, Recycling, and Disposal Services (SIN 899-5). These vendors will first determine your agency's needs with regard to both physical and data security and then dispose of these assets in a manner that meets your needs. You can feel comfortable once you've selected a vendor from the GSA Environmental Services, and we can all breathe a little easier.

For additional information on this schedule, contact GSA today!

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www.gsa.gov/environmentalservices

Sources for The Electronic Graveyard:
Environmental Protection Agency – www.epa.gov

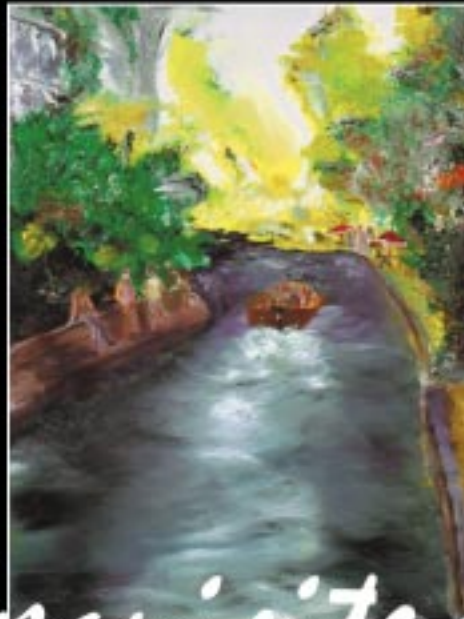


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Mongolia (7)
Morocco (21)
Nepal (16)
Pakistan (19)
Philippines (31)
Sri Lanka (14)
West Bank/Gaza (2)
Burma (6) China (65)
East Timor (7)
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Haiti (20)
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Nicaragua (20)
Panama (29)
Paraguay (13)
Peru (22)

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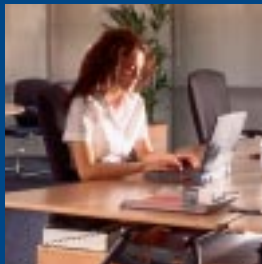
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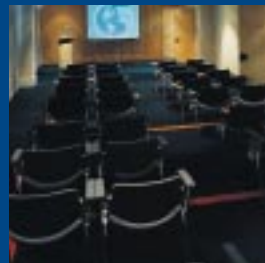
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