ELECTRIC
WALDEN

WE HAVE "WALKED BACK THE CAT," SO TO SPEAK, TO RECORD

HISTORIC MILESTONES IN THE DEVELOPMENT

OF THE

HYPERCONTEXT/MULTIMEDIA/TRANSCLUDED/MODULARIZED

"STACK OF THE ARTIST OF KOUROO"!

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

3,200 BCE

A news item relating to the development of ELECTRIC WALDEN technology: In our current state of the evidences, the Mesopotamian culture is being generally supposed to have been the 1st to have begun to produce written texts. In one preserved example a Sumerian was using a stylus and wet clay to keep track of ingredients for the making of beer.

ELECTRIC WALDEN

"NARRATIVE HISTORY" AMOUNTS TO FABULATION, THE REAL STUFF BEING MERE CHRONOLOGY

In prehistory the Sahara had been very different from now, raining all the time, full of canoes and elephants, with Lake Chad a hundred feet higher than it is now. For a dozen millennia the region had supported enough game to allow hunting and nomadic pastoralism, but then the land had begun to dry up. One reference says that between 6,000 BCE and 4,000 BCE the Nile River had been subject to flooding and lake levels at Fayum had been high, until a drier period at about 3,500 BCE had been followed by a wet spike at about 3,200 BCE. This is supposed to be at the time corresponding to the predynastic Naqada cultures.

A news item relating to the development of ELECTRIC WALDEN technology: In Egypt, a system was in place for the use of pictorial hieroglyphics, phonetically arranged symbols on small clay tablets, as an inscribed record. The earliest preserved examples turn out to have been simple receipts, that is, they indicated payments received for commodities.

ELECTRIC WALDEN

HISTORY'S NOT MADE OF WOULD. WHEN SOMEONE REVEALS, FOR INSTANCE, THAT A PARTICULAR INFANT WOULD INVENT THE SEWING MACHINE, S/HE DISCLOSES THAT WHAT IS BEING CRAFTED IS NOT REALITY BUT PREDESTINARIANISM. THE RULE OF REALITY IS THAT THE FUTURE HASN'T EVER HAPPENED, YET.

ELECTRIC WALDEN

3,000 BCE

A news item relating to the development of ELECTRIC WALDEN technology: The dust abacus (basically a picture of an abacus, made with one's finger on a dusty or sandy surface, and possibly using pebbles as markers on lines drawn on the dusty surface) was invented, probably in Babylonia. We note in passing that the word for abacus, in the Hebrew language, has the meaning of dust.

ELECTRIC WALDEN

THE FUTURE IS MOST READILY PREDICTED IN RETROSPECT

ELECTRIC WALDEN

2,500 BCE

A news item relating to the development of ELECTRIC WALDEN technology: Ceramic seals were being used by the inhabitants of the valley of the Indus River, in what has become Pakistan, to indicate ownership or destinations for bundles of goods.

ELECTRIC WALDEN

"History is the why of now."

– Austin Meredith

1,800 BCE

News items relating to the development of ELECTRIC WALDEN technology:

- Ceramic pottery and heddle weaving spread through the Andean highlands (the cloth and pots were decorated with designs similar to ones still in use four thousand years later).
- Metallurgy spread through northern Europe.
- A Babylonian mathematician developed algorithms to resolve numerical problems.
- At about this period in Mesopotamian astronomy (the Early Old Babylonian Period), Hammurabi imposed a single official lunar calendar upon the Babylonian Empire, and the 1st identifiable star-list appeared in "Prayer to the Gods of the Night."
- Over the half century between 1,800BCE and 1,750BCE multiplication tables appeared in Mesopotamia.
- Sumerian astronomers, many of whom were female, were using calculations in which hours were made up of 60 minutes, and circles of 360 degrees (they were also attempting to predict and control the weather, and not only their 60-minute hours and 360-degree circles, but also these meteorological struggles, would be carried over into Hellenistic astrology).[1]

1. The people we term "ancient Greeks" spoke various languages many of which were not like Greek at all. Macedonian, for instance, is a Slavonic language. Over and above that, most of these "Hellenes" did not reside in what we now consider Greece — Troy, for one example, was on the Dardanelles coast of Turkey. Nevertheless these people did share a common culture. Accordingly, historians use the term "Hellenic" to indicate the very insular pre-Alexandrian Greek culture and the term "Hellenistic" to indicate the more cosmopolitan post-Alexandrian Greek culture. For convenience they date the change to 337 BCE, when Alexander of Macedon's father Philip II united the previously antagonistic Hellenic city-states behind an invasion of Iran. Also, while it's commonly said that Sumerian astrology influenced Vedic, or Indian, astrology, this is probably ethnocentrism rather than documented fact. Even if it did, the Indian methods clearly diverged. To provide just one illustration, the Vedic astrologers, rather than dividing the day into 24 parts each having 60 parts, divided the day into 60 parts (*nalika*) each having 24 parts.

1,500 BCE

News items relating to the development of ELECTRIC ◻ WALDEN technology:

- Near the Black Sea, Hittites were referring to iron as “metal from heaven,” that is, from meteorites.
- During the Shang Dynasty in China, divination inscriptions were being made on the bottom carapaces of turtles and on the shoulder blades of domestic animals. One such fragment indicates that the Chinese already knew the length of the solar year to be $365^{1}/_{4}$ days.

“History is the why of now.”

– Austin Meredith

1,350 BCE

A news item relating to the development of ELECTRIC WALDEN technology: Decimal numbers were in use in China.

“MAGISTERIAL HISTORY” IS FANTASIZING: HISTORY IS CHRONOLOGY

500 BCE

News items relating to the development of ELECTRIC WALDEN technology:

- The pens of Egyptian scribes were made of Calamus or Bamboo reeds obtained from the Nile delta or from Armenia, having split, frayed, or carved ends.
- The bead-and-wire abacus originated in Egypt.

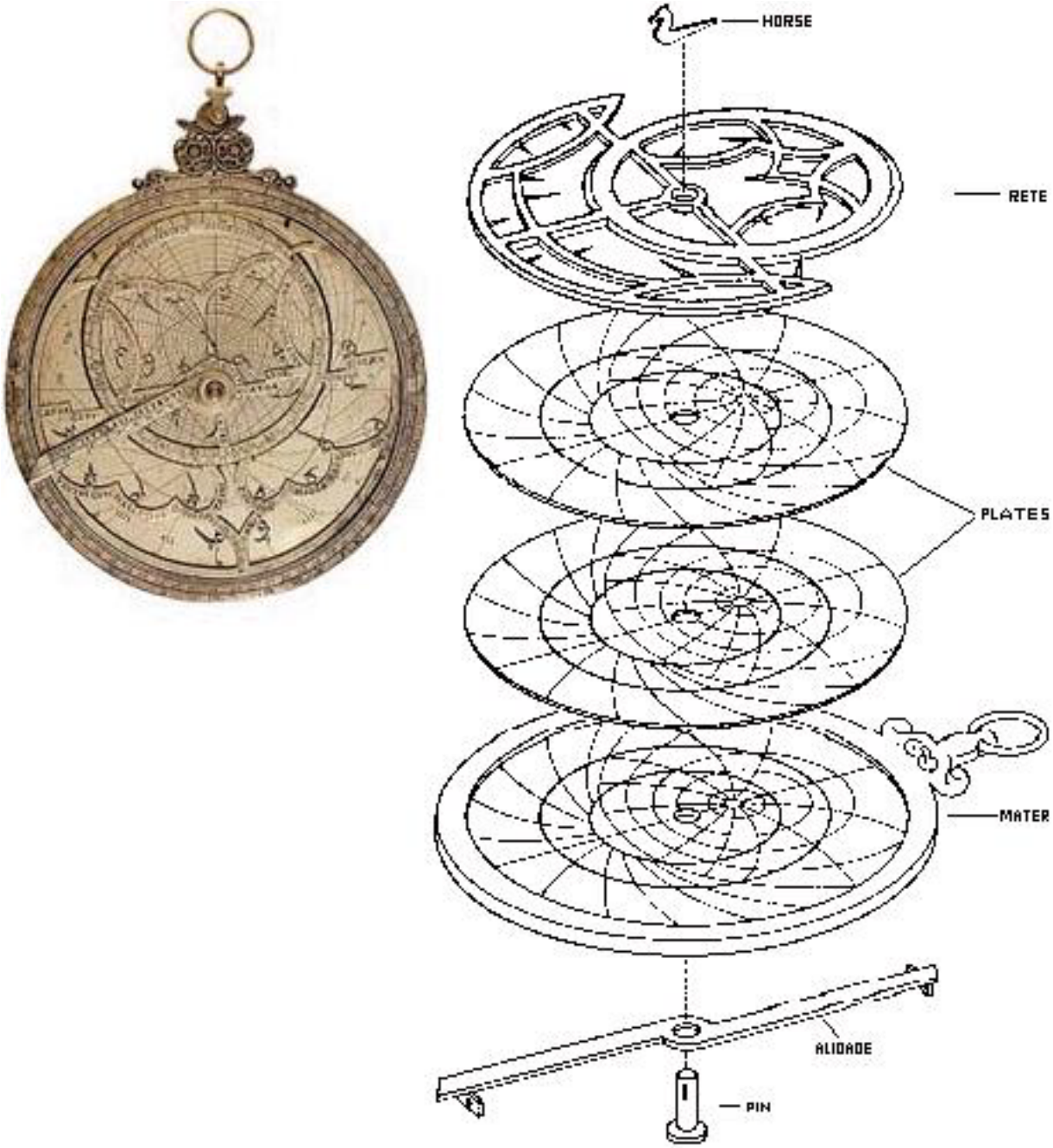
ELECTRIC WALDEN

INSCRIPTION

150 BCE

Hipparchus perfected the astrolabe, the principles of which had already been known. The ones that have survived the vicissitudes of time have ordinarily been made of brass, but the device could easily have been fabricated out of stiff paper and cardboard, or out of other materials. The front of an *astrolabe* has some fixed parts (these are time scales, and a stereographic projection of the sky as seen from a specific latitude) and some

rotating parts (that simulate the daily rotation of the sky).



The most basic method used by a navigator to plot the course of the vessel is deduced or “dead” reckoning. Using the magnetic compass, continuous records are kept of the approximate directions traveled, and using the sand-glass, continuous records are kept of the approximate times elapsed while traveling in these directions, and by the use of a floating log tied to a knotted line, continuous records are kept of the approximate speeds of the vessel. Typically, the course of a vessel would be calculated hourly. When conditions became right for

taking a celestial sighting, a dead reckoning might be revised. Another method is known as “latitude sailing” or “running down your easting (or westing)” — once the navigator reached a desired latitude, determined by sightings of some known celestial body such as the sun or the pole star, the course of the vessel was maintained at that latitude, sailing due east or due west. This required no elaborate tables of declination or complex mathematical calculations; all one needed to do was to maintain that celestial body at the same declination (angular height above the horizon). By latitude sailing one might reach one’s objective without any certain knowledge of one’s longitude, or its longitude — one needed only to keep sailing and keep a lookout. Christopher Columbus practiced latitude sailing on his 1492-1493 voyage, as did Vasco da Gama when he rounded Cape of Good Hope to arrive at Calicut, India in 1498. Celestial navigation –determining one’s latitude from observations of the sun or stars– provided greater flexibility. To the end of the 15th Century, the celestial body most often used was Polaris, for this did not involve the use of tables of declination. At first, only the meridian altitude of Polaris was used — that point when it reached its zenith in the sky. Later, navigators would be able to use Polaris at any time of the night without having to wait for it to reach its zenith. By the end of the 15th Century, mariners were determining their latitude from the sun as well as from the stars. Finally, with the development of a usable marine chronometer in 1761, navigators would be able in addition to determine longitude.

The main body of a typical brass *astrolabe* consisted of a brass disk about ¼ inch thick and about six inches or less in diameter, hollowed in the center and containing sets of thin brass plates. The ring around the edge of the disk (which is referred to as the *limb*) would be marked off in degrees. On European devices it is common to see this limb divided also into 24 hours, noon being at the top and midnight at the bottom. Inserted into the hollow in the disk (which is referred to as the *mater* or mother) is a plate (referred to as a *climate* or *tympanum*) engraved with circles of altitude and azimuth for the intended user’s local latitude. Such an instrument might contain several such *climate* plates, engraved on both sides, so that the *astrolabe* could be used at several latitudes. What the traveler would do was open the instrument and put the *climate* topmost in the *mater* that was probably closest to his latitude at that time. Over the *climates* is fitted a disk (which is referred to as the *rete* or net) also made of brass, that is mostly cut away or pierced so the traveler could see the *climate* through it. There were pointers that indicated a number of fixed stars. A circle on the *rete* illustrated the sun’s annual path in the sky (this path is known as the *ecliptic*). That *ecliptic* circle is divided into 30-degree sections which indicate the signs of the *zodiac*. The *rete* is manipulatable so it can be made to rotate in one sidereal day to simulate the daily rotation of the stars in the sky. Pinned to the top of the *rete* was usually a rotating bar called the *rule*. The *rule* and the *rete* were held in position by this pin through the center of the instrument and the *rule* could be made to rotate over the *rete*. Screws not having as yet been invented, you will probably notice that this pin is held in place with a wedge shaped like the head of a horse. The entire *astrolabe* was hung, for taking measurements of the sun or of a star, by a cord connected to a ring located at the top of the instrument. The top of the instrument, where this ring was connected, is called the *kursi* or throne. On European instruments the attachment mechanism was called the fixed *armilla* or ring, and there was in addition a swiveling *armilla*. The back of an *astrolabe* was usually engraved with a wide variety of scales, the nature of which depended on where and when it had been fabricated. All such devices included scales for measuring angles and scales for determining the sun’s longitude for any date, but there might be other helpful scales as well. Many of these devices sported a scale called the shadow square, by which one might solve simple problems of trigonometry. A cotangent scale, on Islamic devices, helped to determine the daily times for prayer, and in addition a scale helped to locate the *qibla* (the direction of Mecca). European instruments often included a scale by which the traveler might convert between unequal or “planetary” hours and equal hours. The back of each *astrolabe* included an *alidade*, by which the traveler could measure the altitude of celestial objects.

November 30, 2006, New York Times

Early Astronomical "Computer" Found to Be Technically Complex

By JOHN NOBLE WILFORD

A computer in antiquity would seem to be an anachronism, like Athena ordering takeout on her cellphone.

But a century ago, pieces of a strange mechanism with bronze gears and dials were recovered from an ancient shipwreck off the coast of Greece. Historians of science concluded that this was an instrument that calculated and illustrated astronomical information, particularly phases of the Moon and planetary motions, in the second century B.C.

The instrument, the Antikythera Mechanism, sometimes called the world's first computer, has now been examined with the latest in high-resolution imaging systems and three-dimensional X-ray tomography. A team of British, Greek and American researchers deciphered inscriptions and reconstructed the gear functions, revealing "an unexpected degree of technical sophistication for the period," it said.

The researchers, led by the mathematician and filmmaker Tony Freeth and the astronomer Mike G. Edmunds, both of the University of Cardiff, Wales, are reporting their results today in the journal Nature.

They said their findings showed that the inscriptions related to lunar-solar motions, and the gears were a representation of the irregularities of the Moon's orbital course, as theorized by the astronomer Hipparchos. They established the date of the mechanism at 150-100 B.C.

The Roman ship carrying the artifacts sank off the island of Antikythera about 65 B.C. Some evidence suggests it had sailed from Rhodes. The researchers said that Hipparchos, who lived on Rhodes, might have had a hand in designing the device.

In another Nature article, a scholar not involved in the research, François Charette of the University of Munich museum, in Germany, said the new interpretation of the mechanism "is highly seductive and convincing in all of its details." It is not the last word, he said, "but it does provide a new standard, and a wealth of fresh data, for future research."

Technology historians say the instrument is technically more complex than any known for at least a millennium afterward. Earlier examinations of the instrument, mainly in the 1970s by Derek J. de Solla Price, a Yale historian who died in 1983, led to similar findings, but they were generally disputed or ignored.

The hand-operated mechanism, presumably used in preparing calendars for planting and harvesting and fixing religious festivals, had at least 30, possibly 37, hand-cut bronze gear-wheels, the researchers said. A pin-and-slot device connecting two gear-wheels induced variations in the representation of lunar motions according to the Hipparchos model of the Moon's elliptical orbit around Earth.

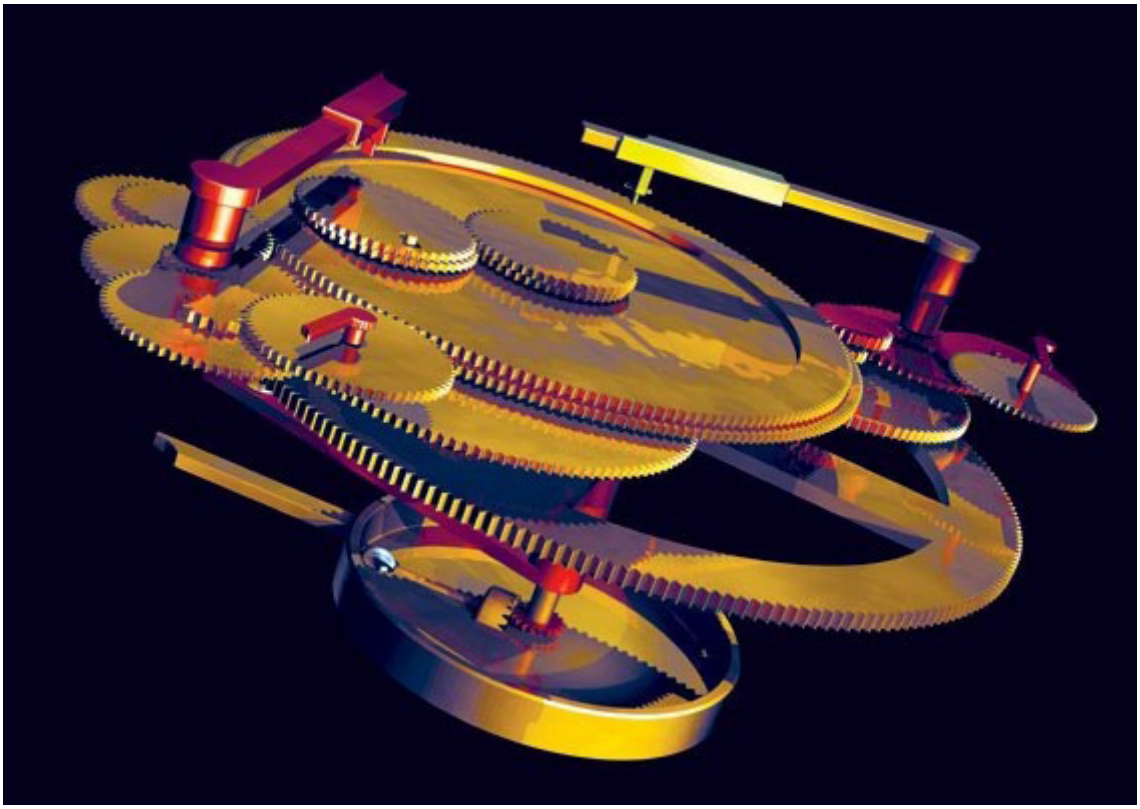
The numbers of teeth in the gears dictated the functions of the mechanism. The 53-tooth count of certain gears, the team said,

was "powerful confirmation of our proposed model of Hipparchos' lunar theory." The detailed imaging revealed more than twice the inscriptions recognized earlier. Some of these appeared to relate to planetary and lunar motions. Perhaps, the team said, the mechanism also had gearings to predict the positions of known planets.

Dr. Charette noted that more than 1,000 years elapsed before instruments of such complexity are known to have re-emerged. A few artifacts and some Arabic texts suggest that simpler geared calendrical devices had existed, particularly in Baghdad around A.D. 900.

It seems clear, he said, that "much of the mind-boggling technological sophistication available in some parts of the Hellenistic and Greco-Roman world was simply not transmitted further."

"The gear-wheel, in this case," he added, "had to be reinvented."



79 CE

August 24: Mount Vesuvius, known to be volcanic in origin but perhaps reasonably quiescent for at least a millennium, and not having had a really really big blast since about 1,760BCE, all of a sudden became intensely active between noon and 1PM, blasting a column of pumice twelve miles into the air. The wind happened to be blowing from the northwest at the time, so the volcanic matter began to fall toward the southeast, the direction of Pompeii. The eruption of course produced total darkness, except of course for electrical discharges from the atmospheric disturbances. Ash, pumice, and rock piled up in the streets and on the rooftops, falling into the houses through every open space. Some roofs began to collapse under this weight, and falling debris may also have caused injury — but there was nothing at this point to indicate the total devastation that was to come. This continued for the remainder of the day. The inhabitants of the region wandered around in darkness, pushing their way through the accumulating pumice and debris.[2] Some made their way out of the region, while others attempted to stick it out near their homes. Shortly after midnight, however, there were ground surges of magma and volcanic mud as well as pyroclastic surges (avalanches of noxious gases and ash rushing from the cone of Vesuvius with terrific force at over 100 kilometers an hour). At the base of Vesuvius, Herculaneum was hit with such a surge and was entombed in volcanic mud. Several pyroclastic surges went toward Pompeii but got stopped at the northern wall of the town. At about 7:30AM, enough pumice and debris had piled up against this northern wall that the next pyroclastic surge rolled up over the top of it, shearing off any buildings that were not already buried by volcanic matter. All those who were still present in the town at this point died, literally baked alive by the hot air of this surge (which is why on many of the plaster casts we have recovered from voids in the deposit, the limbs of the victim are pulled in toward the body — this heat contracted the flexor muscles). Pompeii was beneath 60 feet of ash and mud.

