

Information Appliances

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American University

The Information Age!

- What is the “information age”?
- When did the “information age” begin?
- Where and how did it begin?
- Who did what?

One Hundred Fifty Years!

1850

- Farming
- Railroad (early)
- Barges (horse drawn)
- Water power
- Candles and oil lamps
- Factories
- Human brain
- Pony Express

2000

- Service economy
- Jet aircraft
- Personal automobiles
- Nuclear power
- Universal electrification
- Automated factories
- Ubiquitous computers
- Internet & WWW

1848: United States

- President : **General Zachary Taylor**
- succession: 11th
- born: Montebello, VA on Nov. 24, 1784
- gold discovered: California at Sutter's Mill
- Erie Canal (1817), C & O Canal (1850), Illinois-Michigan Canal (1848)
- Steam Passenger Service to England: 1846

Railroads

- 1804 Richard Trevithich of England invents the steam locomotive
- 1831 South Carolina Canal and Railroad Co institutes first regularly scheduled steam powered train service in US
- 1850 Congressional land grants for RR
- May 10, 1869 Union Pacific and Central Pacific join at Promontory Point, Utah

Southern Railway Locomotive 1401 (1926)



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The Invention of the Telegraph

- numerous people experimented with ways to communicate over distances
- numerous scientists experimented with electricity: Ampere, Volta, Gauss and others
- *1753: Scottish magazine suggests a system of insulated wires, one for each letter!*
- *1825: Pavel Ludovich Schilling: wire needles*
- *1833 Gauss, Weber: galvanometer telegraph*
- *1837: Wheatstone, chronometric telegraph*

The NEED for the telegraph

- United States is a large country with a dispersed population
- 1837 US Senate called for proposals to establish a **national telegraph system** (giant semaphore system).
- Other countries used semaphore systems; **French had 3,000 miles**
- 5 proposals: 4 semaphore
1 electrical: Morse

Samuel F. B. Morse(1791-1872



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Samuel Finley Breese Morse

- born: 1791 in Charleston, MA (one year after the death of Benjamin Franklin)
- graduated from Yale
- moved to NYC in 1823 and became one of the foremost **artists** of his day
- **appointed first professor of art in US**
- died: 1872

An Epiphany

- returning (by ship) from Europe in 1832, Samuel F. B. Morse hears about Ampere's experiments with electricity:
- *“If this be so, and the presence of electricity can be made visible in any desired part of the circuit, I see no reason why intelligence might not be instantaneously transmitted by electricity to any distance.”*