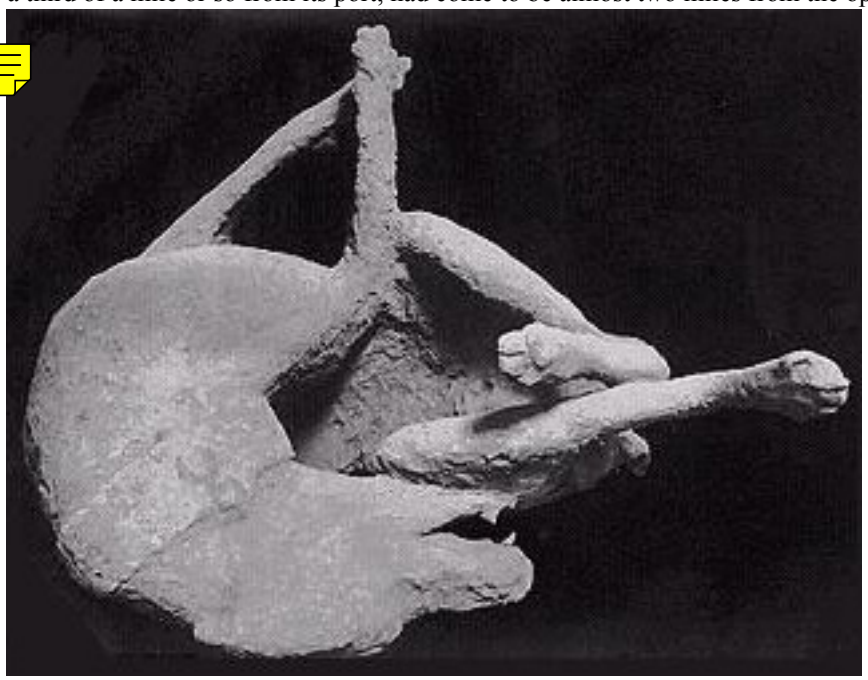
Some 16,000 people living in cities and towns around the base of the volcano had been killed, most of them during the first 30 seconds of that thermal blast. Walnuts were left on a table, uneaten, by priests whose meal

2. There is a story being told, that the inhabitants of Pompeii and Herculaneum had been unaware that they were situating their lives on the slopes of a volcano — that they were supposing Vesuvius to be merely another mountain. This hardly seems plausible.

had been rudely interrupted A dog would be found, still chained to a post.

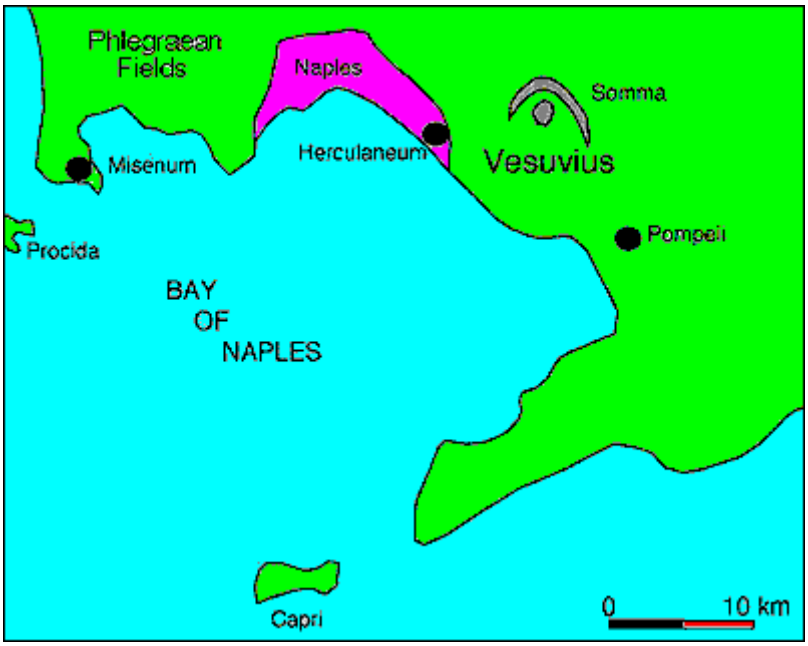
So much new surface material had been deposited in the Gulf of Naples that the remains of city, which had

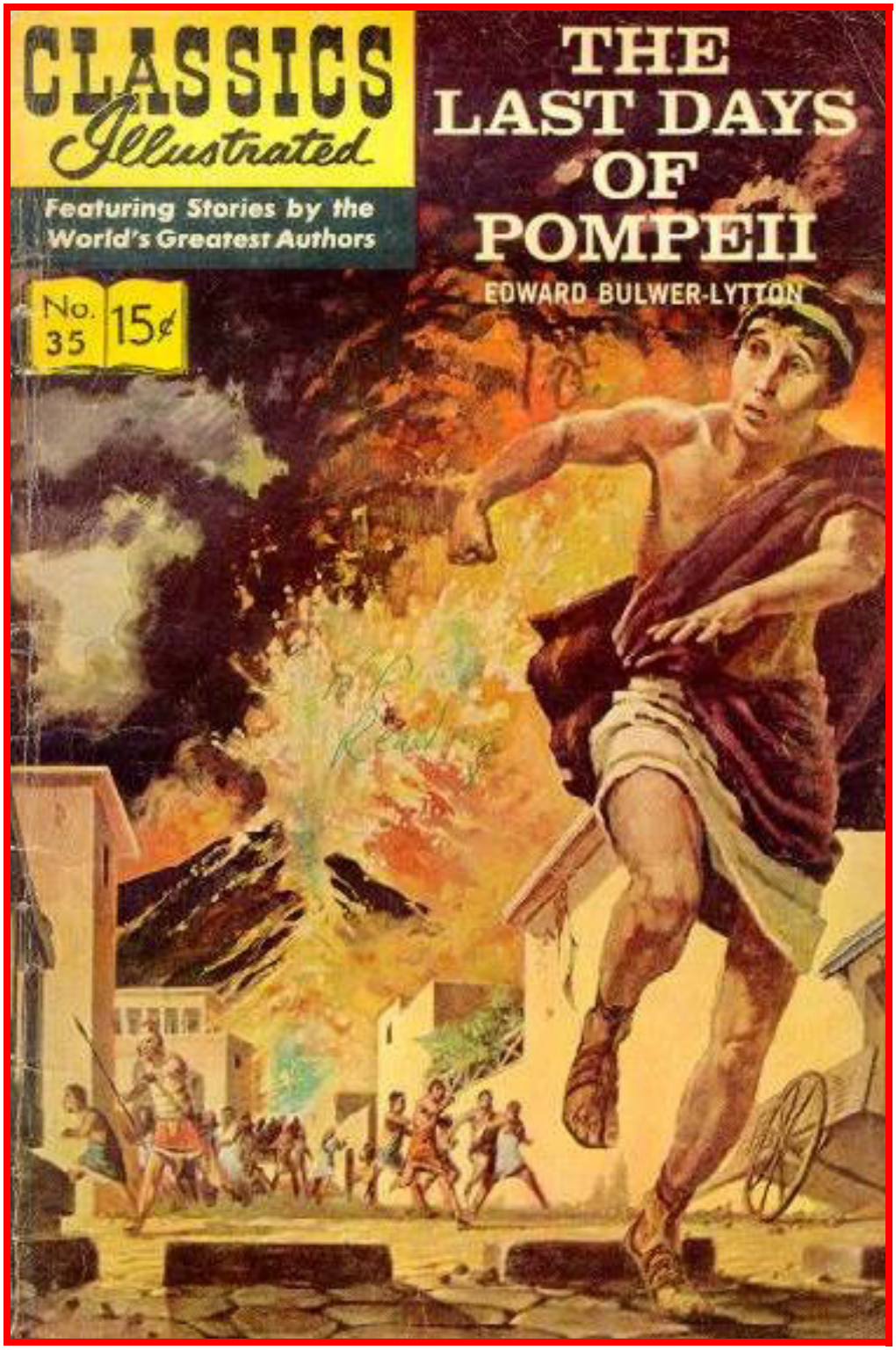
been only a third of a mile or so from its port, had come to be almost two miles from the open water.



Pliny the Elder, naturalist and author born in 23 CE, who was living with his sister at Misenum, died during this eruption. He had written of the Essenes, and had created ten volumes of NATURAL HISTORY. He had described how local farmers would auction their immature fruit while it was on the trees, a practice still followed in some Kent orchards in England.

APPLES




CLASSICS
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THE LAST DAYS OF POMPEII
EDWARD BULWER-LYTTON

How it was that Pliny came die during this eruption despite the fact that Misenum was unaffected, we know from a detailed account that his teenage nephew Pliny the Younger would send to the historian Cornelius Tacitus. What happened was due to the fact that Pliny was not only a Roman senator but also commanded the imperial fleet at the naval base of Misenum. (Two Roman naval bases protected Italian shipping from pirate activity, this one dominating Naples[3] and the Bay of Naples and another other at Aquileia, dominating the Adriatic.) That morning, when his sister had noticed an unusual cloud (now termed the "Plinean column," he had pulled rank and commandeered a naval vessel to go take a closer look. As the boat was being readied, a messenger brought a plea for help from a friend's wife who lived at the foot of Vesuvio. The strange cloud covered an immense eruption, escape by land had become impossible, she was trapped. The "volcano"[4] was releasing as much heat energy as 100,000 atomic bombs the size of the one that we would drop on the city of Hiroshima. As the ship approached the beach below where Pompeii had been (the friend's wife was by this point almost certainly already lost), bits of ash and pumice were landing on the deck. As they drew closer, chunks of blackened rock were pounding the planks. There being so much debris that the sailors could not beach the boat, Pliny told the rowers to make for the harbor at Stabiae a few miles to the south, where Pomponianus, another of Pliny's friends, had a house, and there they were able to get onto the beach. Pliny found that they also would be unable to escape by land. The sea having become too rough to attempt a launch, Pliny ate, bathed, and lay down to sleep while his friends stayed up throughout the night, watching as the ash rose higher and higher outside their door.

> A darkness overspread us, not like that of a cloudy night, or when there is no moon, but of a room when it is shut up and all the lights are extinguished. Nothing then was to be heard but the shrieks of women, the screams of children, and the cries of men ... some wishing to die from the very fear of dying,[5] some lifting up their hands to the gods; but the greater part imagining that the last and eternal night had come, which was to destroy both the gods and the world together.

"Fear of Fear" Trope

As dawn approached it seemed the ash was going to trap Pliny in his bedroom, so they woke him and the party headed for the beach where the ships were waiting. The air was so full of poisonous gases that the corpulent old man, a lifelong asthmatic, needed to lie down to rest on a sheet his friends stretched out for him on the beach. Then, when he tried to rise, he was overcome and died in the arms of his two slaves. Not only should you not be around smokers if you are an asthmatic, you also should plan not to be around any smoking volcanos. When the eruption subsided after a couple of days, his body would be recovered for burial.

It would appear that although this eruption had devastating consequences locally, it was not what you'd term a world-class event. It doesn't seem to have had much influence, for instance, on the weather even in the Mediterranean region:

VOLCANIC EXPLOSIVITY INDEX (Logarithmic)

Timing	Volcanic Event	Logarithmic Explosivity Index
640,000 years ago	**Yellowstone, Wyoming**	**VEI-8**

3. At this point, although hegemony had come to pertain to the Romans, the locals of Naples were still Greek-speakers.

VOLCANIC EXPLOSIVITY INDEX (Logarithmic)

Timing	Volcanic Event	Logarithmic Explosivity Index
74,000 years ago	Toba, Sumatra (the largest caldera in the world)	VEI-8
5,600 BCE	Mazama (forming Crater Lake)	VEI-7
1,620 BCE	Thera	VEI-7
79 CE	Vesuvius	VEI-5
April 10, 1815	Tambora, Indonesia	VEI-7

4. Our term “volcano” derives from Vulcano, a small island at the southern boundary of the Aeolian Islands about 25 kilometers from northern Sicily. This last erupted in 1888-1890. Vulcanello, the youngest part of Vulcano Island, began to form only about 2,100 years ago as an isolated island that later became connected with the main island. The latest activity at Vulcanello occurred in the 16th Century — its lava flows now host large hotel complexes.

VOLCANIC EXPLOSIVITY INDEX (Logarithmic)

Timing	Volcanic Event	Logarithmic Explosivity Index
January 20, 1835	Cosigüía, Nicaragua	Very large
August 26, 1883	Krakatau	VEI-6
July 15, 1888	Bandaisan, Japan	Apparently not that much of an explosion
May 10, 1902	Mt. Pelée, Martinique	Apparently not that much of an explosion
January 30, 1911	Taal, Philippines	Apparently not that much of an explosion
June 6-8, 1912	Novarupta (near Mt. Katmai), Alaska	VEI-6
1919	Kelud, Java	Apparently not that much of an explosion
1932	Quizapú, Chile	Apparently not that much of an explosion
1947-1948	Hekla, Iceland	Apparently not that much of an explosion
1956	Bezmianny, Kamchatka	Apparently not that much of an explosion
June 15, 1991	Pinatubo, Philippines	VEI-6
May 18, 1980	Mount Saint Helens, USA	VEI-5
March 20-October 2010	Eyjafjallajökull	VEI-4

VEI5 = Event of a size to be expected about once per decade
VEI6 = Event of a size to be expected about once per century
VEI7 = Event of a size to be expected every other millennium or so
VEI8 = Event of a size to be expected every 10,000 years or so

5. “Some wishing to die from the very fear of dying” — doesn’t that sound familiar?

> Maxim 511 of Publilius Syrus: “The fear of death is more to be dreaded than death itself.”

It is to be noted that after this enormous eruption, Vesuvius would return to behaving in a rather benign manner. There had not seemed to have been any eruptions of significance for at least a millennium, and subsequent to 79 there would be only six eruptions of significance for nearly another millennium, eruptions involving only pyroclastic fragments — none of them producing any lava flows whatever.

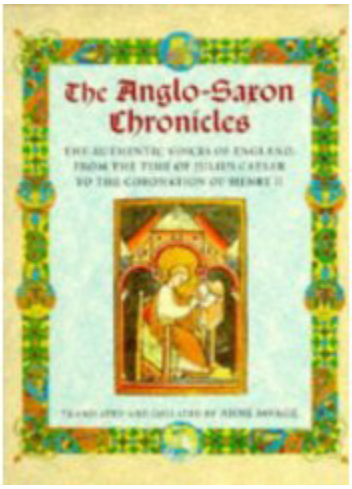
Eventually (and here's the nub of it), a pen with a bronze nib would be found among the volcanic residues.

Under the lava at Herculaneum we have discovered a symbol of a cross, leading to speculation that Roman-Christianity was practiced in secret. The cross could be from 64 CE as it appeared to be covered probably during the period of persecution. The cross at this time was, however, the symbol of slavery, whereas the fish was the symbol of Christianity (freedom). To consider the cross as a Christian symbol at this time doesn't compute. To ask someone to take up your cross and follow you would have been like asking someone to take up your gallows and follow you.

200 CE

The Anglo-Saxon Chronicles and also, the 1st sushi on record.

ANGLO-SAXON CHRONICLES



A news item relating to the development of ELECTRIC WALDEN technology: The saun-pan computing tray was being used in China, while the soroban computing tray was being used in Japan.

ELECTRIC WALDEN

JAPANESE EMPERORS

50CE	Jimmu
?CE	Suizei
?CE	Annei
?CE	Itoku
?CE	Kosho
100CE	Koan
?CE	Korei
?CE	Kogen
200CE	Kaika
219CE-249CE	Sujin
249CE-280CE	Suinin
280CE-316CE	Keiko
316CE-342CE	Seimu
343CE-346CE	Chuai
346CE-395CE	Oojin

ELECTRIC WALDEN

250 CE

A news item relating to the development of ELECTRIC WALDEN technology: In Guatemala, Honduras, and eastern Mexico, the classic period of Maya civilization began.
We suppose the Olmecs, Mayans, and Zapotecs to be the 1st of the various Mesoamerican cultures that would be developing writing.

ELECTRIC WALDEN

INSCRIPTION

"HISTORICAL PERSPECTIVE" BEING A VIEW FROM A PARTICULAR POINT IN TIME (JUST AS THE PERSPECTIVE IN A PAINTING IS A VIEW FROM A PARTICULAR POINT IN SPACE), TO "LOOK AT THE COURSE OF HISTORY MORE GENERALLY" WOULD BE TO SACRIFICE PERSPECTIVE ALTOGETHER. THIS IS FANTASY-LAND, YOU'RE FOOLING YOURSELF. THERE CANNOT BE ANY SUCH THINGIE, AS SUCH A PERSPECTIVE.

393 CE

By this point Aurelius Augustinus of Hippo ("St. Augustine") was preaching in place of his bishop Valerius, because the old man was a Greek speaker who had never been able to speak Latin without a thick accent. In COUNCILS, Augustine cited precisely 27 "New Testament" books. (This is what a religion scholar, comparing this number with what we have now, would call "a reality check.")[6]

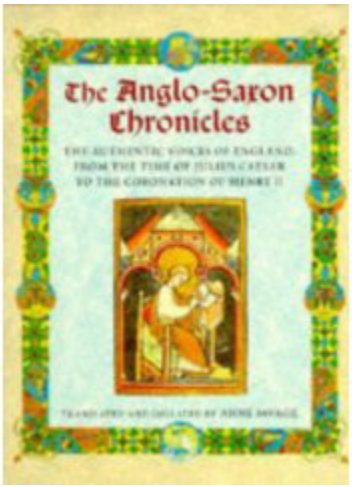
6. A news item relating to the development of ELECTRIC WALDEN technology: At some point (and I may as well insert the record here in the chronology, with Ambrose reaching his 60s and Augustine his 40s), Augustine came upon Ambrose while this elder was reading alone, and was impressed to notice that during this process Ambrose seemed to have no particular need to sound out the words he was reading off the parchment: "his voice and tongue were at rest." Augustine would make a record of this remarkable fact, in his CONFESSIONS (VI, 3):

> *Sed cum legebat oculi ducebantur per paginas et cor intellectum rimabatur, vox autem et lingua quiescebant.*

400 CE

By this point a stable form of water-based writing ink had been developed, for use in pens of one form or another. It was a composite of iron salts, nut-galls and gum, and was made according to a formula which would remain in use for centuries. Its color when first applied to paper was bluish-black, but it rapidly turned into a darker black and then over the years faded to the familiar dull brown seen in old documents.

ANGLO-SAXON CHRONICLES



THE TASK OF THE HISTORIAN IS TO CREATE HINDSIGHT WHILE INTERCEPTING ANY ILLUSION OF FORESIGHT. NOTHING A HUMAN CAN SEE CAN EVER BE SEEN AS IF THROUGH THE EYE OF GOD.

600 CE

Prince Shotoku sent the first official Japanese mission to China.

ELECTRIC WALDEN

HISTORY OF THE BOOK

News items relating to the development of ELECTRIC WALDEN technology:

- In China, books were being printed.
- Although there is a specific reference to a quill used as a pen in the 7th-Century writings of St. Isidore of Seville, surely use of pens fabricated from bird feathers began much earlier despite our lack of documentation for that fact. From this point forward, at least, quills would be the writing instrument of choice all the way into the early years of the 19th Century. It is said that Monticello slaves kept geese specifically to supply Thomas Jefferson with quills for his writing. The best feathers were taken from the bird in the spring. It was the five outer or pinion feathers of the wing that were pulled. The feathers of the right wing were less desirable because they curved inconveniently inward toward the writer when used by a right-handed person. Such a quill might last Jefferson as much as a week, with careful trimming by pen-knife. At one point Saint Petersburg in Russia would be sending 27,000,000 quills per year into the English market. Swan feathers would be considered a premium grade. For making fine lines crow feathers would be used. The feathers of eagles, owls, hawks, and turkeys would occasionally be used.

YOUR GARDEN-VARIETY ACADEMIC HISTORIAN INVITES YOU TO CLIMB ABOARD A HOVERING TIME MACHINE TO SKIM IN METATIME BACK ACROSS THE GEOLOGY OF OUR PAST TIMESLICES, WHILE OFFERING UP A GARDEN VARIETY OF COGENT ASSESSMENTS OF OUR PROGRESSION. WHAT A LOAD OF CRAP! YOU SHOULD REFUSE THIS HELICOPTERISH OVERVIEW OF THE HISTORICAL PAST, FOR IN THE REAL WORLD THINGS HAPPEN ONLY AS THEY HAPPEN. WHAT THIS SORT WRITES AMOUNTS, LIKE MERE "SCIENCE FICTION," MERELY TO "HISTORY FICTION": IT'S NOT WORTH YOUR ATTENTION.

ELECTRIC WALDEN

610 CE

A news item relating to the development of ELECTRIC WALDEN technology: Tan-cheng (or Tam-ch'i) brought techniques for the making of paper and ink from Kao-li on the Korean peninsula to the islands of the Japanese archipelago.

INSCRIPTION

ELECTRIC WALDEN

NOBODY COULD GUESS WHAT WOULD HAPPEN NEXT

690 CE

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: Making (of course) a firm distinction between merely necessary conditions and sufficient conditions, there would have been any number of necessary conditions for the emergence of such a personal book as Thoreau's WALDEN, such as books, publishers, a public, etc. One of those necessary conditions for such as private and personal thing as a perusal of WALDEN seems to have been the institution of private and silent reading, and institution which needs to be examined. It would appear that reading, as an activity, has simply not always been the sort of private and silent matter as it primarily is nowadays. For instance we have on the record a remark Augustinus of Hippo once made, in regard to a colleague of his, Bishop Ambrose of Milan, who exhibited the then-extraordinary characteristic, that "His eyes traveled across the pages and his heart searched out the meaning, but his voice and tongue stayed still." In other words, this capable father of the church could actually read without moving his lips.

How strange is it, then, that we can read so readily in a private and silent manner? According to the theory of Paul Saenger,[7] it is a truly extraordinary thing. Studies of various kinds of brain lesion indicate that the ability to read what is called *scripta continua*,[8] which is the form in which books appeared up until this year 690 CE in Ireland with the appearance of the illuminated manuscript known as the BOOK OF MULLING, and the ability to read text presented in the form of discrete, separated words, actually are situated in two discrete areas of the brain.