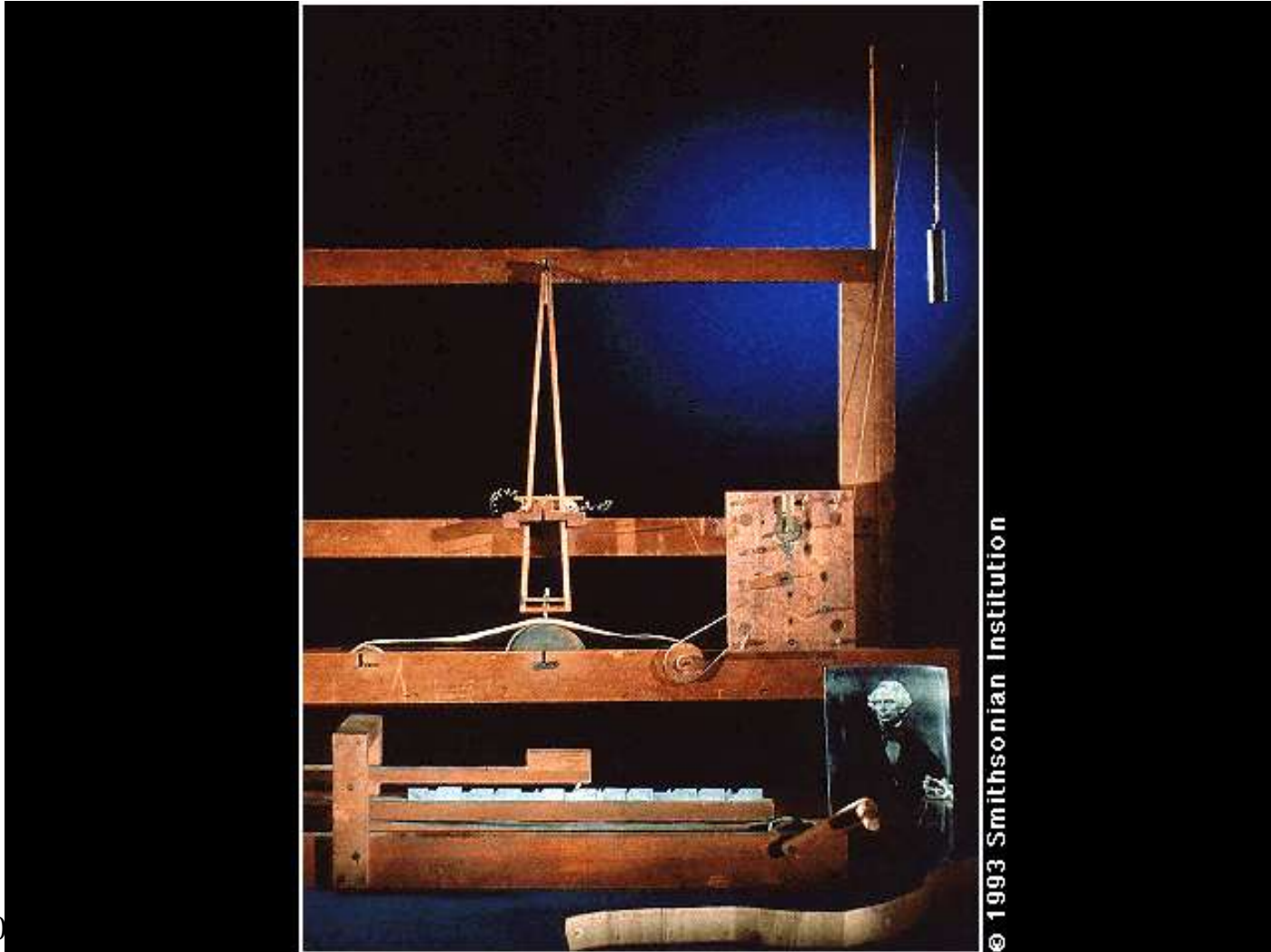
The Invention of the Telegraph

- First efforts used dictionary:



- 2 1 5 3 6
- “experiment” “successful”
- **Alfred Vail** redesigns the telegraph 1837
- Morse Code (dot-dash) 1838
- patent issued for his version: used an artist’s frame and metal slugs to transmit code for each letter 1840

Morse's Telegraph



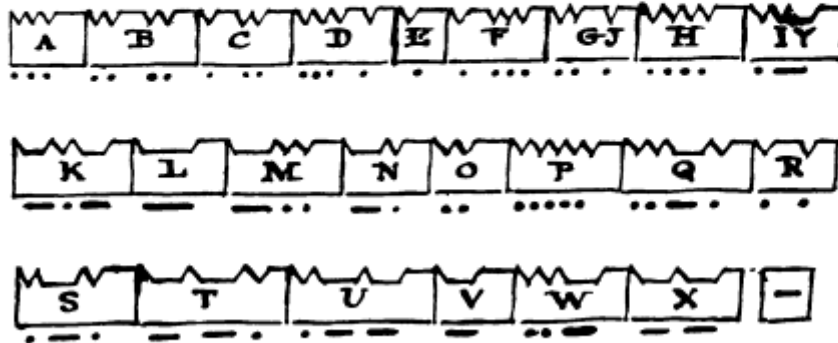
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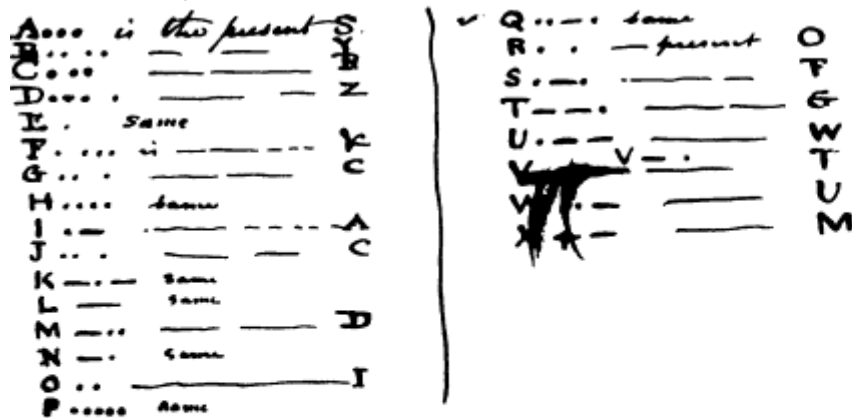
Morse's original telegraph (1837)

- First instrument to transform information into electrical form and transmit it reliably over long distances.
- Printed patterns on paper.
- Transmitter used **metal slugs** with peaks and valleys; a tray containing the slugs was dragged from left to right by a falling weight.
- *Printer* paper was controlled by a wooden clock mechanism; *printer* used an **electromagnet**.

The following is the form of the type, and the code as drawn in the caveat of 1837.



The changes from this original arrangement of the dots, spaces and lines, are seen on comparison.



A notebook page shows Morse's 1837 code (with 1844 modification) and its relationship to the sawtooth type.

The Development of the Telegraph

- Morse gets \$30,000 from U.S. Congress 1843
- Plan: message from Baltimore to Washington
- Spends \$23,000 laying pipe with wire inside which shorts out and fails
- Hears about European use of single wire (and the earth as ground) and has Ezra Cornell string a wire along the B&O tracks to just outside of Baltimore (EC endows Cornell University)

The Invention of the Telegraph

- First message: “*What hath God wrought?*”
(Balaam in (Bible) Numbers 23:23)
- May 1, 1844: message sent about the Whig convention and their Presidential nominees
- May 24, 1844: line is completed from Pratt Street RR (Baltimore) Station to Supreme Court (Washington, DC)

Morse/Vail Telegraph Key (1844)



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Morse/Vail Telegraph Register (1844)



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Impacts

- 1846: Mexican War
- 1848: Associated Press: 6 New York newspapers
- 1850s: Erie railroad: messages about tracks, switches, location, freight, passengers, personnel, rolling stock, etc. **Creates a *system* for control and management of a widely dispersed enterprise**
- 1858: First transatlantic cable:
 - 26 hours for first message to cross
- 1864: Union Army advantage during Civil War

Transatlantic Cable (1858)



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The Atlantic Cable

[left is 1866; right is 1956 (first transatlantic telephone cable)]

- Established to carry **instantaneous communications** across the oceans for the first time.
- Although seen as a landmark event by society, it was a technical failure, remaining in service only a few days.
- Later cables laid in 1866 were completely successful and compare to the landing of men on the moon a century later.