Putting separations between words, so that text flow is broken into discrete words that can be individually grokked by the silent reader, as for instance in this paragraph, is an enabling notational convenience that would almost immediately catch on. Within a couple of centuries the new practice would spread to books copied out in England, and then to books copied out in the Low Countries, and then to books copied out in the rest of Europe. This would bring about a change in the manner in which books were used: whereas books used to be read aloud, which facilitated reading in groups, suddenly the reader could prefer to be alone. And this, in turn, would bring about a subtle shift in the content of books: whereas books used to contain common-consensus or creedal material, this new phenomenon, the private book, could contain materials which flew in the face of the common consensus and flew in the face of the locally accepted creed.[9]

7. SPACE BETWEEN WORDS: THE ORIGINS OF SILENT READING (Stanford UP).
8. Thisisscriptacontinuainwhichthereisnospacingbetweenthewords.
(Itisquiteabiteasiertoreadthissortofwritingifyoureaditaloud.)
9. It is the grandiose objective of this Kouroo project, to wreak a similar havoc upon the current situation of passive, linear reading of constantly reinvented and reprocessed ideas. The division of texts into standardized, sourced modules and then the continual reuse of these standardized modules in various contexts is conceived to be truly similar to the above division of texts into standardized, sourced (dictionary) words and then the continual reuse of these standardized definitions in various contexts. As words are to sentences, so modules are to texts. We have put words into a dictionary to standardize them; we will put modules into a call library to standardize them. The Kouroo Contexture is the first such call library to become generally available. If you're not using it, you're not with it.

1000 CE

A news item relating to the development of ELECTRIC WALDEN technology: Gerbert of Aurillac (Pope Sylvester II) devised a more efficient abacus.

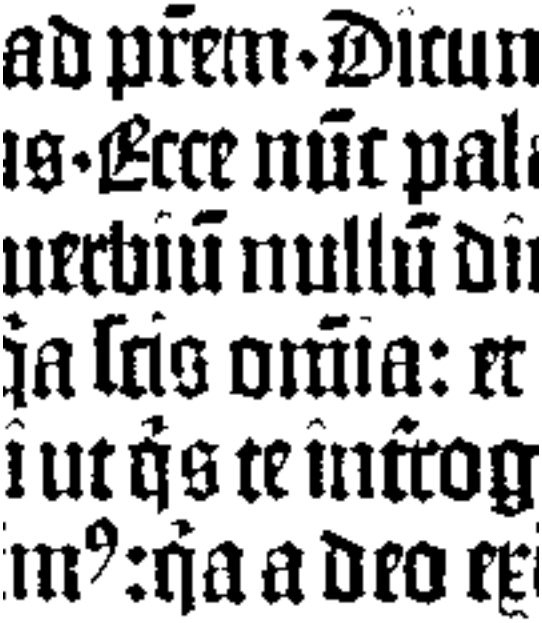
ELECTRIC
WALDEN

WHAT I'M WRITING IS TRUE BUT NEVER MIND
YOU CAN ALWAYS LIE TO YOURSELF

1448

A news item relating to the development of ELECTRIC WALDEN technology: In Mainz, Johannes Gutenberg was printing off the first of his new-technology Bibles.

ELECTRIC WALDEN



TYPE

It isn't a new problem, to find a place in a text. These buttons, for finding a place in the text, are on the edge

> When Gutenberg, along with Johann Fust, printed the "Forty-Two Line Bible" in Mainz in 1448, the age of the proprietal literary author, an author understood in terms similar to the Roman imperial authority, began in Western Europe.... The idea of authorial "rights," or "legitimate authorial privileges," as [Alistair] Fowler calls it [KINDS OF LITERATURE, Oxford: Clarendon Press, 1982, page 266], is specifically an effect of print and not at all a theoretical necessity or logical axiom.
>
> — Docherty, Thomas. ON MODERN AUTHORITY: THE THEORY AND CONDITION OF WRITING INTO THE PRESENT DAY. NY: St. Martin's Press, 1987, pages 6-7

of the Gutenberg Bible:

On the following screen is what an entire page of the Gutenberg Bible looked like:

Artists such as John and Hubert Van Eyck of Bruges had begun to mix oil with their colors during the earlier part of this century, and it seems to have been from this that such printers were learning how to prepare a proper ink for use with this moveable metal type innovation:[10]

> It may be supposed that Gutenberg acquired the knowledge of the newly found properties of boiled linseed oil from the German painters. It is certain that he used oil as the basis of his ink, and that it was also used by his pupils and his successors. And it has been in use ever since, for there is no substitute. We have not been told how this ink was compounded.
>
> — De Vinne, Theodore L. THE INVENTION OF PRINTING

10. Flax, a plant that grows to a height of about 20 to 40 inches and, unfortunately, radically impoverishes the soil on which it is grown, was exclusively a fiber crop, its abundant seed being a waste product. However, approximately three gallons of linseed oil could be extracted from a bushel of this waste seed. The "flax sick" fields could eventually be restored through crop rotation. The property of the oil that makes it useful in printing is that it is an oxidizing oil that when exposed in a thin film produces a skin that is insoluble in water. During the 19th Century there would be experiments in substituting rosin oil or colophonic tar, and then interest would shift to the addition of various chemical drying agents into the linseed oil used in printing.

cubitos: ⁊ columne decem baſeſq; totidem. In ea quoq; atrij latitudine que reſpicit ad orientē quinquaginta cubiti erūt: in quibz quindecim · cubitoꝝ tentoria lateri uno deputabuntur columneq; tres · ⁊ baſes totidē: et ī latere altero erūt tentoria cubitos obtinēcia quindecim · columne tres · et baſes totidem. In introitu uero atrij · fiet tentoriū · cubitoꝝ viginti · ex iacincto et purpura · coccoq; biſtincto et biſſo retorta: opꝰ plumarij. Columnas habebit ꝛ quor: cū baſibz totidē. Oēs columne atrij p circuitū · veſtite erūt argenteis laminis: capitibz argenteis: et baſibz eneis. In lōgitudine occupabit atriū cubitos centū: in latitudine quinquaginta. Altitudo quīq; cubitorū erit: ſietq; de biſſo retorta: et habebit baſes eneas. Cūcta vaſa tabernacli ī omne uſus ⁊ cerimonias · tam paxillos eiꝰ q; atrij · ex ere facies. Precipe filijs iſrl: ut afferant tibi oleum de arboribz olivaꝝ puriſſimū · piloq; contuſū: ut ardeat lucerna ſemp · in tabernaculo teſtimonij extra velum quod oppanſū eſt teſtimonio: et collocabūt eā aaron et filij eiꝰ · ut uſq; mane luceat corā dño. Perpetuus erit cultꝰ per ſucceſſiones eorum corā filijs iſrahel.

XXVIII

Applica quoq; ad te aaron frēm tuū cū filijs ſuis de medio filioꝝ iſrl · ut ſacerdotio fungantur michi aaron · nadab · ⁊ abiū · eleazar · ⁊ ythamar: faciesq; veſtem ſanctā · aaron fratri tuo ad honorē et decorē. Loquereriſq; cunctis ſapientibz corde: quos repleui ſpū ſapie: ut faciant veſtimēta aaron: in quibz ſanctificatus miniſtret michi. Hec erunt uestimēta que facient: rationale · et ephod · ⁊ tunicā · et lineā · ⁊ mitrā · et balteū. Facient fratri tuo aaron · et filijs eius veſtimēta ſancta: ut ſacerdotio fungant̄ michi. Accipientq; aurum et iacinctū et purpuram · coccūq; biſtinctum et biſſum. Facient autē ſuphumerale de auro ⁊ iacincto et purpura coccoq; biſtincto et biſſo retorta: opere polimito. Duas oras iunctas habebit in utroq; latere ſummitatū: ut ī unū redeant. Ipſa quoq; textura et cūcta operis varietas erit ex auro ⁊ iacincto ⁊ purpura: coccoq; biſtincto ⁊ biſſo retorta. Sumeſq; duos lapides onichinos · et ſculpes in eis noīa filioꝝ iſrl: ex nomina in lapide uno · ⁊ ex reliqua ī altero · iuxta ordinē natiuitatis eorū. Opere ſculptoris · et celatura gemmarij · ſculpes eos nominibz filioꝝ iſrl · inclusos auro atq; circumdatos: et pones in utroq; latere ſuphumeralis · memoriale filijs iſrl. Portabitq; aaron nomina eoꝝ corā dño ſup utrūq; humerū: ob recordationem. Facies et uncinos ex auro: et duas catenulas auri puriſſimi ſibi inuicem coherentes: quas inſeres uncinis. Rationale quoq; iudicij facies opere polimito iuxta texturā ſuperhumeralis: ex auro iacincto · et purpura · coccoq; biſtincto ⁊ biſſo retorta. Quadrangulū erit et duplex. Menſuram palmi habebit · tam in longitudine q; in latitudine: ponesq; in eo quatuor ordines lapidū. In primo ordine erit lapis ſardius · et thopazius et ſmaragdus. In ſecundo carbunculus · ſapphirus · et iaſpis. In tertio ligurius · achates · et amethiſtus. In quarto cryſolitus · onichinus · et berillus. Aurei erunt in ſuis ordinibz. Habebitq; nomina filioꝝ iſrl · duodecim ſculpta in lapidibz: ſingula nomina ſingulorū per duodecim tribus. Facies in rationali catenulas ſibi inuicem coherentes: opere polimito. Duo quoq; anulos aureos: quos pones in duobz angulis rationalis. Duasq; catenulas aureas: quas mittes per anulos in angulis rationalis. Extremitates autē catenularum duarum: quas in ſuis locis ante ſuphumerale poſuimus: ſuſcipies in uncinos · et mittes in oras ſuphumeralis · ex aduerſa parte. Duos quoq; anulos aureos: quos pones in duobz angulis rationalis · ex parte ſuphumeralis · deorſum · et contra iuncturā · ſuper cingulū ſuphumeralis. Ligabūtq; anulos rationalis · anulis ſuphumeralis · hyacinctino cordone: ut ſit ſuper cingulū · et non recedat rationale a ſuphumeralis. Portabitq; aaron nomina filioꝝ iſrl · in rationali iudicij ſuper pectus ſuum: quando ingredietur ſanctuariū: memoriale coram dño iugiter. Pones autē in rationali iudicij · doctrinā et veritatē: quas cū ingreſſus fuerit aaron coram dño · portabit. Et habebit iudicium filioꝝ iſrl ſuper pectus ſuum coram dño iugiter. Facies et tunicā ephod · totā hyacinctinā. Et foramen capitis in medio eius: oraq; per circuitū textilis operis. Sicut foramen loricē ſolet habere ne ſcindatur: ſic et hec oram habebit in circuitu. Et in inferiori parte tunicē per circuitū quaſi malogranata hyacinctina et purpurea · coccoq; biſtincto · et biſſo retorta. Tintinnabula aurea in medio malogranatorum: ita ut tintinnabulum aureum ſit et malogranatum · tintinnabulum et malogranatum · per totum inferiorem tunicē circulum. Eritq; aaron in ea · quando miniſtrat: ut audiatur ſonus eius quando ingreditur ſanctuariū coram dño · et quando egreditur: ne forte moriatur. Facies et lamen purum auri · et exculpes in eo opere ſculptoris · ſicut ſolent exculpi gemmarij · ſculpes: Sanctū dño. Et ponetur in mitra hyacinctina. Erit autē ſuper frontem pontificis. Et portabit aaron iniquitates eorum: quas obtulerint filij iſrl in cunctis donis ſanctificationum ſuarum. Semper erit in fronte eius: ut placeat eis dño. Subtiliabis et tunicā byſſinā · et facies mitram byſſinā. Balteum autē opere plumarij. Filijs aaron facies tunicas: et balteos · et mitras in gloriā et decorē. Et indues eis fratrem tuum aaron · et filios eius cum eo. Et unges eos · et implebis manus eorum · ⁊ ſanctificabis eos: ut ſacerdotio fungantur michi. Et facies femoralia linea: ut operiant carnem miſerie ſue. A renibz uſq; ad femora erunt. Et induet ea aaron et filij eius: quando ingredientur tabernaculum teſtimonij · aut quando accedent ad altare ut miniſtrent in ſanctuario: ne portent iniquitatem et moriantur. Legitimum ſempiternum erit aaron et ſemini eius poſt eum.

XXIX

Hec autē facies eis ut ſanctificentur et ſacerdotio fungantur michi. Tolle vitulum de armento · et duos arietes immaculatos. Panes azimos · et libamina azima conſpersa oleo: ſimilam triticeam. Omnia hec facies ponderis et menſure. Et offeres ea in caniſtro · et offeres vitulum et duos arietes. Aaron quoq; et filios eius ad oſtium tabernaculi teſtimonij. Lauabisq; eos aqua. Et tollens veſtimenta indues aaron tunica · et reliqua quibz indutus eſt. Et ephod · ⁊ rationale · quod accinges balteo ephod. Et pones mitram in capite eius · et lamen ſanctificationis in mitra. Oleum quoq; unctionis fundes ſuper caput eius · et unges eum. Filios quoq; eius applicabis · et indues tunicis lineis. Et accinges balteo aaron et filios eius · et impones eis mitras: et erit ſacerdotium eorum legitimum ſempiternum. Et implebis manus aaron et manus filiorum eius. Et offeres vitulum coram tabernaculo teſtimonij. Et ponent aaron et filij eius manus ſuas ſuper caput vituli. Et immolabis eum coram dño · ad oſtium tabernaculi teſtimonij. Et ſumes de ſanguine vituli · et pones digito tuo ſuper cornua altaris. Reliquum autē ſanguinis effundes ad baſim altaris. Adipem quoq; et omne quod operit intrinſecus · et reticulum ſuper iecur · et duos renes cum adipibz ſuis: adolebis in altari. Carnes autē vituli et pellem et ſtercora combures igni extra caſtra. Quia pro peccato eſt. Arietem quoq; unum · et de capite eius ponent aaron et filij eius manus ſuas. Quem cū immolaueris · et ſanguinem eius effuderis circa altare. Membratim diuides eum · et lotis intrinſecis et pedibz · pones ſuper membra et ſuper caput eius. Et adolebis totum arietem in altari. Holocauſtum eſt dño · ſuauiſſimus odor victime dño. Tolles et arietem alterum · et ponent aaron et filij eius manus ſuas ſuper caput eius. Quem cū immolaueris · et tuleris ſanguinem · pones in auricula dextera aaron et filiorum eius. Et in pollice manus dextere eorum · et in pollice pedis dextri. Reliquum autē ſanguinis effundes circa altare. Et ſumes de ſanguine qui eſt in altari · et de unguento unctionis: et aſperges aaron et veſtimenta eius · filios quoq; et veſtimenta filiorum eius. Et ſanctificabitur ipſe et veſtimenta eius · filij quoq; et veſtimenta filiorum eius. Adipem autē arietis et caudam · et quicquid operit intrinſecus · et reticulum ſuper iecur · et duos renes cum adipibz ſuis: et armum dexterum. Quia aries iſte conſecrationum eſt. Et panem azimum · et libamen azimum · et ſimilam quę conſpergenda eſt oleo: et ſpecies omnes. Quas ponens in caniſtro offeres coram dño. Et offeres de manibz eorum · et adolebis in altari ſuper holocauſtum in odorem ſuauitatis coram dño. Victima eſt dño. Et tolles pectuſculum de arietis conſecrationum aaron · et elevabis illud elevatione coram dño. Et erit pars tua. Sanctificabis autē pectuſculum elevationis et armum oblationis · quem elevabis et ſanctificabis de arietis conſecrationum aaron et filiorum eius. Et erit aaron et filijs eius lex ſempiterna a filijs iſrl. Primitie enim ſunt. Et erunt primitie a filijs iſrl de victimis pacificorum ſuorum. Primitie dño. Veſtimenta quoq; ſanctificationis aaron · erunt filijs eius poſt eum: ut ungantur in eis · et ſanctificentur in manibz eorum. Septem diebz utetur eis · qui ſacerdotio fungetur pro eo de filijs ſuis · et ingredietur tabernaculum teſtimonij: ut miniſtret in ſanctuario. Arietem autē conſecrationum tolles · et coques carnes eius in loco ſanctificationis. Panes quoq; qui ſunt in caniſtro · ad oſtium tabernaculi teſtimonij comedent aaron et filij eius. Et quicquid reliquum fuerit de carnibz et de panibz · igne conſumetur. Non comedetur quia ſanctificatum eſt. Omnis alienigena non vescetur ex eis. Quia ſanctificata ſunt. Si remanſerit quippiam de carnibz conſecrationum et de panibz uſq; mane · combures quod reſiduum fuerit igni. Non comedetur quia ſanctificatum eſt. Septem diebz conſecrabis manus eorum. Vitulum pro peccato per singulos dies ad expiationem. Et mundabis altare · cum expiaueris illud. Et unges ad ſanctificandum. Septem diebz expiabis altare · et ſanctificabis illud. Et erit altare ſanctum ſanctorum. Omne quod tetigerit altare ſanctificabitur. Hec autē facies ſuper altare. Agnos anniculos duos per ſingulos dies iugiter. Agnum unum offeres mane · et agnum alterum offeres ad vesperam. Decimam partem ſimile conſperſe oleo quod premitur ex hin · et libamen vini quarte partis hin · in agno uno. Et in agno alterum offeres ad vesperam ſacrificium ſimile et libamen ſecundum mane · in odorem ſuauitatis victima dño. Holocauſtum iugiter in generationibz veſtris · ad oſtium tabernaculi teſtimonij coram dño. Vbi conueniam uobis · ut loquar ad te. Ibi quoq; conueniam filios iſrl · et ſanctificabitur tabernaculum in gloria mea. Et ſanctificabo tabernaculum teſtimonij et altare. Aaron quoq; et filios eius ſanctificabo · ut ſacerdotio fungantur michi. Et habitabo in medio filioꝝ iſrl · et ero eis deus. Et cognoſcent quia ego ſum dominus deus eorum · qui eduxi eos de terra egypti · ut habitarem in medio eorum. Ego dominus deus eorum.

XXX

Facies et altare ad adolendum incenſum · de lignis ſetim. Cubitalis erit longitudo eius · et cubitalis latitudo. Quadrangulum erit · et bicubitalis altitudo. Ex ipſo habebit cornua. De ligno unum cum eo. Et teges illud auro purissimo · tam testudinem eius · quam parietes per circuitum · et cornua. Et faciet ei coronam auream per circuitum. Duos quoq; anulos aureos · quos pones ſub corona per binos ex utroq; latere. Et mittes in eos vectes · ut portetur altare in eis. Vectes autē facies de ligno ſetim · et operies eos auro. Et ponet eos ante velum quod oppanſum eſt arche teſtimonij · coram propitiatorio quo tegetur teſtimonium. Adolebitq; aaron incenſum odoramentorum ſuper altare · mane cum compoſuerit lucernas. Et quando accendit lucernas ad vesperam · adolebit incenſum iugiter coram dño in generationibz veſtris. Non offeretis ſuper altare incenſum alienum · nec holocauſtum · nec ſacrificium. Et libamen non effundetis ſuper eum. Et deprecabitur aaron ſuper cornua altaris ſemel in anno · in ſanguine victime pro peccato propitiationis. Semel in anno deprecabitur in generationibz veſtris. Sanctificatum dño eſt. Locutuſq; eſt dominus ad moyſen dicens. Cū tuleris ſummam filioꝝ iſrl · per numerum eorum: dabunt unuſquiſq; pretium animę ſue dño · et non erit plaga in eis cū recenſiti fuerint. Hoc dabit omnis qui tranſit ad numerum. Dimidium ſiclum ad menſuram ſiclum ſanctuarij. Siclus habet viginti obolos. Dimidium ſiclum offerent primitie dño. Omnis qui tranſit ad numerum · a vigeſimo anno et ſuperius: dabit primitias. Ditabitur nullus pauperior · et non minuetur quicquam de dimidio ſiclo · cū primitias offerent dño · ut roget pro animabz veſtris. Et accipies pecuniam propitiationis a filijs iſrl · et dabis eam in opus tabernaculi teſtimonij. Et erit filijs iſrl in memoriale coram dño · ut roget pro animabz veſtris. Locutuſq; eſt dominus ad moyſen dicens. Facies et labrum eneum · et baſim eius enea ad lauandum. Et ponet inter tabernaculum teſtimonij et altare. Mittesq; aquam · et lauabunt aaron et filij eius manus ſuas et pedes. Quando ingredientur tabernaculum teſtimonij · lauabunt aquam · ne forte moriantur. Et quando accedent ad altare · ut miniſtrent et adoleant incenſum dño. Lauabunt manus ſuas et pedes · et non morientur. Legitimum ſempiternum erit eis · tam ſemini eius quam in generationibz ſuis. Locutuſq; eſt dominus ad moyſen dicens. Tolle tibi aromata · ſtacten · et onicha · et galbanum · aromata · et purissimam thus. Omnia equa lance ponderabis. Et facies ex eis compoſitum incenſum · opere pigmentarij · ſale conditum · purum · et ſanctum. Et conteres ex eo mirifice · ponesq; coram teſtimonio in tabernaculo teſtimonij · ubi apparebo tibi. Sanctum ſanctorum erit vobis incenſum. Quod ſecundum compoſitionem eius · non facietis ſibi. Quia ſanctificatum dño eſt. Homo quicunq; fecerit ſimile · ut odore illius fruatur · interficietur de populo ſuo. Locutuſq; eſt dominus ad moyſen dicens. Vide · vocavi nomine beſeleel filium uri filij hur de tribu iuda. Et implevi eum ſpū dei · ſapientia · et intelligentia · et ſcientia · et omni doctrina. Ad excogitandum et faciendum opus in auro · et argento · et ere. In gemmarum quoq; ſculptura · et lignorum cesura · et in omni opere ſcientie. Ecce dedi ei ſocium ooliab filium achiſamech de tribu dan. Et in cordibz cunctorum ſapientium corde · fecit ſapientiam: ut faciant omnia que mandavi tibi. Tabernaculum teſtimonij · et arcam teſtimonij · propitiatorium quod ſuper eam eſt · et omnia vaſa tabernaculi. Mensam et vaſa eius · et candelabrum purum · et vaſa eius · et altare incenſi. Et altare holocauſti · et vaſa eius · labrum et baſim eius. Vestimenta quoq; ſanctificationis · aaron ſacerdotis · et veſtimenta filiorum eius ad miniſtrandum mihi. Oleum unctionis · et incenſum aromatum ſanctuarij. Omnia que mandavi tibi · faciant. Locutuſq; eſt dominus ad moyſen dicens. Loquere filijs iſrl · et dices ad eos. Verumtamen ſabbata mea cuſtodite. Signum eſt inter me et vos in generationibz veſtris: ut ſciatis quia ego dominus qui ſanctifico vos. Cuſtodite ergo ſabbatum · quia ſanctum eſt vobis. Qui violaverit illud morte morietur. Anima quę comederit fermentatum · interficietur anima illa de populo ſuo. Sex diebz operabimini. Die autē ſeptimo ſabbatum requietionis eſt ſanctum domino. Omnis qui fecerit opus in die ſabbati · morte morietur. Cuſtodiant filij iſrl ſabbatum · et celebrent illud in generationibz ſuis pactum ſempiternum. Inter me et filios iſrl · ſignum in ſempiternum. Sex enim diebz fecit dominus celum et terram · et die ſeptimo ceſſavit. Et requieuit.