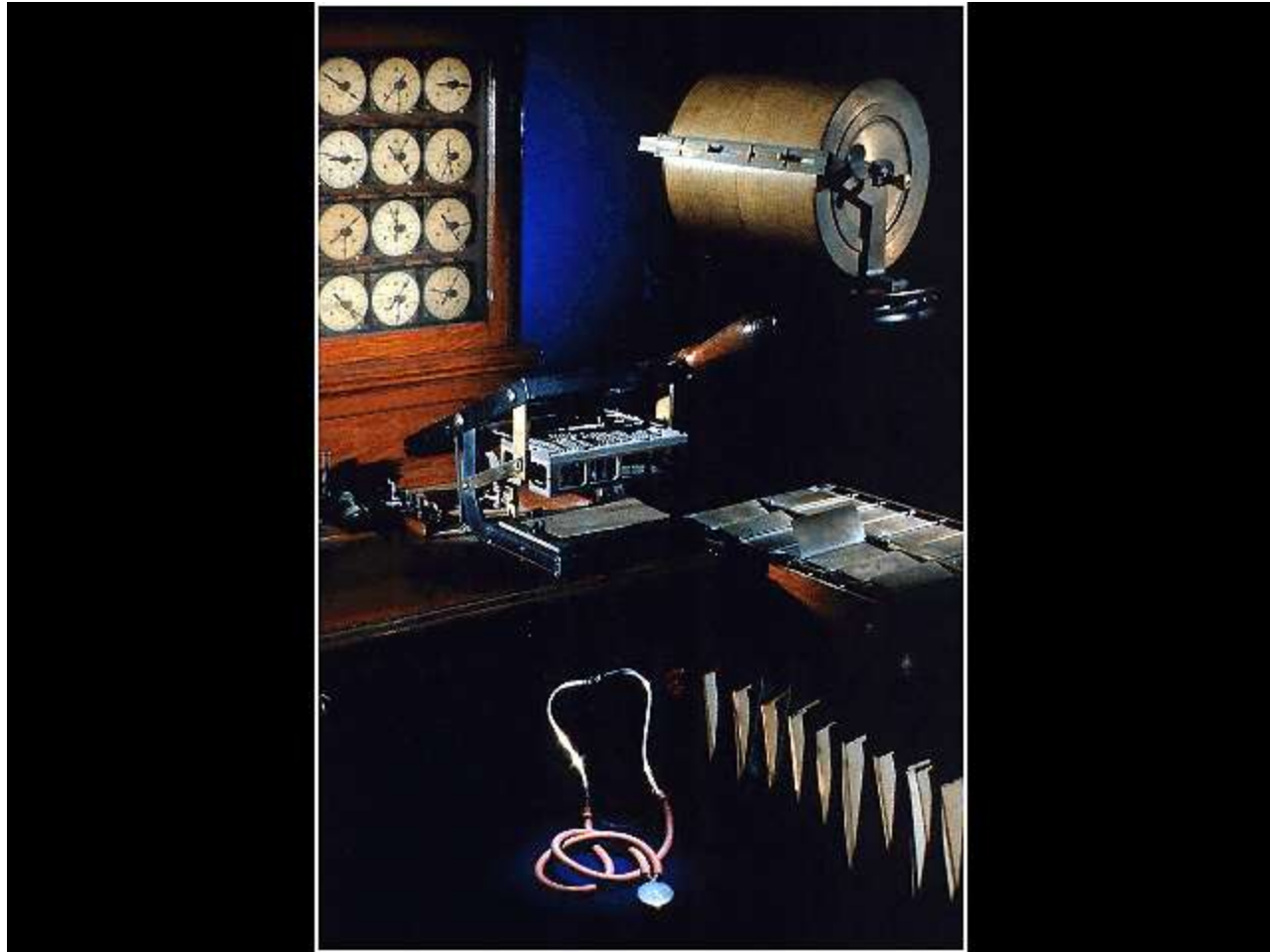
Impacts

- American fascination with *technology*
- Wall Street (stock *exchange*)
- Chicago (commodities *exchange*)

“Operations are made in one day...by repeated communications, which could not be done in from two to four weeks by mail.”

- **First giant *monopoly*: *Western Union***
- ***Information as power***
- ***Technological haves and have nots***

Information appliances proliferate



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What is an *inventor*?

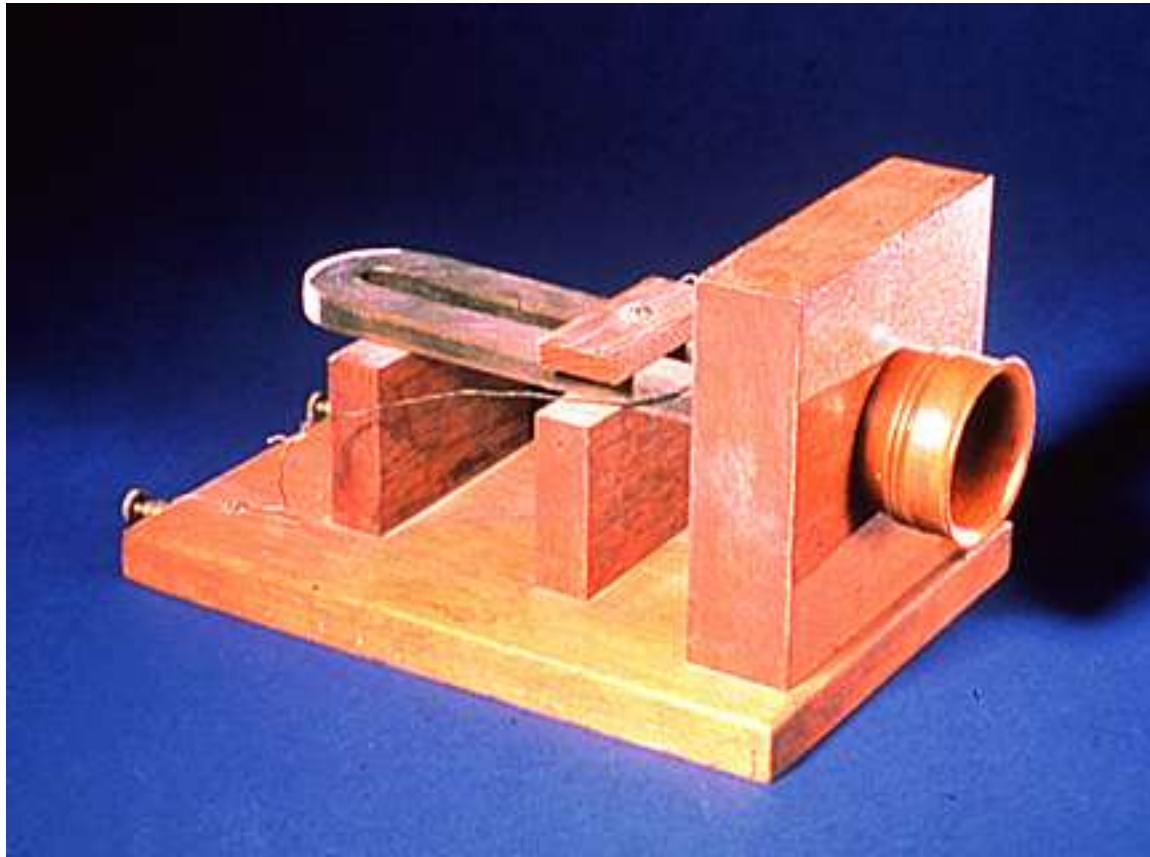
Who gets credit for what?

- Many people (Europe & US) experimenting with communications devices
- *Scientists* are discovering the laws of nature, but actual usage, i.e., *technology*, is separate and *commercialization* is considered a breach of academic etiquette!
- Thus, an artist, with a *vision*, is able to create one of the most important inventions in history using other people's skills

The Invention of the Telephone

- 1876: Alexander Graham Bell gets a patent for “Improvements in Telegraphy”
- *“If I can get a mechanism which will make a current of electricity vary in its intensity, as the air varies when a sound is passing through it, I can telegraph any sound, even the sound of speech.”*
 - 1876 1st working telephone
 - 1886 167,000 telephones in U.S.