XXXI

Dedit quoq; moyſi · cū conſummaſſet loquens ei in monte ſinai · duas tabulas lapideas · ſcriptas digito dei. Videns autē populus quod moyſes moram faceret in deſcendendo de monte · congregatus aduerſum aaron · dixit ei. Surge · fac nobis deos qui nos precedant. Moyſi enim huic qui nos eduxit de terra egypti · nescimus quid acciderit. Quibus ille reſpondit. Tollite inaures aureas de auribz uxorum veſtrarum · filiorum et filiarum veſtrarum · et afferte mihi. Feceruntq; omnes quod iuſſerat. Et allatis auribus · fudit ex eis · et formavit opere fusorio vitulum conflatilem. Dixeruntq; ſunt dii tui iſrl · qui te eduxerunt de terra egypti. Quod cū vidiſſet aaron · edificavit altare ante eum. Et precepit dicens. Cras ſolemnitas domini eſt. Surgentes ergo mane · obtulerunt holocauſta · et hoſtias pacificorum. Sedit populus manducare et bibere · et ſurrexerunt ludere. Locutuſq; eſt dominus ad moyſen dicens. Vade · descende · peccavit populus tuus quem eduxiſti de terra egypti. Recceſſerunt cito de via quam mandaſti eis · feceruntq; ſibi vitulum conflatilem · et adorantes immolaverunt ei victimas · dixeruntq; hi ſunt dii tui iſrl · qui te eduxerunt de terra egypti. Rurſumq; dixit dominus ad moyſen. Cerno populum hunc · quod ſit populus durę cervicis. Dimitte me ut irascatur furor meus contra eos · et deleam eos · faciamq; te in gentem magnam. Moyſes autē orabat dominum deum ſuum · et dicebat. Cur domine irascitur furor tuus contra populum tuum · quem eduxiſti de terra egypti in fortitudine magna · et in manu robuſta. Ne quęſo dicant egyptii · callide eduxit eos · ut interficeret in montibz · et deleret de terra. Quieſcat ira tua · et placabilis eſto ſuper malitia populi tui. Memento abraham · iſaac · et iſrl ſeruorum tuorum · quibus iurans dixiſti. Multiplicabo ſemen veſtrum ſicut ſtellas celi · et omnem terram hanc quam locutus ſum dabo ſemini veſtro · et poſſidebitis eam ſempiternum. Placatus eſt dominus ne faceret malum quod locutus fuerat contra populum ſuum. Reuerſuſq; moyſes deſcendit de monte · portans duas tabulas teſtimonij lapideas · ſcriptas ex utraq; parte. Quarum una pagina et altera ex hac parte habebat ſcripturam. Tabule opus dei erant · et ſcriptura dei · exarata in tabulis. Audiens autē iheſu tumultum populi iubilantis · dixit ad moyſen. Ululatus belli reſonat in caſtris. Qui reſpondit. Non eſt vox hortantium ad prelium · nec vox cogentium ad fugam · ſed vocem cantantium ego audio. Cumq; appropinquaſſet ad caſtra · vidit vitulum et choros. Et iratus valde · proiecit de manibz tabulas · et confregit eas ad radicem montis. Arripiens quoq; vitulum quem fecerant · combuſſit igni · et contrivit uſq; ad puluerem. Quem ſparſit ſuper aquam · et potum dedit filijs iſrl. Dixitq; moyſes ad aaron. Quid tibi fecit populus hic · ut induceres ſuper eum peccatum grande. Cui aaron reſpondit. Ne irascatur furor domini mei · tu enim nouiſti populum hunc quod prauus ſit. Dixerunt mihi. Fac nobis deos qui nos precedant. Moyſi enim huic qui nos eduxit de terra egypti · nescimus quid acciderit. Quibus ego reſpondi. Quis habet aurum · tollat et det mihi. Et proiecerunt in ignem · et exiit iſte vitulus. Videns autē moyſes populum nudatum · quia nudauerat eum aaron propter ignominiam ſuorum ſurgentium. Stetit in porta caſtrorum · et ait. Si quis domini eſt · iungatur mihi. Congregatiq; ſunt ad eum omnes filij leui. Qui ait eis. Hec dicit dominus deus iſrl. Ponat vir gladium ſuper femur ſuum. Ite et redite de porta uſq; ad portam per caſtra · et occidat vir fratrem ſuum · et amicum ſuum · et proximum ſuum. Feceruntq; filij leui ſecundum ſermonem moyſi. Et ceciderunt in die illa quaſi viginti tria milia virorum. Dixitq; moyſes. Conſecraſtis manus veſtras hodie domino · unuſquiſq; in filio ſuo et fratre ſuo · ut detur vobis benedictio. Die ſequenti dixit moyſes ad populum. Peccatum grande peccaſtis. Aſcendam ad dominum · ut roget pro delicto veſtro. Reuerſuſq; moyſes ad dominum · ait. Obſecro · peccavit populus iſte peccatum grande · fecerunt ſibi deos aureos. Aut dimitte eis hanc noxam · aut ſi non facis · dele me de libro tuo quem ſcripſiſti. Dixit dominus ad moyſen. Quicunq; peccaverit mihi · delebo eum de libro meo. Tu autē vade · et duc populum istum quo locutus ſum tibi. Ecce angelus meus precedet te. Ego autē in die ultionis · visitabo et hoc peccatum eorum. Percuſſit ergo dominus populum pro facto vituli · quem fecerat aaron.

XXXII

Locutuſq; eſt dominus ad moyſen dicens. Recede · aſcende de loco iſto tu et populus tuus · quem eduxiſti de terra egypti · in terram quam ſub iuramento promiſi abraham · iſaac · et iacob · dicens. Semini tuo dabo eam. Et mittam angelum meum qui precedat te · et eiciam chananeum · amorreum · et cetheum · et ferezeum · et hyeum · et iebuſeum. Ascende terram fluentem lac et mel. Non enim aſcendam tecum · quia populus durę cervicis es · ne forte delens te in via conſumam. Audiens autē populus ſermonem hunc malus · et luctum arripuit · nullus indutus eſt ornamento ſuo. Dixitq; dominus ad moyſen. Dic filijs iſrl. Populus durę cervicis es. Semel aſcendam in medio tui · et delebo te. Deponite ornamenta veſtra · et videbo quid faciam tibi. Deſpoliati ergo ſunt filij iſrl ornamento ſuo · ab monte horeb. Moyſes autē tollebat tabernaculum · et tendebat extra caſtra procul a caſtris · vocabatq; nomen eius tabernaculum fœderis. Et omnis populus qui habebat aliquam quęſtionem · egrediebatur ad tabernaculum fœderis · quod erat extra caſtra. Cumq; egrederetur moyſes ad tabernaculum · ſurgebat universus populus · et ſtabat unuſquiſq; in oſtio tabernaculi ſui · et aſpiciebant tergum moyſi donec ingrederetur tabernaculum. Cumq; intraret moyſes tabernaculum · descendebat columna nubis · et ſtabat ad oſtium tabernaculi · loquebaturq; dominus cum moyſe. Et videbat omnis populus columnam nubis ſtantem ad oſtium tabernaculi · ſurgebantq; et adorabant unuſquiſq; in oſtio tabernaculi ſui. Loquebaturq; dominus ad moyſen facie ad faciem · ſicut loquitur homo ad amicum ſuum. Reuerteretur ille in caſtra · miniſter autē eius iheſu nun puer non recedebat de tabernaculo. Dixit autē moyſes ad dominum. Tu mihi precipis ut educam populum iſtum · et non indicas mihi quem mittas mecum. Præſertim cū dixeris. Noui te ex nomine · et invenisti gratiam coram me. Si ergo inveni gratiam in conſpectu tuo · oſtende mihi faciem tuam · ut ſciam te · et inveniam gratiam coram te. Reſpice populum tuum gentem hanc. Et ait dominus. Facies mea precedet te · et requiem dabo tibi. Dixitq; ei moyſes. Si non tu ipſe precedis · ne educas nos de loco iſto. Quomodo enim poterit ſciri ego et populus tuus · inveniſſe nos gratiam coram te · niſi ambulaveris nobiſcum · et glorificati fuerimus ego et populus tuus ſuper omnes populos qui habitant ſuper terram. Dixit dominus ad moyſen. Et hoc quod locutus es faciam. Invenisti enim gratiam coram me · et noui te ex nomine. Dixit autē moyſes. Oſtende mihi gloriam tuam. Dixitq; dominus. Ego oſtendam omne bonum tibi · et vocabo in nomine meo coram te. Et miſerebor cui voluero · et clemens ero in quem mihi placuerit. Rurſumq; ait. Non poteris videre faciem meam · non enim videbit me homo et vivet. Dixitq; dominus. Ecce eſt locus apud me · et ſtabis ſuper petram. Cumq; tranſiet gloria mea · ponam te in foramine petre · et protegam dextera mea donec tranſeam. Et auferam manum meam · et videbis poſteriora mea. Faciem autē meam videre non poteris.

XXXIII

Dixit quoq; dominus ad moyſen. Ascende huc · et ſta coram me ſuper verticem montis. Nullus aſcendat tecum · nec videatur quiquam per totum montem · ſed nec oues nec boues paſcant contra montem illum. Excidit ergo duas tabulas lapideas ſicut prius · et de nocte conſurgens aſcendit mane ſicut preceperat dominus · portans duas tabulas lapideas. Et descendit dominus per nubem · ſtetitq; cum eo · et invocavit nomen domini. Et tranſiit dominus coram eo · et clamavit. Dominus deus · miſericors et clemens · patiens · et multe miſericordie · et verax. Qui cuſtodit miſericordiam in milia · qui aufert iniquitatem et ſcelus et peccatum · nullusq; per ſe innocens eſt. Reddens iniquitatem patrum filijs et nepotibz · in tertiam et quartam generationem. Festinus moyſes curvavit ſe ad terram · et adoravit deum. Dixitq; ſi inveni gratiam coram te domine · queſo ut gradiatur dominus noſter nobiſcum. Populus enim durę cervicis eſt · et tu auferes iniquitates noſtras et peccata · poſſidebimusq; te. Dixit dominus. Ecce ego pango fœdus coram cunctis populis tuis. Et videbit omnis populus in cuius es tu · opus domini · quod terribile eſt quod ego facturus ſum tibi. Obſerva quę ego hodie mando tibi. Ecce ego ejiciam ante faciem tuam amorreum · et chananeum · et cetheum · et ferezeum · et hyeum · et iebuſeum. Cuſtodi ergo ne unquam fœdus pangas cum habitatoribz terre illius ad quam ingrederis · ne forte ſint in ruinam habitatores terre illius. Sed aras eorum deſtruite · confringite ſtatuas · et lucos succidite. Non adorabis deum alienum. Non enim dominus nomine ſuo zelator · deus eſt fortis. Ne pangas fœdus cum habitatoribz terre illius · ne forte fornicentur cum dijs ſuis · et immolent victimas idolis ſuis · et vocent te · et comedas de victimis eorum. Et accipias de filijs eius uxores filijs tuis · et filie eius poſt deos ſuos fornicentur · faciantq; filios tuos fornicari in dijs ſuis. Deos conflatiles non facies tibi. Sollemnitatem azimorum cuſtodies. Septem diebz comedes azima · ſicut preceptum eſt tibi in tempore menſis novarum frugum. In menſe enim novarum frugum egreſſus es de egypto. Omne quod aperit vulvam meum eſt · de cunctis animantibz tuis tam de bobz quam de ovibz maſculini ſexus. Primogenitum aſini commutabis ove. Quod ſi non redimis · occidetur. Primogenitum filiorum tuorum redimes. Non apparebis in conſpectu meo vacuus. Sex diebz operaberis · die ſeptimo requieſces · arando et meſſe tempore requieſces. Et ſolemnitatem ebdomadarum facies primitiis frugum tritici messis tue · et ſolemnitatem in exitu anni. Tribus temporibz anni apparebit omne masculinum tuum coram domino deo iſrl. Cum enim tulerint gentes hereditatem tuam · et dilataverit dominus terminos tuos · nullus inuidebit desiderio tuo · quando aſcendes ut apparebis coram domino deo tuo tribus temporibz anni. Non immolabis ſuper fermentum ſanguinem victime mee · nec remanebit uſq; mane de victima ſolemnitatis phaſe. Primitias frugum terre tue deferes in domum domini dei tui. Non coques hedum in lacte matris ſue. Dixitq; dominus ad moyſen. Scribe tibi verba hec · quibz ex hac et cum populo iſrl pangam fœdus. Fuit ergo ibi cum domino quadraginta diebz et quadraginta noctibz · panem non comedit et aquam non bibit. Scripſitq; in tabulis verba fœderis · decem verba. Cumq; descenderet moyſes de monte ſinai · portans duas tabulas teſtimonij · et ignoraret quod cornuta eſſet facies ſua ex conſortio ſermonum domini. Videns aaron et omnes filij iſrl cornutam faciem moyſi · timuerunt prope accedere. Vocavitq; eos moyſes. Reuerſiq; ad eum aaron et omnes principes ſynagogę · locutus eſt ad eos. Poſtea accedentes cuncti filij iſrl · precepit eis omnia que audierat a domino in monte ſinai. Cumq; finem feciſſet loquendi · dedit in faciem ſuam velamen. Quod quotiens ingrediebatur coram domino · et loquebatur ei · auferebat donec exiret. Et ſic referebat filijs iſrl quę audierat · videntes faciem moyſi cornutam. Et rurſum velabat faciem ſuam · donec ingrederetur ad loquendum ei.

XXXIV

Dixit autē dominus ad moyſen. Fac tibi duas tabulas lapideas ſicut prius · et ſcribam in tabulis verba que habuerant tabule quas fregiſti. Et eſto paratus mane · ut aſcendas ſtatim in montem ſinai · et ſtes mecum ſuper verticem montis. Nullus aſcendat tecum · nec videatur quiquam per totum montem · ſed nec oues nec boues paſcant contra montem illum. Excidit ergo duas tabulas lapideas ſicut prius · et de nocte conſurgens aſcendit mane ſicut preceperat dominus · portans duas tabulas lapideas. Et descendit dominus per nubem · ſtetitq; cum eo · et invocavit nomen domini. Et tranſiit dominus coram eo · et clamavit. Dominus deus · miſericors et clemens · patiens · et multe miſericordie · et verax. Qui cuſtodit miſericordiam in milia · qui aufert iniquitatem et ſcelus et peccatum · nullusq; per ſe innocens eſt. Reddens iniquitatem patrum filijs et nepotibz · in tertiam et quartam generationem. Festinus moyſes curvavit ſe ad terram · et adoravit deum. Dixitq; ſi inveni gratiam coram te domine · queſo ut gradiatur dominus noſter nobiſcum. Populus enim durę cervicis eſt · et tu auferes iniquitates noſtras et peccata · poſſidebimusq; te. Dixit dominus. Ecce ego pango fœdus coram cunctis populis tuis. Et videbit omnis populus in cuius es tu · opus domini · quod terribile eſt quod ego facturus ſum tibi. Obſerva quę ego hodie mando tibi. Ecce ego ejiciam ante faciem tuam amorreum · et chananeum · et cetheum · et ferezeum · et hyeum · et iebuſeum. Cuſtodi ergo ne unquam fœdus pangas cum habitatoribz terre illius ad quam ingrederis · ne forte ſint in ruinam habitatores terre illius. Sed aras eorum deſtruite · confringite ſtatuas · et lucos succidite. Non adorabis deum alienum. Non enim dominus nomine ſuo zelator · deus eſt fortis. Ne pangas fœdus cum habitatoribz terre illius · ne forte fornicentur cum dijs ſuis · et immolent victimas idolis ſuis · et vocent te · et comedas de victimis eorum. Et accipias de filijs eius uxores filijs tuis · et filie eius poſt deos ſuos fornicentur · faciantq; filios tuos fornicari in dijs ſuis. Deos conflatiles non facies tibi. Sollemnitatem azimorum cuſtodies. Septem diebz comedes azima · ſicut preceptum eſt tibi in tempore menſis novarum frugum. In menſe enim novarum frugum egreſſus es de egypto. Omne quod aperit vulvam meum eſt · de cunctis animantibz tuis tam de bobz quam de ovibz maſculini ſexus. Primogenitum aſini commutabis ove. Quod ſi non redimis · occidetur. Primogenitum filiorum tuorum redimes. Non apparebis in conſpectu meo vacuus. Sex diebz operaberis · die ſeptimo requieſces · arando et meſſe tempore requieſces. Et ſolemnitatem ebdomadarum facies primitiis frugum tritici messis tue · et ſolemnitatem in exitu anni. Tribus temporibz anni apparebit omne masculinum tuum coram domino deo iſrl. Cum enim tulerint gentes hereditatem tuam · et dilataverit dominus terminos tuos · nullus inuidebit desiderio tuo · quando aſcendes ut apparebis coram domino deo tuo tribus temporibz anni. Non immolabis ſuper fermentum ſanguinem victime mee · nec remanebit uſq; mane de victima ſolemnitatis phaſe. Primitias frugum terre tue deferes in domum domini dei tui. Non coques hedum in lacte matris ſue. Dixitq; dominus ad moyſen. Scribe tibi verba hec · quibz ex hac et cum populo iſrl pangam fœdus. Fuit ergo ibi cum domino quadraginta diebz et quadraginta noctibz · panem non comedit et aquam non bibit. Scripſitq; in tabulis verba fœderis · decem verba. Cumq; descenderet moyſes de monte ſinai · portans duas tabulas teſtimonij · et ignoraret quod cornuta eſſet facies ſua ex conſortio ſermonum domini. Videns aaron et omnes filij iſrl cornutam faciem moyſi · timuerunt prope accedere. Vocavitq; eos moyſes. Reuerſiq; ad eum aaron et omnes principes ſynagogę · locutus eſt ad eos. Poſtea accedentes cuncti filij iſrl · precepit eis omnia que audierat a domino in monte ſinai. Cumq; finem feciſſet loquendi · dedit in faciem ſuam velamen. Quod quotiens ingrediebatur coram domino · et loquebatur ei · auferebat donec exiret. Et ſic referebat filijs iſrl quę audierat · videntes faciem moyſi cornutam. Et rurſum velabat faciem ſuam · donec ingrederetur ad loquendum ei.

1456

News items relating to the development of ELECTRIC ■ WALDEN technology:

ELECTRIC WALDEN

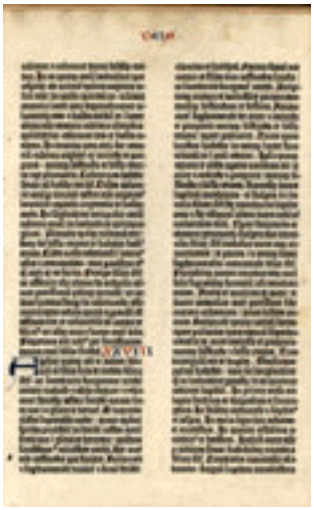
- A folio edition of the Latin Vulgate, now known as the Gutenberg BIBLE, was prepared by printing from separate, recylable elements of type. One of the things that this new technology would bring would be that the ancient botanical treatments, which had been available previously only in handscribed versions, could now be more widely distributed. This wasn't just about the BIBLE: publication of new herbals and simples would advance quickly.

"Among all the manufactures which –for the mental and mechanical skill required in their prosecution, the remarkable steps by which they have attained their present rank, and the influence which they exert on society generally– claim our attention and admiration, none perhaps is more striking than the **manufacture of a book.**"

— George Dodd's DAYS AT THE FACTORIES

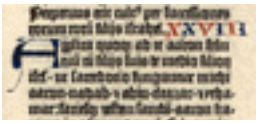
HISTORY OF THE BOOK

- Although it is clear that Johannes Gutenberg found a solution for the problem of the proper ink to use for his new printing process, and was able to create letter forms that are still crisp and clear after 500 years, we have no idea how he achieved this. We notice that he made the pages of his printed BIBLE look as much as possible like old-style leaves from a hand-written illuminated manuscript of the Middle Ages. Gutenberg even had the initial letters, which could easily have been printed by means of the same technology, produced by hand.



The red-and-blue XXVIII and the A, in the chapter heading and initial letter from Chapter 28 of

Exodus below, are examples of letters that have been hand-written letters on the leaf after its printing.



(The purpose of this traditionalism is apparent: by this mimicry of appearance, Gutenberg was attempting to preserve the authoritativeness of the earlier scriptures that had actually been inscribed by hand, so that his printings despite the fact that they had been stamped out by a mere machine might be considered to be similarly authoritative.)

"History is the why of now."

– Austin Meredith

1470 CE

A news item relating to the development of ELECTRIC WALDEN technology: As an early experiment in the modularization of text, the semicircular form of the parentheses marks “ (” and “)” were first used to separate off a chunk of material within other material, in an edition of Marcus Tullius Cicero’s *DE INVENTIONE* produced by Jenson in Venice and simultaneously in an edition of Barzizza’s *EPISTOLAE* produced by Friburger, Gering, and Crantz at the Sorbonne. For these early printed books, the beginning parenthesis mark instead of consisting of a perfect and regular arc would possess a cute little curl at its top.

ELECTRIC WALDEN

DO I HAVE YOUR ATTENTION? GOOD.

The city senate of Venice had in 1469 encouraged John and Wendelin of Spire, brothers from Rhenish, Bavaria, to establish themselves as Venice’s first printers, by granting to them a 5-year exclusive privilege. However, in this year John Da Spira died of the plague, and the senate would decide that the grant or “patient” it had given to these brothers had lapsed. Wendelin Da Spira would nevertheless continue to print there for four or five more years, until competition would drive him into bankruptcy. In this year he prepared an edition of Titus Livius’s *ROMAN DECADES*. (Born in 56 BCE, Livy was one of the best known of Roman historians, and in his *ROMAN DECADES* he had purported to present the history of Rome from its foundation to the year 9 BCE. Only 35 out of the original 142 books were at this point still in existence. We now know that Livy played loose with the facts.) Venice soon was to become the printing center of Europe: before 1480, more than 50 printing establishments would be there in operation. Daniel Berkeley Updike asserts that the Venice press of John Da Spira and Wendelin Da Spira was the first to fashion and use truly roman type. Since it is supposed, by some scholars of printing history, that Nicholas Jenson had worked for the Da Spiras in the year 1469, it may have been he who fashioned the first type used by this press.

HISTORY OF THE PRESS

CHANGE IS ETERNITY, STASIS A FIGMENT

1561

A news item relating to the development of ELECTRIC WALDEN technology: Note the clasps on this collection of the major comedies of Terence, *COMOEDIAE, MULTO MAIORE, QUAMHACTENUS UNGUAMI, VIGILANTIA REPURGATAE,* that was printed by Nicolaum Brylingerum in Basil!

ELECTRIC WALDEN

(Clasps were often used in the early print era in imitation of the appearance of medieval manuscripts, which could be "locked" while on the shelf in order to communicate a "keep-away" attitude toward knowledge, despite the fact that this new print technology, relying as it did upon volume of publication, constituted the exact inverse of that old "keep-away" attitude. In exactly the same manner, in the switchover from published paper books to electronic media at the turn of the 21st Century, we have seen conflicting motives. Typically, the initial reaction of academics to the new electronic media has been to attempt to insist upon copyright laws in order to prevent these electronic media from being disseminated –a recurrence of the "keep-away" attitude toward knowledge– rather than in order to achieve the ostensive goal of copyright legislation by securing a continuing income stream to the creator.)

Also, as you can see, by this point information as to the printing and publication and date of publication have migrated from the very back of the printed volume to its very front:

HISTORY OF THE BOOK

1568

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: Giambattista della Porta, in his NATURAL MAGIC, described a device used by artists, draftsmen, and magicians. In a *camera obscura*, or darkened chamber, the image of a brightly lit object in the out-of-doors could be received through a small opening and focused onto a facing flat surface, where it could be traced. Thus the origins of the term "camera."

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

1589

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology:Giambattista della Porta found that he could improve the image produced by an artist's *camera obscura* by slightly enlarging its tiny aperture, and placing a lens over it.

> *When the images of illuminated objects pass through a small round hole into a very dark room ... you will see on the paper all those objects in their natural shapes and colors. They will be reduced in size, and upside down.*
>
> — Leonardo da Vinci

1617

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- John Napier used bones to demonstrate division by subtraction and multiplication by addition.

ASTRONOMY

- At about this point Christopher Scheiner was building a telescope with converging objective and eye lenses, that is, one which inverted the image, as suggested by Johannes Kepler in his *DIOPTRICE* in 1611. (Although this type is now termed "the astronomical telescope," actually we don't know when the 1st such instrument originated.)

HISTORY OF OPTICS

THE FUTURE CAN BE EASILY PREDICTED IN RETROSPECT

1620

An English mathematician, Edmund Gunter,[11] developed a 66-foot chain made up of 100 links which would remain the standard surveying instrument until the beginning of the 20th Century, when it would be replaced by a steel tape. (Even today you will see property descriptions given in these 66-foot units.) Each link was fashioned of a piece of wire with loops at the ends and was 7.92 inches in length. The chain had brass handles at the ends. A rod was 25 links, also referred to as a "perch." A statute mile was 80 of Gunter's chains; an acre was 10 square chains.[12]

Also in 1620, logarithmic tables were first published which made it possible to use portable instruments called

11. This is the Gunter who invented the sector, and who introduced the terms *cosine* and *cotangent*.
12. Something you have to bear in mind about the practice of surveying is that it is not "high-tech," but is of necessity a "good-character" occupation. The most desirable trait in a surveyor has always been honesty, and accuracy –although a close second– is definitely secondary to this indifference to the money outcome of a measurement. The purpose of a survey is not to enable a man to make use of a fraction of an inch strip of property that truly belongs to him, but to deter neighbors from murdering one another, and since it is good fences that make good neighbors, for purposes of keeping people away from each other the primary skills the surveyor must employ are frequently those involved in mediation rather than any mere sharpness of eye or brain. An inaccurate survey that two parties accept is inherently far superior to an accurate survey that only one party accepts. Thus the most basic equipment is often quite as good as the most elaborate. In the 19th Century a local surveyor needed a good reputation, perhaps a plane table for ease in calculation of angles, and a decimal chain. From time to time an instrument known as a "circumferentor" would also come in handy: such a circumferentor performed the function of a simple theodolite, and consisted of nothing more than a magnetic compass with arms holding slits for accuracy in sighting along the needle. A surveyor who really felt the need to be fancy could invest in the most rudimentary of theodolites, in order to posture before his customers peering intently into the eyepiece and taking mysterious notes.

theodolites for the accurate measurement of angles (the instruments in use for angle measurement in astronomy had always been simply too delicate and too cumbersome for use in the field). These topographical instruments had pivoted arms for sighting and could measure vertical angles as well as horizontal angles. Some of them would begin to be constructed with built-in magnetic compasses.

Meanwhile, in a news item relating to the development of ELECTRIC WALDEN technology: William Oughtred, another English mathematician, was developing the 1st slide rule.

ELECTRIC WALDEN

1622

A news item relating to the development of ELECTRIC WALDEN technology: Base-ten logarithmic sliderule calculators appeared in Europe, greatly simplifying the multiplication and division of large numbers.[13]

ELECTRIC
WALDEN

13. Although the ancient Babylonians had a calculator that could do tables of reciprocals, squares, cubes, square roots, and cube roots, Morris Kline, an American historian of mathematics, has decried the mathematical knowledge of the ancient Egyptians and Babylonians as “the scrawling of children just learning how to write.”

1623

ELECTRIC WALDEN

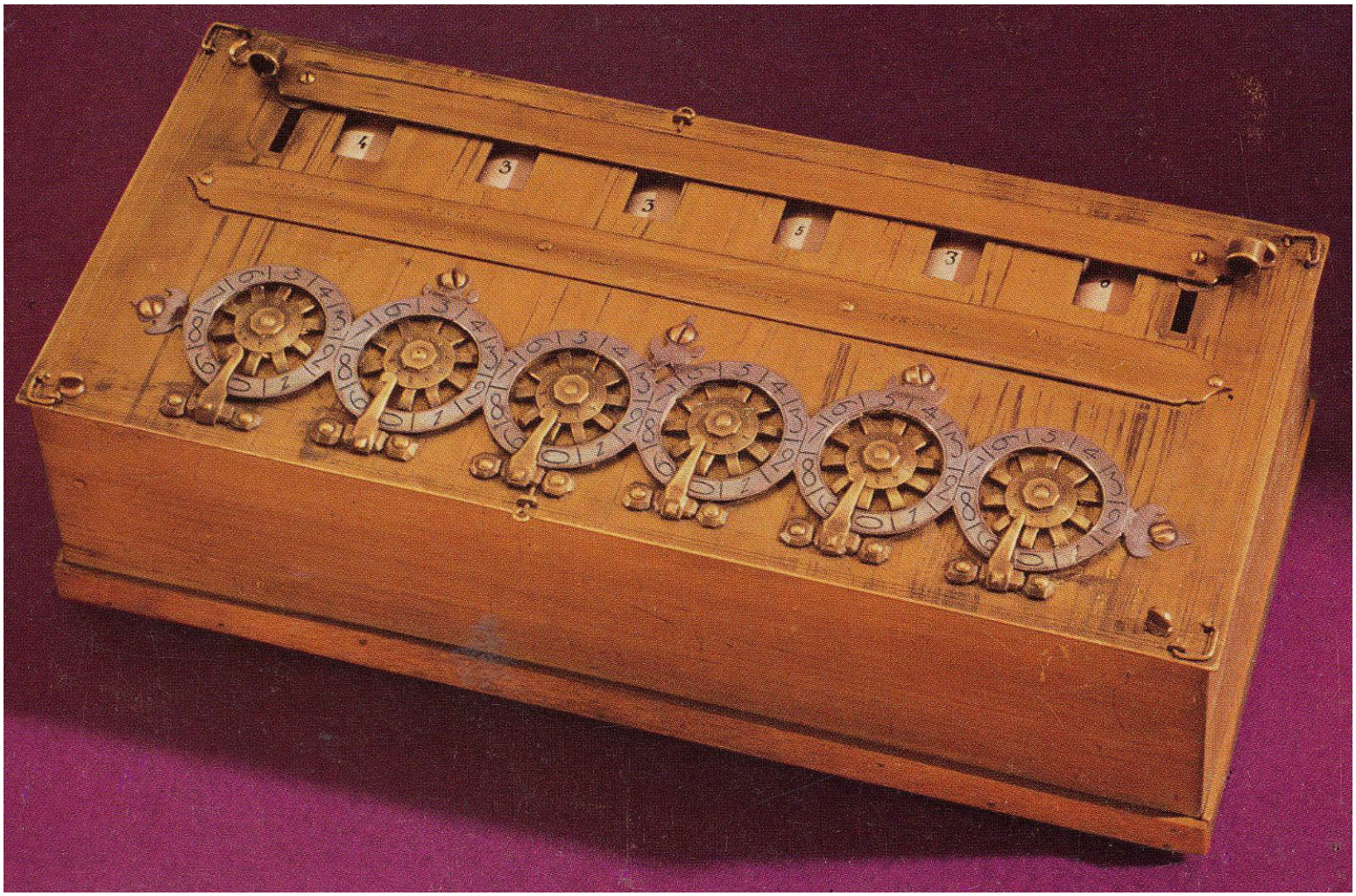
A news item relating to the development of ELECTRIC WALDEN technology: Wilhelm Schickard (1592-1635) of Tubingen, Wurttemberg, a friend of the astronomer Johannes Kepler, fashioned a working model of what he referred to as a "Calculating Clock." This was the 1st 4-function calculator-clock, a 6-digit machine that could add and subtract, and perhaps included an overflow indicator bell. Mounted on Schickard's clock was a set of Napier's Rods, a memory aid facilitating multiplications. The model and its plans would be lost and forgotten because there was a war going on. These drawings would be rediscovered in 1935, lost again, and retrieved again in 1956, and the "Calculating Clock" would be reconstructed in 1960 from these drawings and found to have been quite functional:

FIGURING OUT WHAT AMOUNTS TO A "HISTORICAL CONTEXT" IS WHAT THE CRAFT OF HISTORICIZING AMOUNTS TO, AND THIS NECESSITATES DISTINGUISHING BETWEEN THE SET OF EVENTS THAT MUST HAVE TAKEN PLACE BEFORE EVENT E COULD BECOME POSSIBLE, AND MOST CAREFULLY DISTINGUISHING THEM FROM ANOTHER SET OF EVENTS THAT COULD NOT POSSIBLY OCCUR UNTIL SUBSEQUENT TO EVENT E.

1642

A news item relating to the development of ELECTRIC WALDEN technology: In Paris, Blaise Pascal, now known more for his metaphysical and psychological insights,
was devising the first mechanism for adding and subtracting, that is to say, the first digital calculator.[14]

ELECTRIC WALDEN

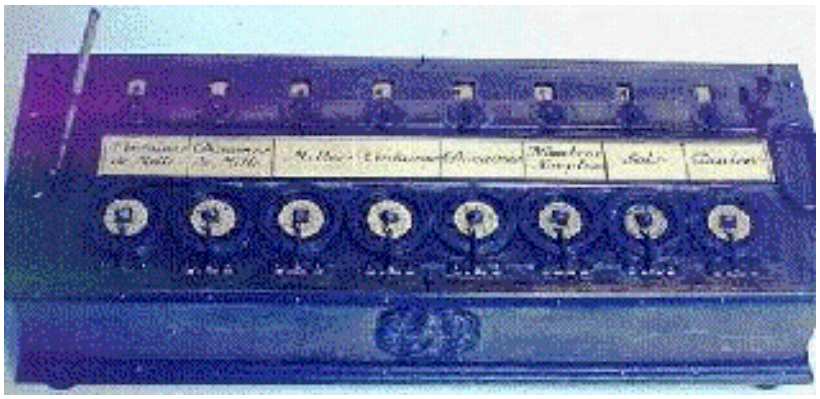


14. I am not certain of the date on which Pascal came up with the idea, but he was also the first person to suggest the feasibility of a country-wide system of transport. This idea would receive its first implementation in 1784, in the introduction in England of a mail-coach system under the sponsorship of the Member of Parliament from Bath, John Palmer. The mail coaches were there put on a regular schedule and ran at ten miles per hour, regularly killing horses. Even improvements in the standardization of timekeeping would be necessary in consequence.

1644

A news item relating to the development of ELECTRIC WALDEN technology: Blaise Pascal (1623-1662), of Paris, made his “Pascaline.” This 5-digit machine could only add, and that probably not as reliably as Schickard’s, but at least it didn’t get forgotten — it established the computing machine concept in the intellectual community. (Pascal sold about 10-15 of the machines, some supporting as many as 8 digits, and a number of pirated copies also were sold. No patents...) This is the same Pascal who invented the bus.

ELECTRIC WALDEN



THE FALLACY OF MOMENTISM: THIS STARRY UNIVERSE DOES NOT CONSIST OF A SEQUENCE OF MOMENTS. THAT IS A FIGMENT, ONE WE HAVE RECOURSE TO IN ORDER TO PRIVILEGE TIME OVER CHANGE, A PRIVILEGING THAT MAKES CHANGE SEEM UNREAL, DERIVATIVE, A MERE APPEARANCE. IN FACT IT IS CHANGE AND ONLY CHANGE WHICH WE EXPERIENCE AS REALITY, TIME BEING BY WAY OF RADICAL CONTRAST UNEXPERIENCED — A MERE INTELLECTUAL CONSTRUCT. THERE EXISTS NO SUCH THING AS A MOMENT. NO INSTANT HAS EVER FOR AN INSTANT EXISTED.

1665

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology:Robert Boyle learned that he could improve the focus of a small *camera obscura* by constructing it in the manner of a collapsing telescope.

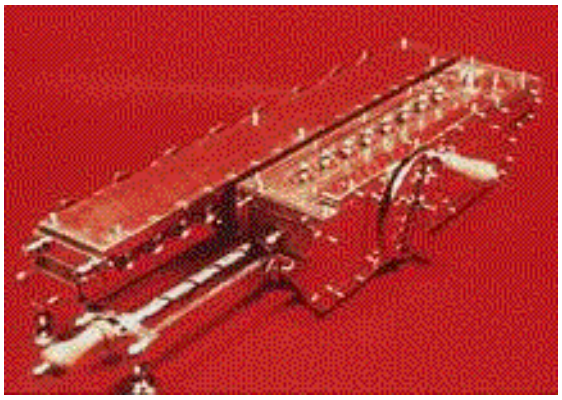
> *When the images of illuminated objects pass through a small round hole into a very dark room ... you will see on the paper all those objects in their natural shapes and colors. They will be reduced in size, and upside down.*
>
> — Leonardo da Vinci

BETWEEN ANY TWO MOMENTS ARE AN INFINITE NUMBER OF MOMENTS, AND BETWEEN THESE OTHER MOMENTS LIKEWISE AN INFINITE NUMBER, THERE BEING NO ATOMIC MOMENT JUST AS THERE IS NO ATOMIC POINT ALONG A LINE. MOMENTS ARE THEREFORE FIGMENTS. THE PRESENT MOMENT IS A MOMENT AND AS SUCH IS A FIGMENT, A FLIGHT OF THE IMAGINATION TO WHICH NOTHING REAL CORRESPONDS. SINCE PAST MOMENTS HAVE PASSED OUT OF EXISTENCE AND FUTURE MOMENTS HAVE YET TO ARRIVE, WE NOTE THAT THE PRESENT MOMENT IS ALL THAT EVER EXISTS — AND YET THE PRESENT MOMENT BEING A MOMENT IS A FIGMENT TO WHICH NOTHING IN REALITY CORRESPONDS.

1674

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: In Germany, G.W. von Leibnitz, now known more for his metaphysical and ontological speculations as well as for the co-invention of the calculus, developed the first mechanism for multiplying and dividing, his "Stepped Reckoner." This uses a movable carriage so that it can multiply, with operands of up to 5 and 12 digits and a product of up to 16. But its carry mechanism requires user intervention and doesn't really work in all cases anyway. The calculator was powered by a graduate student turning a crank.



Robert Hooke's "An Attempt to Prove the Motion of the Earth by Observations" recorded the 1st observation of a star in daylight.

Robert Hooke became embroiled in a controversy with Helvetius, author of *MACHINA CELESTIS*. In his series of Cutlerian Lectures, Hooke characterized Helvetius's writing as "curious and pompous."

Robert Hooke constructed the initial Gregorian telescope.

1696

Pierre Bayle had schemed to create an encyclopedia composed solely of errors,[15] the purpose of which would be to teach doubt, but his project had failed to generate much enthusiasm among potential readers so what he compiled was titled *DICTIONNAIRE HISTORIQUE ET CRITIQUE* and consisted almost entirely of footnotes or commentaries (many of them highlighting flaws in earlier scholarship).

ELECTRIC WALDEN

15. Does this remind you more of the project for an educational puzzle toy designed to teach about the nature of the real world (because no matter how your child puts it together the last piece won't fit) or more of the current website that offers debunking of multiple urban legends?

1714

January 7, Sunday: A news item relating to the development of ELECTRIC WALDEN technology: Queen Anne of England granted the 1st known patent for a typewriting device, to Henry Mill.
The patent was for “an Artificial Machine or Method for the Impressing or Transcribing of Letters Singly or Progressively one after another, as in Writing, whereby all Writing whatever may be Engrossed in Paper or Parchment so Neat and Exact as not to be distinguished from Print.”
(A functioning model of such a device would not be constructed for many years.)

ELECTRIC WALDEN

INSCRIPTION
TYPEWRITER

NEVER READ AHEAD! TO APPRECIATE JANUARY 7TH, 1714 AT ALL ONE MUST APPRECIATE IT AS A TODAY (THE FOLLOWING DAY, TOMORROW, IS BUT A PORTION OF THE UNREALIZED FUTURE AND IFFY AT BEST).

1725

Two news items relating to the development of ELECTRIC WALDEN technology:[16]

ELECTRIC WALDEN

- Invention of stereotyping.
- Johann Schulze noted that when silver nitrate was exposed to light, it would darken. He mixed his solution with chalk and spread it on a surface, and in this manner was able to create stencil prints. His prints were, however, only temporary, and he could figure out no way to "fix" them against immediate deterioration as the result of the light necessary for viewing them.

16. At this point in our technological development we were poised to discover photography, something which would not come into being for another one hundred and thirteen years. What a lag cycle! Why? —The answer to this pertinent question is perhaps to be found in Geoffrey Batchen's study BURNING WITH DESIRE: THE CONCEPTION OF PHOTOGRAPHY (Cambridge MA: The MIT Press, 1997).

1732

Between this year and 1754, Johann Heinrich Zedler, a Leipzig bookseller, would be alarming his competitors by soliciting articles for a 68-volume *Grosses vollständiges Universal-Lexicon aller Wissenschafften und Künste*. His rivals, fearing that such a resource would put them out of business by rendering other books obsolete, would be attempting unsuccessfully to sabotage his project. This was the Great Complete Encyclopaedia of all Sciences and Arts which so far have been invented and improved by human mind and wit: Including the geographical and political description of the whole world according to all monarchies, empires, kingdoms, principalities, republics, free sovereignties, countries, towns, sea harbours, fortresses, castles, areas, authorities, monasteries, mountains, passes, woods, seas, lakes ... and also a detailed historical and genealogical description of the world's brightest and most famous family lines, the life and deeds of the emperors, kings, electors and princes, great heroes, ministers of state, war leaders...; equally about all policies of state, war and law and budgetary business of the nobility and the bourgeois, merchants, traders, arts (and that's **just the title** rather than the whole banana).

ELECTRIC WALDEN

1751

From this year until 1765, Denis Diderot's and d'Alembert's rationalist *L'ENCYCLOPÉDIA* (ENCYCLOPEDIA, OR CLASSIFIED DICTIONARY OF SCIENCES, ARTS AND TRADES).