First working telephone



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Experimental phones

Electrical patterns change according to a needle moving up and down in a liquid

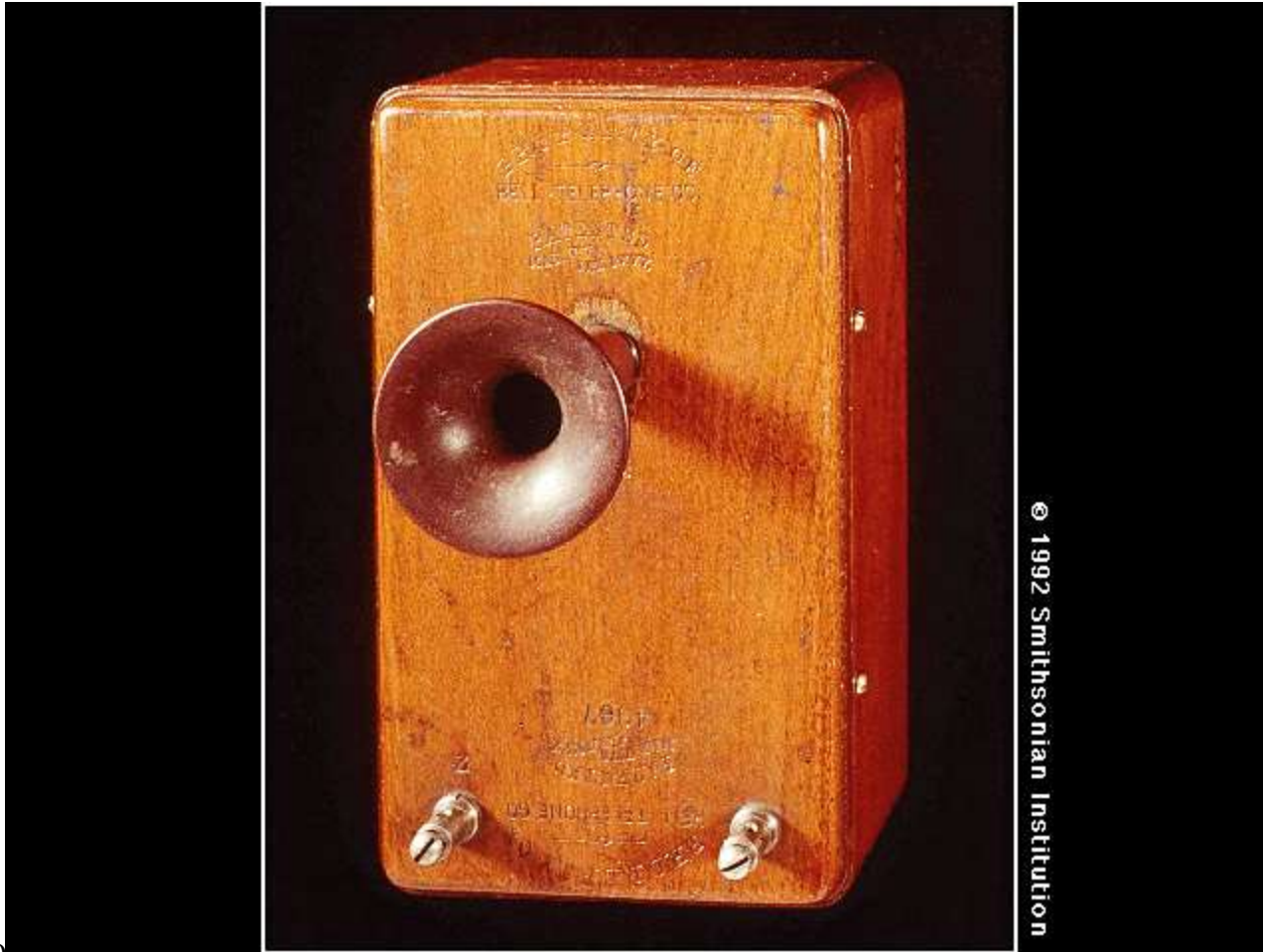


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Commercial magneto phone (1877)

Transmission and reception in same instrument



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