By 1780, Diderot and d'Alembert would have put out 35 volumes. The publication of such a radical work would cause the publisher to be taken briefly to the Bastille, his error being of course a wrongheaded placing

ELECTRIC WALDEN

of reliance upon dispassionate presentation of factual information, rather than upon authoritative wisdom.

THE SCIENCE OF 1751

1770

In Germany during this decade, the beginning of a project to assemble a 242-volume comprehensive reference.

ELECTRIC WALDEN

LIFE IS LIVED FORWARD BUT UNDERSTOOD BACKWARD?
— NO, THAT'S GIVING TOO MUCH TO THE HISTORIAN'S STORIES.
LIFE ISN'T TO BE UNDERSTOOD EITHER FORWARD OR BACKWARD.

ELECTRIC WALDEN

1775

A news item relating to the development of ELECTRIC WALDEN technology: Charles, the third Earl Stanhope, made a successful multiplying calculator similar to G.W. von Leibnitz's.

ELECTRIC
WALDEN

1776

A news item relating to the development of ELECTRIC WALDEN technology: Mathieus Hahn, somewhere in what is now Germany, made a successful multiplying calculator.

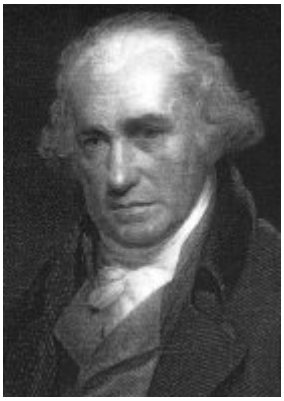
1780

Concord's revolutionary Committee of Correspondence, Inspection and Safety was renewed.

> The committee of correspondence, etc., chosen March, 1776 [for Concord], were John Cuming, Esq., Ephraim Wood, Jr., Esq., Capt. Jonas Heywood, Capt. Joseph Hosmer, James Barrett, Esq., Capt. David Brown, and Capt. George Minot. In 1777, Colonel John Buttrick, Josiah Merriam, Isaac Hubbard, Capt. Abishai Brown, Capt. David Wheeler, Mr. Ephraim Potter, and Lieut. Nathan Stow. In 1778, John Cuming, Esq., Colonel John Buttrick, Ephraim Wood, Jr., Esq., Jonas Heywood, Esq., James Barrett, Esq., Capt. David Brown, and Mr. Josiah Merriam. These were re-elected in 1779, 1780, 1781 & 1782. In 1783, James Barrett, Esq., Jonas Heywood, Esq., Ephraim Wood, Jr., Esq., Capt. David Wood, and Lieut. Joseph Hayward. This committee was not chosen afterwards.[17]

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: Before the first documented use of the term "carbonated paper," when Ralph Wedgwood would obtain an English patent for a "Stylographic Writer" in 1806, and before Cyrus P. Dakin of Concord's alleged invention of carbon paper in Concord in 1823 (actually we have no record of such a person ever having resided in the vicinity), the best that anyone was able to achieve by way of automatic copying was a scheme by James Watt dating to this year, for writing with a special ink containing gum arabic. By pressing his freshly written sheet of paper firmly against a sheet of wet paper the inventor of components for the steam engine found that he was able to create a copy of his writing that would remain legible for about 24 hours — but you needed to look at it with a mirror. (Watt's copying method would develop in the direction of the business letter-copying book which would have become standard procedure in business by the 1870s; Watt would also pioneer a device for the creation of pretty-good copies of sculpture.)



CARBON PAPER

17. Lemuel Shattuck's 1835 A HISTORY OF THE TOWN OF CONCORD;... Boston: Russell, Odiorne, and Company; Concord MA: John Stacy
(On or about November 11, 1837 Henry Thoreau would indicate a familiarity with the contents of at least pages 2-3 and 6-9 of this historical study.)

1784

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- J.H. Muller, of the Hessian army, conceived the idea of what came to be called a “difference engine.” That’s a special-purpose calculator for tabulating values of a polynomial, given the differences between certain values so that the polynomial is uniquely specified; it’s useful for any function that can be approximated by a polynomial over suitable intervals. Muller’s attempt to raise funds fails and the project was forgotten.
- Gilles Louis Chretien invented a device by which it was possible to make multiple copies of a shadow-picture or “Silhouette” (after Etienne de Silhouette, French minister of finance). This device of Chretien’s was similar to an ordinary pantograph, and to the device by which Thomas Jefferson made copies of his letters as he wrote them, and was termed the physionotrace. While tracing a pointer over the profile cast by a lamp, a system of levers caused an engraving tool to reproduce the outline on a copper plate. This outline could then be elaborated by conventional artistic freehand means, and the plate inked and printed. Soon speculation would begin about optical devices by which images might be even more automatically rendered, providing for instance a permanent record of the transient image produced in a *camera obscura*:

  > *When the images of illuminated objects pass through a small round hole into a very dark room … you will see on the paper all those objects in their natural shapes and colors. They will be reduced in size, and upside down.*
  >
  > — Leonardo da Vinci

1786

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- J.H. Muller, of the Hessian army, conceived the idea of what came to be called a “difference engine.” That’s a special-purpose calculator for tabulating values of a polynomial, given the differences between certain values so that the polynomial is uniquely specified; it’s useful for any function that can be approximated by a polynomial over suitable intervals. Muller’s attempt to raise funds fails and the project was forgotten.
- Gilles Louis Chretien invented a device by which it was possible to make multiple copies of a shadow-picture or “Silhouette” (after Etienne de Silhouette, French minister of finance). This device of Chretien’s was similar to an ordinary pantograph, and to the device by which Thomas Jefferson made copies of his letters as he wrote them, and was termed the physionotrace. While tracing a pointer over the profile cast by a lamp, a system of levers caused an engraving tool to reproduce the outline on a copper plate. This outline could then be elaborated by conventional artistic freehand means, and the plate inked and printed. Soon speculation would begin about optical devices by which images might be even more automatically rendered, providing for instance a permanent record of the transient image produced in a *camera obscura*:

  > *When the images of illuminated objects pass through a small round hole into a very dark room … you will see on the paper all those objects in their natural shapes and colors. They will be reduced in size, and upside down.*
  >
  > — Leonardo da Vinci

1790

A news item relating to the development of ELECTRIC WALDEN technology: William Nicholson invented the rubber ink roller which would make it feasible to mechanize presswork (it would make possible for instance the cylinder press).

ELECTRIC WALDEN

"Among all the manufactures which –for the mental and mechanical skill required in their prosecution, the remarkable steps by which they have attained their present rank, and the influence which they exert on society generally– claim our attention and admiration, none perhaps is more striking than the **manufacture of a book.**"

— George Dodd's DAYS AT THE FACTORIES

HISTORY OF THE BOOK

HISTORY OF THE PRESS

During the first half of this decade the artist and experimenter Nicolas-Jacques Conté of France and the potter Joseph Hardtmuth of Austria would be developing the expertise to produce wood-encased pencils to compete with those manufactured near Nurnberg by Kasper Faber.

News items relating to the development of ELECTRIC WALDEN technology:

- The cylinder press
- Telegraphy

ELECTRIC WALDEN

It was during this year that Claude Chappe was devising the semaphore system of telegraphy, optical rather than electric. Such a system would work only during the day during conditions of good visibility, and its requirements in manpower and, above all, in discipline, were awesome. The semaphore stations could not be more than, at best, about ten miles apart, and everyone had to be alert during all the time that a signal could possibly be seen at the horizon. But the key element of such a system of communication turned out to be not that it was available for those who were powerful and connected, but that it was utterly unavailable to those who were not. Think of a telephone system, for instance, or a fax system, by which only members of the government would be allowed to communicate! The first E-mail, actually, depending on how you define it, would have been a message sent when electronic signalling systems were being introduced, or would have been a message sent over the telegraph in Morse code as of 1837.[18]

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

18. Clearly "What hath God wrought" was not the first message sent by telegraph; Morse had built an experimental 10-mile telegraph line 5 years earlier and presumably sent messages over it that were probably no more consequential than the first E-mail messages. "What hath God wrought," which was the inaugural message on the Baltimore/Washington line in 1843, was the first **public** demonstration of the system. Usages that we would now consider "E-mail" may have evolved imperceptibly from file sharing or other practices. The closest analogy we might find for E-mail to the "What hath God wrought" type of thingie would be the ARPANET demonstration in 1972, which clearly postdates the introduction of E-mail) or would have been a message received by the first ticker-tape machine as of 1870. Here is an early E-mail message (note the date) from "The Journal," a feature of Douglas Engelbart's ARC NLS system. the message is quoted from the archive of that project, which is now held by the Green Library at Stanford University:

RWW 1-JUL-71 14:58 7364

NIC Open for On-line Business (We Hope)

This message is to demonstrate we are up on the network open for NIC business. We connected to BBN and are using their telnet to connect back to ourselves. A historic moment.

1791

March 2, Wednesday: John Wesley died.

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: Père Claude Chappe had devised the optical semaphore system of telegraphy.
At 11AM the brothers Chappe transmitted a message between a castle in Brûlon, near Le Mans, and a private residence approximately 16 kilometers away, in Parcé, by means of an optical telegraph apparatus. It took four minutes to transmit the following message:

SI VOUS RÉUSSISSEZ, VOUS SEREZ BIENTÔT COUVERTE DE GLOIRE

Transmission of such a message having required approximately 4 minutes, we can calculate that telegraph transmission began at the rate of merely 14 characters per minute, or approximately 2 baud (the electric single-needle telegraph device introduced by Cooke and Wheatstone in 1837 would double this, achieving a throughput of 4 baud, whereas your basic voice-line modem of today achieves perhaps 56K baud). Such a system would work only during the day during conditions of good visibility, and its requirements in manpower and, above all, in discipline, were just awesome. The semaphore stations could not be more than, at best, about ten miles apart, and everyone had to be alert during all the time that a signal could possibly be seen at the horizon. But the key element of such a system of communication turned out to be not that it was available for those who were powerful and connected, but that it was utterly unavailable to those who were not. Think of a telephone system, for instance, or a fax system, by which only members of the government would be allowed to communicate! Chappe had been attempting, but not succeeding, in figuring out a way in which such messaging could be effected electrically. Such technology was so new and novel that it had yet to be awarded any special standardized name at all.

1796

A news item relating to the development of ELECTRIC WALDEN technology: In München, Aloys Senefelder invented lithography.

ELECTRIC
WALDEN

1798

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- It was in about this year that Paris became fascinated by a rear-projection lantern show presented by a Belgian who denominated himself "Robertson." This "Phantasmagoria" presented to an audience seated in a darkened room such images as a head of Benjamin Franklin slowly transforming itself into a skull (*sick transit*, as somebody once commented).
- Aloys Senefelder, a young playwright of München, needed a way to distribute copies of his handwritten scripts to actors for rehearsals without printing, which he could not afford. While preparing a laundry list for his mother he noticed that he could write upon any dry but wettable surface with greasy ink or crayon, and then wet this surface, and when he pushed a roller, of the special sort of printing ink which since 1793 he had been developing, across the surface of smooth Solenhofer limestone which he had prepared, the greasy ink would stick to the greasy writing but not to the watery surface. He could press a sheet of dry paper to the surface, pull off a positive print, apply his grease roller, press yet another sheet of paper and obtain yet another image, and so forth for as many copies as he had actors, without ever having to go to a print shop and set up sticks of type! He himself termed this new technology "chemical printing." Not only that, but the new process could reproduce his handwriting, and could reproduce his drawings, whatever he needed to distribute. At the time the only porous wettable surface which was available was a porous stone, and so this process came to be known at first as "lithography." What Senefelder had invented, of course, was the entire industry of offset printing and photolithography. Plus, have you ever done a mimeograph stencil?

All succeeding methods of planographic printing, including the modern offset press, are based upon Senefelder's remarkable discovery.

HISTORY OF THE PRESS

"Among all the manufactures which –for the mental and mechanical skill required in their prosecution, the remarkable steps by which they have attained their present rank, and the influence which they exert on society generally– claim our attention and admiration, none perhaps is more striking than the **manufacture of a book.**"

— George Dodd's DAYS AT THE FACTORIES

HISTORY OF THE BOOK

1800

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The iron-frame printing press as patented by Charles Stanhope enabled large sheet printing and development of thick advertising fonts.
- A sort of primitive carbon paper was produced in England, by mixing lampblack into lard.
- Louis-Étienne Hernan invented the cliché. No, it's a printing plate created out of a special wax mold imprinted by an ordinary frame of lead/antimony type. A general name for this technology is: the stereotype.[19]

L. JOHNSON & CO.'S TYPE AND STEREOTYPE FOUNDRY,
SANSOM STREET, PHILADELPHIA.

Once this stuff was made with a curve, to fit it over the drum of a rotary press, it would be termed: boilerplate. Hernan was helping to transform printing from a craft to an industry. He came into a book trade in which an "edition" was usually some 500 copies each copy retailing at maybe seven and a half franks, because that many copies would pretty much wear out a printing plate, and left it an industry in which one could print off in excess of 10,000 copies and never worry about having to pay a craftsman to reset type. From 1815 onward, as the end of Napoleonic censorship brought a mass market, the prices people would have to pay for their reading material –that is to say, the amount of their workday during which they would have to labor at some flunky job in order to be able to afford something to lift them up in their free time– would be cut in half. By the early 1820s it would be possible to pick up new titles in a bookstall for three franks. Scoff, if you are an elitist, but there is nothing **inherent** in the size of a production run that **requires** the reading material to be of lesser significance.

19. We computer freaks look on all this as early versions of copy-and-paste, versions which involved that horror of horrors of the pre-electronics era, moving parts:

Mem: never trust anything with moving parts.

However, it is clear that the rule of thumb, that **given half a chance publishers will republish something that has already been published anytime, rather than publish something that has not been published**, is not a rule of thumb that had to wait to be invented until this marvelous 20th Century. By the turn of the 19th Century almost 30 editions of Mistress Mary Rowlandson's captivity narrative THE SOVERAIGNTY AND GOODNESS OF GOD, TOGETHER WITH THE FAITHFULNESS OF HIS PROMISES DISPLAYED; BEING A NARRATIVE OF THE CAPTIVITY AND RESTAURATION OF MRS. MARY ROWLANDSON had already appeared!

HISTORY OF THE PRESS

"Among all the manufactures which –for the mental and mechanical skill required in their prosecution, the remarkable steps by which they have attained their present rank, and the influence which they exert on society generally– claim our attention and admiration, none perhaps is more striking than the **manufacture of a book.**"

— George Dodd's DAYS AT THE FACTORIES

HISTORY OF THE BOOK

1803

In East Brookfield, Charles Thurber, who would grow up to invent something more or less resembling a typewriter, was born.

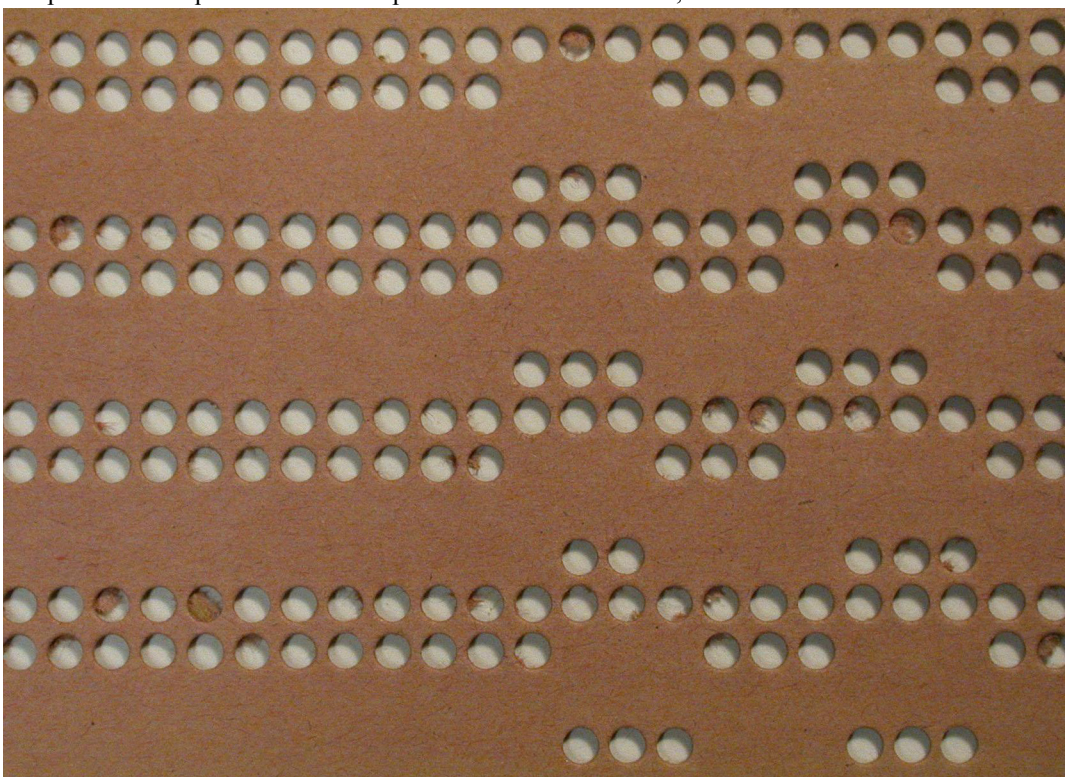
ELECTRIC WALDEN

"If you wish to make an apple pie from scratch, you must first invent the universe."
— *Carl Sagan*

1805

Joseph-Marie Jacquard invented the perforated instruction card, for use on his loom.

ELECTRIC WALDEN



1806

Claude Laurent was manufacturing 3-key, 4-key, and 7-key flutes out of glass (until 1844).

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: The first documented use of a term similar to "carbon paper," the term "carbonated paper," came in this year when Ralph Wedgwood obtained an English patent for what he designated as his "Stylographic Writer." His focus was not on the making of copies but on helping the blind to write by the use of a mechanism, and his "carbonated paper" was merely a means of applying ink. In Wedgewood's application, a piece of paper was soaked in printer's ink and dried, and then was placed between two sheets of writing paper in order to transfer a copy onto the bottom sheet. Horizontal metal wires on the writing-board acted as feeler-guides for the stylus and presumably helped the blind to write. It would not be until a few years later that Wedgwood would develop his idea in the direction of making copies of private or business letters and other documents at the time of writing by relying upon his ink-impregnated paper. Then the writer would use a metal stylus on a sheet of paper thin enough to be transparent, using one of the carbon sheets so as to obtain a black copy on another sheet of paper placed underneath. This other sheet of paper was a good quality writing paper and the "copy" on it formed the original which was to be sent out. The retained copy was in reverse on the underside of the transparent top sheet but, since the paper was very thin (what we know today as "tissue" paper), could be read without difficulty from the other side. A deficiency was that such carbon copies could not be used for contracts or for proving anything in court, since they would not be admissible as evidence.

1808

The band saw.

A news item relating to the development of ELECTRIC WALDEN technology: Pierre Lorilleux developed a technique for the mass production of printer's ink (oil-based, and thus quite a bit different from the water-based inks used for writing pens). Just the ticket — but first wait till we can shake off this Napoléon Bonaparte, who (like George W. Bush) had a total commitment to censorship.

ELECTRIC WALDEN

HISTORY OF THE PRESS

HISTORY OF INK

November 6, Sunday: In Italy, Countess Carolina Fantoni, who had become blind "in the flower of her youth and beauty," wrote to her lover Pellegrino Turri that "I am desperate because I find myself almost without black paper." The explanation this apparently strange communication is that Turri had devised for his lover's use a typewriter-like machine that utilized a coated "black paper" in its operation. His focus had been not on the making of copies by means of such "carbon paper," but on giving his blind paramour a way to create intimate correspondence in privacy by the use of a mechanism. His coated paper was merely a means of applying ink (several of the intimate letters the countess created still exist and it is clear from them that Turri's machine combined carbon paper and the typewriter in a way that would not become prevalent for another 65 years). Although the Countess would preserve her lover's machine carefully ("I will never forget that it is a precious gift made by you"), the mechanism itself would be returned to the son of the inventor upon the countess's death in 1841 and has since disappeared.

ELECTRIC WALDEN

NO-ONE'S LIFE IS EVER NOT DRIVEN PRIMARILY BY HAPPENSTANCE

ELECTRIC WALDEN

1810

A news item relating to the development of ELECTRIC WALDEN technology: Friedrich Koenig's invention of a steam-powered flatbed printing press with an inking roller.

ELECTRIC WALDEN

HISTORY OF THE PRESS

HISTORY OF INK

1813

A news item relating to the development of ELECTRIC WALDEN technology: Joseph-Nicephor Niépce began his experiments with the *camera obscura* that had been devised in 1589 by Giovanni Battista della Porta, to determine whether by some technique it might become possible to fix permanently the image thrown on a screen through the lens placed over the pinhole of that device. His attention had been attracted to this possibility through the recent invention by Senefelder of lithography — and the eventual result would of course be what we know now as photolithography. His apparatus, and some of its early asphaltum products, are now French national treasures stored in the museum of his native town, Châlon-sur-Saône.

ELECTRIC WALDEN

1814

A news item relating to the development of ELECTRIC WALDEN technology: During this year and the next, Nicholas-Louis Robert's new papermaking machine went into production on the Somme River.[20]

ELECTRIC WALDEN

HISTORY OF THE PRESS

November 29, Tuesday: A concert of music by Ludwig van Beethoven was given for the participants in the Congress of Vienna in the Redoutensaal. This performance featured the Symphony no.7, Wellington's Victory and the premiere of his cantata Der glorreiche Augenblick to words of Weissenbach. Attenders include Tsar Alyeksandr I of Russia, King Friedrich Wilhelm II of Prussia, and the Prince of Sicily. Also attending was Jan Vaclav Tomasek and he was particularly displeased with Wellington's Victory.

A news item relating to the development of ELECTRIC WALDEN technology: At 6 AM John Walter II of The Times walked out onto the printing floor at Printing House Square in London, called the poor printer's devils together, the men whom previously he had sworn to secrecy, and informed them that from that moment forward the paper would henceforth be printed by the power of steam. –Which meant of course that the firm would forthwith be able to dispense with their services, and thank you very much.

ELECTRIC WALDEN

THE TIMES

He cautioned them that adequate force was standing by to respond to any violence, or to any attempt on their part to sabotage the new equipment.[21] Their wages, he pledged, would be paid for a, shall we say, reasonable period, until hopefully they had found for themselves other employment. The press began publication at the rate of 1,100 sheets per hour, utilizing for this a flat bed of type and a device centering upon two rotating cylinders.[22]

HISTORY OF THE PRESS

"Among all the manufactures which –for the mental and mechanical skill required in their prosecution, the remarkable steps by which they have attained their present rank, and the influence which they exert on society generally– claim our attention and admiration, none perhaps is more striking than the **manufacture of a book.**"

— George Dodd's DAYS AT THE FACTORIES

HISTORY OF THE BOOK

20. Paper was still being made exclusively from cotton rags, not from wood pulp (it would be the tree's turn later, much later).
21. Try not to let the doorknob hit you in the butt on your way out.
22. Devices in which the type beds would be mounted directly upon a rotating cylinder would come later.

1816

A news item relating to the development of ELECTRIC WALDEN technology: Joseph-Nicephor Niépce began to be able to produce positive photographic images on paper, although he was as yet unable to prevent such images from fading. A lithographer, he was trying to find a way to avoid having to sketch images onto the flat stone for preliminary guidance during inscribing. He was coating pewter plates with a type of varnish called “bitumen of Judaea” which changes its solubility in oil of lavender according to its exposure to light. When the still-soft portions of the coating are washed away with a solvent, what is left is an image made of this hardened bitumen.

ELECTRIC WALDEN

1819

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- In the July issue of the *Analectic*, the lithographic process was introduced in the USA. A stone from München had been presented to the American Philosophical Society, and it was used by Bass Otis to make a "lithograph," meaning inscribed-on-stone, portrait of an otherwise undistinguished but pretty and restful mill home on a pond.
- And meanwhile America's 1st great BIBLE interpreter, who happened also to be a paleontologist, got out his King James Version and a pair of scissors, and went to work rearranging the Gospels for the American mind. He pasted, into a blank notebook, all and only the "diamonds" which he suspected had actually come out of the mouth of Jesus, discarding the slips of paper he characterized as "dunghills" which must have been produced by "very inferior minds." The BIBLE interpreter's name was Thomas Jefferson. You can now see what the ex-President produced in this manner, because it has recently been published by the Beacon Press (it is also included in this database :-). Among the Americans who have attempted this feat, one of the most recent, the poet and translator Stephen Mitchell, considers Thomas Jefferson's attempt to have been particularly "dazzling," although in Mitchell's new version THE GOSPEL ACCORDING TO JESUS he has excised a considerably greater number of the dunghills that were produced by the internal struggles and the external struggles of the early Christian communities than ex-President Jefferson had been historically equipped to detect.

HISTORY OF THE BIBLE

1820

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Charles Xavier Thomas de Colmar (1785-1870) began the 1st calculator to be mass-produced, his "Arithmometer."
- German physicist Johann Salomo Christoph Schweigger presented a paper at the University of Halle describing his electromagnetic experiments. He had found that the strength of a current running through a wire can be measured based on the amount of deflection of a compass needle, in effect creating a galvanometer.
- While attempting to find applications for Friedrich von Schelling's *naturphilosophie* in which everything that happened, happened in a dynamic resolution of mutually opposing tensions, Hans Christian Ørsted (1777-1851) forced so much electric current through a thin wire — that suddenly it began to glow, brightly.
- Between this year and 1860 (by which time the New York Herald would be stamping up to 20,000 impressions per hour), the print productivity of the paper-and-ink printing process would be increasing by two full orders of magnitude. Meanwhile, the expensive single copper prints which had been utilized in the printing industry for the production and reproduction of images (multimedia) were being replaced by the less expensive re-usable lithographic stones. In the next decade, the utilization of images in the print media would be doubling, to the rate of an average of 10 new images per week in Great Britain. The new process would seem limited only by the rate at which the available artists, such as George Cruickshank, could draw, as there did not seem to be any natural limit to the number of political scandals which could be exposed — or to the level of sarcasm which could be displayed by the humorist.

HISTORY OF THE PRESS

Colin H. Bloy has characterized the change in the method of manufacture of ink during this decade as follows: "The adoption of the power grinding machine may be said to be the most significant event in the history of ink-making....." It is intriguing to muse on the idea that the Thoreau family, and especially Henry Thoreau, in the development of a new technique for the fine-grinding of graphite after Charles Jones Dunbar would discover, in 1821 in New Hampshire, a good source of mineral graphite, would be at the forefront of "the most significant event in the history of ink-making," especially since in the presumption of so many folks today, Thoreau had been put down as a mere pencil-maker while being "honored" as an anti-technologist or even a Luddite!

Another hardship of the early ink-maker was ... the amount of physical effort required to grind his pigments by hand. The development of hand- and power-driven grinding machines must have been greeted with open arms. Mechanical hand millers were available at the turn of the nineteenth century, but, so far as can be ascertained, the first really significant step was taken in the 1820s. The stimulus to produce a really good power-driven grinding machine was given by the development of the printing machine. By modern standards, inks ground by hand were very coarse and were found to be unsuitable for use on high-speed equipment. Although no exact date can be put to this innovation, Friedrich Koenig, the inventor of the first successful printing machine, found himself obliged to invent a new grinding machine to provide the inks to work on his machines.[23] The accompanying illustration of the works of Lorilleux in Paris is dated 1824 ... a roller grinding mill driven by steam.... The adoption of the power grinding machine may be said to be the most significant event in the history of ink-making.... When ink-making became industrialized –and an arbitrary date for this would be 1850– and the printer who made his own inks became a rarity, some of the romance of ink-making departed. From being essentially a craft, the secrets of which were jealously guarded and passed on verbally, it became more a science, although not completely.[24]

September 4, Monday: Friend Stephen Wanton Gould wrote in his journal:

23. Goebel, *Unsere Farbe*, page 41

24. Bloy, Colin H. A HISTORY OF PRINTING INK, BALLS AND ROLLERS, 1440-1850. Barnet (Hertfordshire, England): Wynkyn de Worde Society, 1967, pages 51-52, 84

ELECTRIC WALDEN

7th day 9th of 9 M / This Afternoon took the Waggon & with My H, John & Aunt Stanton rode to Portsmouth & took tea with our Aged Cousin Elizabeth Chase. The Afternoon was pleasant & the time was spent pleasantly, but my mind was occupied much in retrospection, on my past visits at the House when the family were all alive & together, but now how changed? Soon we shall all be changed, soon all consigned to the Silent grave & may we so live while here, as to be received into happiness in the World to come. —

RELIGIOUS SOCIETY OF FRIENDS

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: François Arago presented the findings of the Danish physicist Hans Christian Ørsted to the French Academy in Paris.

"If you wish to make an apple pie from scratch, you must first invent the universe."
— Carl Sagan

September 16, Saturday: Carl Loewe visited Johann Wolfgang von Goethe in Jena.

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: German physicist Johann Salomo Christoph Schweigger presented a paper at the University of Halle describing his electromagnetic experiments. He had found that the strength of a current running through a wire can be measured based on the amount of deflection of a compass needle, in effect creating a galvanometer.

September 18, Monday: A news item relating to the development of ELECTRIC WALDEN technology: André-Marie Ampère presented a paper to the French Academy outlining his findings based on those of the Danish physicist Hans Christian Ørsted. Wires carrying electric current showed magnetic properties. Over the next few months Ampère would lay the foundation for the science of electrodynamics.

ELECTRIC WALDEN

THE SCIENCE OF 1820

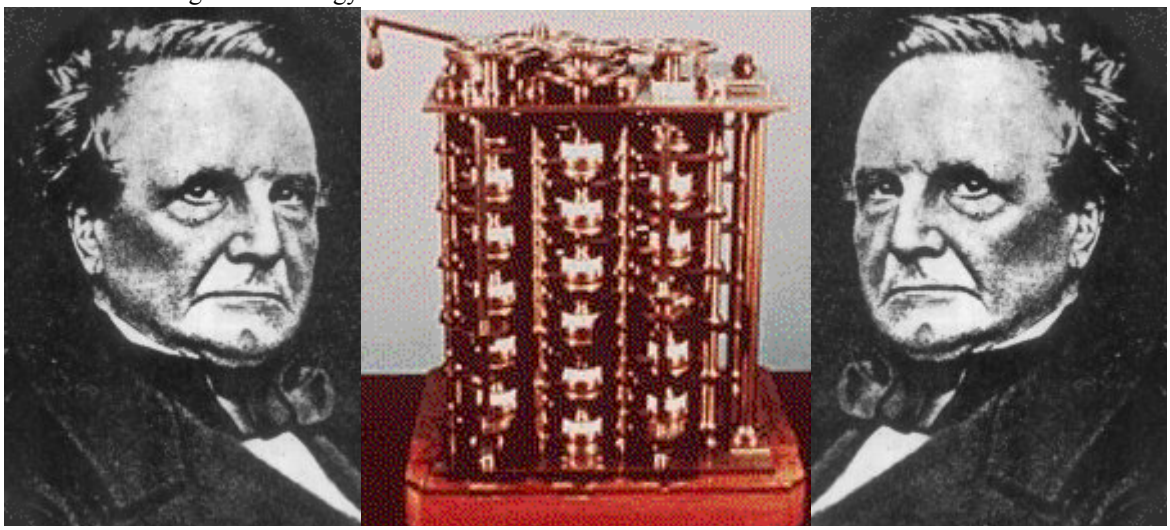
1822

The Nicholsons (father and son) manufactured a thinner flute and adjusted its keys.

News items relating to the development of ELECTRIC WALDEN technology:[25]

ELECTRIC WALDEN

- In printing press technology, William Church invented the mechanical typesetter and thus made possible the development of high-speed typecasting.
- Two early events in the development of photography: Louis-Jacques-Mandé Daguerre, a scenic painter, became a co-proprietor of the Diorama in Paris, where immense paintings were created and displayed in illustration of famous places and historic scenes. Joseph-Nicephor Niépce produced the 1st photogravure etching, using a non-lens contact-printing "heliographic process."
- Charles Babbage of London began a (government-funded) project to build a 6-digit calculator using mechanical gear technology.



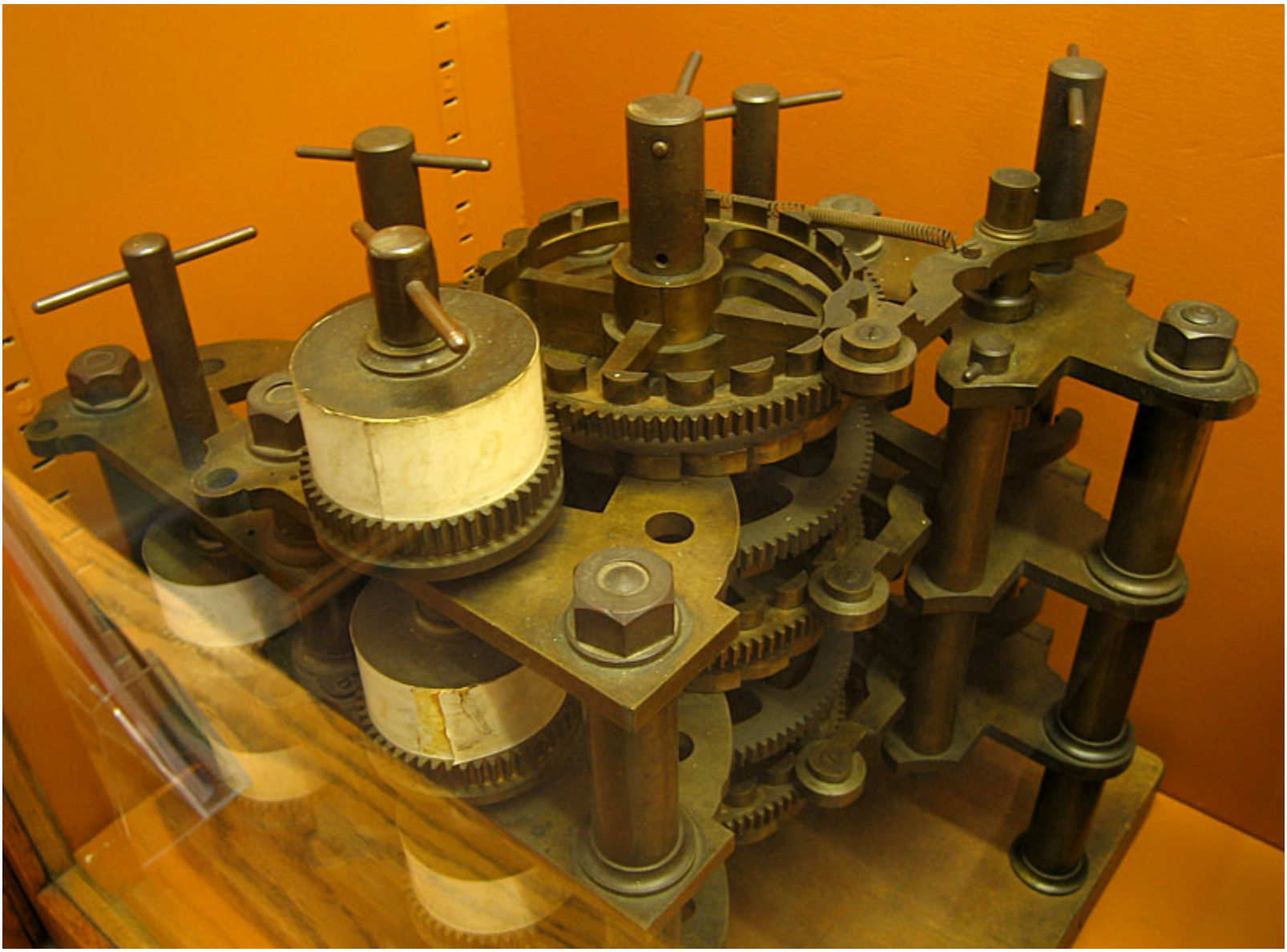
This "difference engine" was intended to compute the values of polynomial functions avoiding the need for laborious manual multiplication and division, by using the method of finite differences. Some parts he managed to complete still survive in the Museum of the History of Science in Oxford and at the Science Museum in London. This first effort was to have been composed of

25.Gernsheim, H. and A. L.J.M. DAGUERRE: THE HISTORY OF THE DIORAMA AND THE DAGUERREOTYPE. London, 1956.

around 25,000 parts weighing in at 15 tons, and would have been 8 feet high, but the design was rethought and Babbage would stop work on this version to begin a 2d version.

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

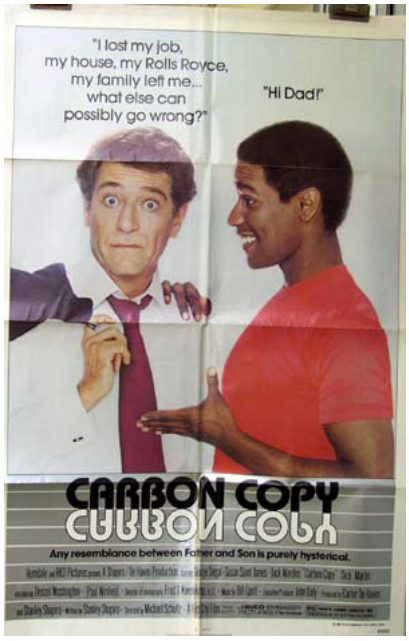


(This was constructed after the fact out of some odds and ends of parts, lying around in Babbage's laboratory, to represent one small component of the enormous geared calculator mechanism that had never been completed.)

1823

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: According to an unprovenanced tale which has appeared several times on TV, one Cyrus Dakin of Concord (there is no local record of such a person) devised a technique for automatically copying anything which was being inscribed in pencil, which he promptly began to term "carbon paper." He allegedly coated the bottom side of sheets of writing paper with paraffin wax and carbon black, or with naphtha and ink, in such manner that the pressure on the paper produced by one's pencil point would create a copy of whatever one was writing on the piece of paper beneath.[26] Dakin allegedly would sell the rights to his invention to the Associated Press.



If you are able to credit such a story you will certainly enjoy the above movie!

26. Previous to this, the best that anyone had been able to achieve by way of automatic copying had been a 1780 scheme by James Watt for writing with a special ink containing gum arabic. By pressing his freshly written sheet of paper firmly against a sheet of wet paper the inventor of components for the steam engine had been able to create a copy of his writing, but you needed to look at it with a mirror, plus, Watt hadn't been able to figure out how to get this reverse copy to remain legible for longer than about 24 hours. (Watt also invented a device for the creation of copies of sculpture, which was somewhat more successful.)

1824

ELECTRIC WALDEN

In a news item relating to the development of ELECTRIC WALDEN technology, Charles Babbage met with the Chancellor of the British Exchequer, Fred Robinson and –because he had previously sold his soul to the devil in return for the backing of Arthur Wellesley, the 1st Duke of Wellington – was able to secure pledges of government support for his computerization project, pledges which over a period of time he would be able to take to the bank to the tune of over £7,500 in development funding.[27] This was at the time far greater than the greatest commitment the British government had ever made to the realization of any single invention. The prototype of the Difference Engine, vast and beautiful, now sits in the Kensington Science Museum, a tribute to British handicraft. Although it did not use electricity, which everyone nowadays assumes to be essential to computerization, but instead used cranks and gears and pulleys and shafts, it did work, and not after a fashion, but fully. Had it gone into production, the arguable benefits and traumas of computerization would have come to us a century earlier. Babbage's prototype Analytical Engine never existed except on paper and in demonstration parts, but modern analysis shows that this design, also, would have worked had it been funded and completed. The problem was not in the concept, but was in the lack of the infrastructure which would have been required properly to implement the concept.

27.The Duke of Wellington, who had taken his smart pill, could see how important computers were going to be for the future of warfare: calculating the probable point of arrival of a naval artillery shell on a mapped shoreline, for instance, on the basis of a calculated gunship position obtained by sextant, so as to be able to achieve the surprise of first-round effectiveness. Real progress. The sort of thing Duke Reagan was so easily persuaded of, if you remember, by weapons system experts telling him that we could use our "smart bombs" and "delivery systems" to surprise Khaddafi in Tripoli without running the risk of surprising any of that man's children.

1827

News items relating to the development of ELECTRIC WALDEN technology:

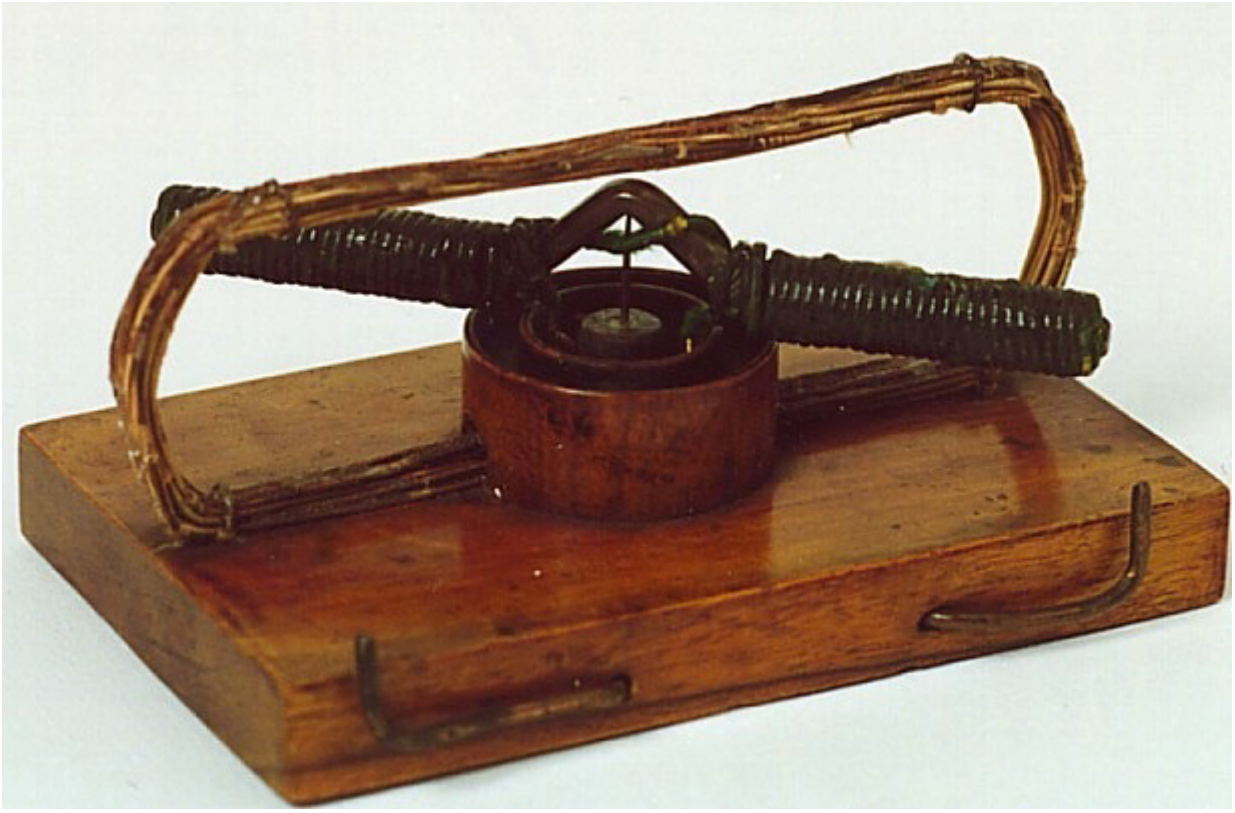
ELECTRIC WALDEN

- Nicholas-Louis Robert's papermaking machinery was by this point transforming cotton rags not into single flat sheets of paper but into giant continuous rolls of paper suitable as one of the raw materials for a printing press-based information industry.
- In Boston, the 1st lithography shop in the United States opened its doors.

1828

In a news item relating to the development of ELECTRIC WALDEN technology, Jedlik Ányos István or Stephanus Anianus Jedlik devised the world's first electric motor:

ELECTRIC WALDEN



This device is preserved at the Museum of Applied Arts in Budapest (ask them to hook it up and demonstrate it to you).

1832

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Charles Babbage produced a prototype segment of his difference engine, which operates on 6-digit numbers and 2nd-order differences (i.e. can tabulate quadratic polynomials). The complete engine was to have operated on 20-digit numbers and 6th-order difference, but no more than this prototype piece was ever assembled.
- The 1st papermaking machine in Sweden, which would remain in operation until 1982 (a fourdrinier machine).
- It was at approximately this point that the phenakistoscope was beginning to be sold. This device consisted of a circular piece of printed cardboard mounted upon a stick. There were slots in the cardboard, and images, such as stills of a galloping horse, were printed around its rim. One held this disk before a mirror and squinted through the slots into the mirror as one spun the disk with one's free hand. The horse appeared to gallop — and of course our modern "movies" were just around the corner, awaiting only the invention of photography.

October 1, Monday: Texian political delegates convened at San Felipe de Austin (this is closer to present-day Houston than it is to Austin, Texas) to petition the government of Mexico for changes in governance for this northern district.

ELECTRIC WALDEN

Samuel F.B. Morse boarded the packet-ship *Sully* in the harbor of Havre, France to return to the United States of America. During this ocean voyage, engaged in a conversation about electromagnetism, he would find himself casually remarking "If the presence of electricity can be made visible in any part of the circuit, I see no reason why intelligence may not be transmitted by electricity." He was having the idea that if a spark could be made to travel along an electrified wire by suddenly interrupting the circuit at one end, that spark might be assigned a meaning, perhaps a part of speech, perhaps a number or a letter of the alphabet, and when that spark would exhibit itself at the far end of the wire, why, it could be taken to **mean** that part of speech, number, or letter! This would constitute a "telegraph," transmitting meaning, conveying a message, but unlike an ordinary telegraph made up of raised and lowered flags or raised and lowered balls seen at a distance, this would be — an "**electric** telegraph!" In a few days, during this voyage, he would make rough sketches of the necessary physical apparatus for producing and receiving a series of such spark-messages, amounting to an elaborate communication such as "Our vessel is in peril, please come rescue us" or "The enemy is sneaking up on you."

George Augustus Thatcher got married with Rebecca Jane Billings (the daughter of Thoreau's deceased aunt Nancy Thoreau Billings). The new style for women's hair was a low, Grecian arrangement, with coronets of pearls, cameos, or flowers worn low on the brow. High gallery shell combs were out of style in favor of lower combs, in gold, with rows of cameos, and women were weaving gold beads or pearls into their braided hair. Another style which began in this year, and which would last longer, would be to wear the hair in a Grecian knot high in the back, with the front hair parted and arranged in soft curls on the temples.

This couple would produce seven children: 1st George Putnam Thatcher born July 14, 1833, who would move to California, 2d Frederick Augustus Thatcher born on September 24, 1835, who would die during his toddlerhood on January 10, 1838, 3d Charles Alfred Thatcher born on May 16, 1837, who would enlist in the Union army during the US Civil war and die at Red River, Louisiana on November 26, 1864 while in command of the steamer USS *Gazelle*, 4th Benjamin Busey Thatcher[28] born on April 21, 1839 in Brewer across the

Penobscot River from Bangor, Maine, who would become an entrepreneur (lumber, wood pulp, then railroad and bank director) in Bangor and would serve as a state Representative and state Senator (Republican), 5th Caleb Billings Thatcher born on November 5, 1840, a resident of Bangor, Maine, 6th Sarah Frances Thatcher born on June 7, 1842, and 7th Henry Knox Thatcher born on August 3, 1854 in Bangor, Maine. Rebecca Jane Billings Thatcher would die on October 27, 1883. Henry David Thoreau would refer to this group of relatives as the "Penobscot tribe" of his family.

That 4th son, Benjamin B. Thatcher the railroad and bank executive and state legislator, would father a son George Thoreau Thatcher and daughter Charlotte May Thatcher. With the relocation of the remains of the Thoreau family of Concord to the new "Author's Ridge" of Sleepy Hollow Cemetery during roughly the 1880s, it was Benjamin B. Thatcher who provided Maine granite for their new simple grave markers. He would die on June 3, 1906.

That 7th son Henry Knox Thatcher became a physician in Maine, was a member of the Republican Party, and attended the Congregational Church. Dr. Thatcher got married with Annie Ross of Bangor, Maine and the couple produced one child, born in 1884 on the anniversary of the birth of Henry David Thoreau, whom they named Henry David Thoreau Thatcher. This eponomously-named son was educated in the schools of Dexter, Maine and in 1905 was graduated from the University of Maine at Orono, Maine. As a civil engineer Henry David Thoreau Thatcher helped design the sewerage of Old Town, Maine.

28. Disambiguation: Benjamin Busey Thatcher (1839-1906) of Bangor was not, but was probably related to, Boston historian and attorney Benjamin Bussey Thatcher (1809-1840), Bowdoin Class of 1826, a representative of the Boston Lyceum who scheduled lectures at Odeon Hall.

1833

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Work on Charles Babbage's Calculational Engine was halted by disagreements with the contractor Joseph Clement and slowness in paying bills.
- The 1st typewriting machine to utilize individual typebars which converged at a common printing point was conceived and built by Xavier Progin, a Frenchman. The device incorporated a primitive form of proportional spacing, since different widths were assigned to capitals versus lower-case letters. Since the operator could look down through the keys and see the typed copy, this was also the 1st device to enable "visible writing," but at that time and later there was real controversy with some holding that visibility would be a great advantage over nonvisibility, but others holding that nonvisibility would be a great advantage over visibility.

"If you wish to make an apple pie from scratch, you must first invent the universe."
— *Carl Sagan*

1834

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Thomas Davenport, the Vermont blacksmith who had invented a commutator-type American motor powered by batteries, installed this in a small vehicle on a section of track, creating one of the 1st electric conveyances (he and his wife would in 1837 obtain US Patent #132, but would go bankrupt because of the high cost of the zinc electrodes required by their batteries).
- In England, Charles Babbage designed an analytical engine which we now know would have been an effective tool had it been completed, and Ada Lovelace pioneered the first software development for use by this hardware, but they were unable to see their project through its funding and development states. By refusing funding, the government effectively delayed the development of computers for something like 13 years, until 1855 when G. Schentz of Stockholm constructed a working model of Babbage's calculating engine, exhibited it at the Paris Exhibition, and marketed it as a calculator.
- Pehr George Scheutz of Stockholm, after reading a brief description of Babbage's project, produced a small difference engine in wood.

1835

A news item relating to the development of ELECTRIC WALDEN technology: Creation of a book, FOREIGN CONSPIRACY AGAINST THE LIBERTIES OF THE UNITED STATES (New-York: Leavitt, Lord & Company), out of a series of articles which had been published in a weekly periodical, New-York Observer. The book is a Know-Nothing treatise against the political influence of Catholicism in which the author announced the discovery of an internationalist Catholic conspiracy: "its plans are already in operation … we are attacked in a vulnerable quarter which cannot be defended by our ships, or forts, or our armies." The

ELECTRIC WALDEN

ANTI-CATHOLICISM

publisher of the weekly periodical was the author's brother. The author was the son of the Congregationalist

SURVEY OF AMERICAN ANTI-CATHOLICISM

minister of Boston, the Reverend Jedediah Morse, the divine who had in May 1798 warned of an internationalistic atheistic conspiracy he termed "the Illuminati." This demagogue's name was Samuel F.B. Morse, and you will remember him not only as the person who laid claims to unique insight which led to his detection of an internationalist Catholic conspiracy but also as the person who laid claims to the unique insights which led to the "invention" of the electric telegraph. (In the case of the electric telegraph, it is now clear that funding and organization and social anthropology were more important ingredients of such a success than any of his technological tinkering — for a whole lot of people had been developing these technological capabilities without possessing his good connections and without attaining the funding and legitimation that would get them anywhere.) The source of the present danger, Morse *fils* announced, was Jesuits operating out of a base within the Austrian government.[29] And it was in this very year that Morse constructed the first working model of the telegraph upon the frame of an old picture from his painting studio:

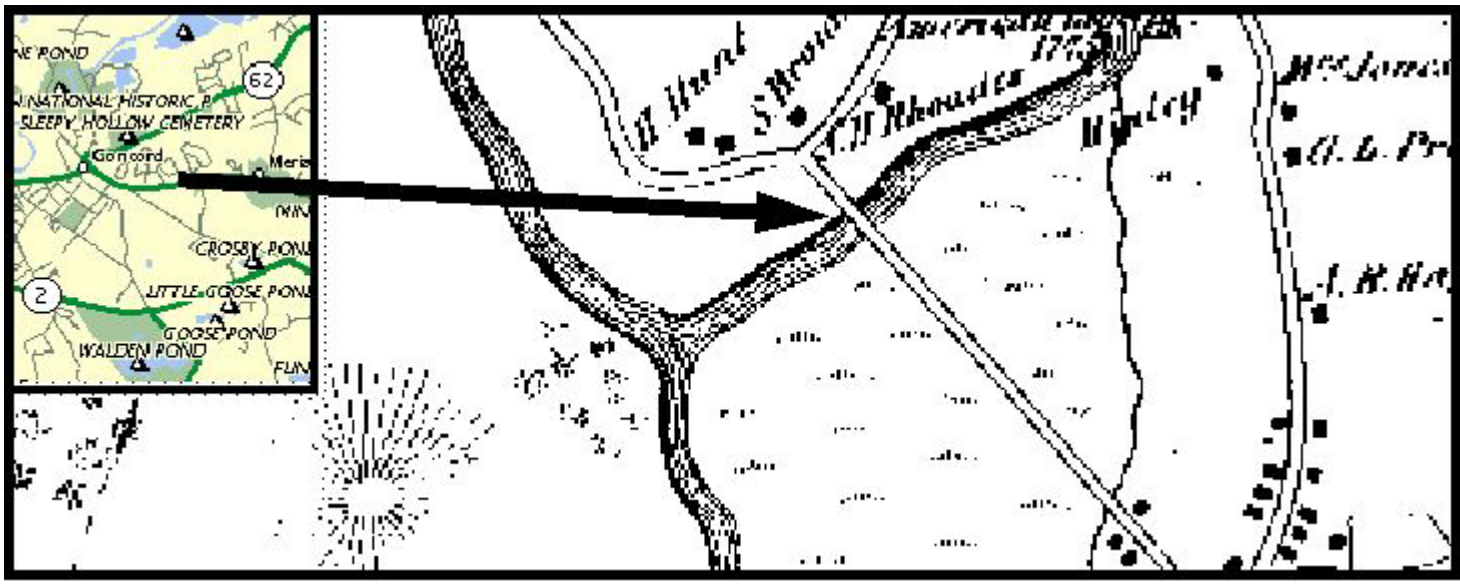
29. During this year also there appeared a book, PLEA FOR THE WEST (Cincinnati: Truman & Smith; New-York: Leavitt, Lord & Company), alleging that the USA was presently the site for an immense life-or-death struggle, of Protestants *vs*. Catholics. "Whatever we [Protestants] do, it must be done quickly…." One of the things we could do quickly would be to call a halt to the immigrant stream of people who were "inexperienced" in our way of life, unaccustomed to the pursuit of life, liberty, and happiness as it is enacted in these great and United States of America. The author of this paranoid masterpiece was the Reverend Lyman Beecher, the father of, among others, Harriet Beecher Stowe. (She didn't get her divisiveness –her ability to create an enemy who must be utterly destroyed whereupon we will all be purified– from out of the blue sky, you know.)
The most recent such piece of shit I have discovered is by the clown who wrote the book upon which the Bertolucci movie "The Last Emperor" was based. Take a look at the Japan-bashing in that book! He claims that before the 2d World War, the Sun Emperor was positioning a group of a dozen or so diplomatic conspirators in Switzerland to run the world. –Which is not to say that the Greater East Asia Co-Prosperity Sphere wouldn't have wanted to take over the world and run it for the benefit of all, it is merely to say that what keeps any one group of us who believe they could fruitfully take over the world and run it from taking over the world and running it is the existence of a whole bunch of other groups of us who believe they could fruitfully take over the world and run it, and is merely to say, also, that we're damned lucky that that's so.

The Johannes Gutenberg age of print, then, perhaps stretches from roughly 1448 and the printing of the "Forty-Two Line Bible" to approximately 1835.

— Docherty, Thomas. On Modern Authority: The Theory and Condition of Writing into the Present Day. NY: St. Martin's P, 1987, page 284

HISTORY OF THE PRESS

There is an argument that Morse got a lot of his plans for the electric telegraph in America from Harrison Gray Dyar of Concord. Dyar was an inventor, and had batteries, and he had the idea of sending electric impulses along a wire and he had the idea of spacing the sparks in such a way as to form an alphabetic code. Using glass apothecary phials as insulators, he strung a wire from tree to tree alongside the Red Bridge road (Hunt's Bridge on the Lowell Road over the Concord River at Gleason E6) "all the way to Curtis's."[30]



He recorded the sparks on a ribbon of moistened litmus paper on a spool that revolved by clockwork. The nitric acid that was formed on the litmus paper by the action of the electricity left little red marks on the blue litmus paper. His experiment worked well enough that he got some cash backing and proposed to string a wire from New-York to Philadelphia. However, the New Jersey legislature called him “dangerous,” and refused permission for this larger experiment, and then one of his backers threatened to take him to court to get his money back. We know that Samuel F.B. Morse married the sister of Charles Walker, and we know that Charles Walker worked with Dyar on this scheme and retained many of Dyar’s sketches, so we may presume that Walker or his sister showed the sketches to Morse. We have also established that Morse knew a number of other people, besides Charles Walker, who had worked with Dyar. Is this not much too much of a coincidence?

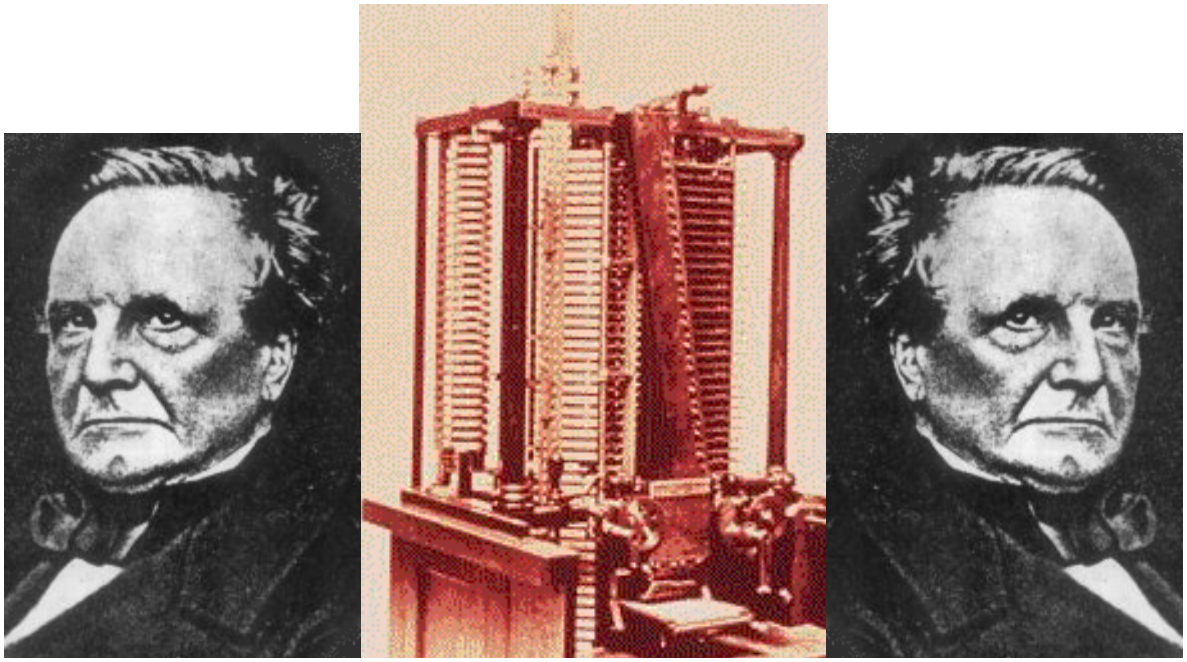
HISTORY OF TELEGRAPHY

30. And ain’t that just great, the brothers George William Curtis and James Burrill Curtis who helped Henry Thoreau raise the frame of his shanty on Walden Pond are not shown on the Concord map. Did they live in some adjoining town?

1836

A news item relating to the development of ELECTRIC WALDEN technology: Charles Babbage produces the 1st design for his "Analytical Engine." Whether this machine, if built, would have been a computer or not depends on how you define "computer." It lacked the "stored-program" concept necessary for implementing a compiler; the program was in read-only memory, specifically in the form of punch cards. In this article such a machine will be called a "program-controlled calculator." The final design had three punch card readers for programs and data. The memory had 50 40-digit words of memory and 2 accumulators. Its programmability included the conditional-jump concept. It also included a form of microcoding: the meaning of instructions depended on the positioning of metal studs in a slotted barrel. It would have done an addition in 3 seconds and a multiplication or division in 2-4 minutes.

ELECTRIC WALDEN



It would not have lighted your cigar or joined your political party.

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

1837

A news item relating to the development of ELECTRIC WALDEN technology: William Fothergill Cooke and Charles Wheatstone patented an electric single-needle telegraph device, which was proving capable of an average of 25 characters per minute, or four baud. (The first system remarkably faster than this would be the Wheatstone Automatic Telegraph, which would use punched paper-tape readers and achieve throughputs of up to 2,000 characters per second (20K), but that would not be coming along until 1858.)

ELECTRIC WALDEN

Or, according to another old book, Samuel F.B. Morse filed telegraph experiments at our Patent Office, which he demonstrated at the City College of New-York. At any rate, it is Morse's instrument rather than Cooke's and Wheatstone's which is on display at the United States National Museum of History and Technology in Washington DC — go figure.

By 1850 the telegraph device would be being found useful for the transmission of time signals, and as such it would be used by Bayfield to determine the longitude of Canadian cities.[31]

CARTOGRAPHY

During this year an electric telegraph line was constructed between the railway stations of Euston and Camden Town.
"Morse" code, the representation of letters by patterns of long and short pulses, actually was invented not by Morse but by his assistant Alfred Lewis Vail (1807-1859).

"History is the how of now."

– Austin Meredith

31. During this year and the following two years, however, what would be happening in northern cartography would be rather more conventional: Peter Dease and Thomas Simpson would be exploring and mapping the arctic mainland coast from the Coppermine River to Chantry Inlet. 1,838 Boards of Boundary Line Commissioners were set up in Upper Canada to settle disputes resulting from deficiencies in the survey fabric. The Boards would be found to be ineffective and the Act would be repealed in 1841 and would expire in 1842.

1838

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Samuel F.B. Morse introduced the "Morse code."
- Invention of the stereoscope by Charles Wheatstone.[32]
- An electrotyping process was developed that took longer than stereotyping but produced finer quality images, both of illustrations and of text. The process involved making an impression in wax of the original engraving or block of print. This waxen impression would then be brushed thoroughly and evenly with a very minute dusting of plumbago, because graphite is electrically conductive. This graphite-coated mold would be washed with a solution of sulfate of copper over which iron filings would be dusted, and then it would be immersed in an electrolytic solution of acidulated sulfate of copper and a copper coating would be electroplated onto the surface of the coated wax. Copper plates are suspended in this bath, facing but not touching the surfaces that are being coated. Electric current is generated in a separate trough filled with a solution of sulfuric acid, isolated from the trough which holds the materials being plated. The rods which suspend the molds in the acidulated sulfate of copper solution are connected by wires with the zinc plate in the battery trough of sulfuric acid, while the copper plates are connected with the platinum plate in that battery trough, and the circuit is completed. After copper was deposited to a sufficient thickness, the original wax could be melted and removed, and the copper surface then mounted onto the printing plates for backing. This process did not use any significant quantities of graphite, and the copper for the plates was recycled and recycled. The inside of the shells needs to be have a coating of chloride of zinc applied with a brush. Over this one lays a sheet of alloyed foil, and then one can back up the shell mechanically with inferior type metal to give it solidity and the requisite thickness. This backing is created either by pouring in the molten metal, or by dipping the shell in molten metal. Then one places the sheet on a perfectly level iron plate resting on an iron frame, and scrapes away any superfluous type metal.
- Louis-Jacques-Mandé Daguerre obtained images on the surface of silver-plated sheets of copper which had been treated with iodine vapor to form a thin coating of light-sensitive silver iodide, and then fixed these images by subjecting them first to hot mercury vapor that attached to the portions of the surface which had been contacted by light, and subsequently to a salt solution which removed residual areas of silver iodide not contacted by light. The result of an exposure of 15 to 20 minutes of a plate mounted inside a *camera obscura*, with the stationary subject outside the pinhole illuminated by the brightest sunlight, was a milky white image of amalgam of mercury upon a duller background of silver. The plates, which were $6^1/_2$ inches by $8^1/_2$ inches, were each a unique positive not allowing for duplication, and to us now who have become accustomed to photographs produced by a "negative" process, these images seem left / right reversed — as if we were viewing another person standing beside us at a mirror.[33]

> At first we did not dare look long at the images he produced. We were frightened by the clarity of the men, imagining that these small, indeed tiny, faces fixed on a plate could in turn look back at us!
>
> —Charles Dauthendey

32. In 1849 this stereoscope would be linked by William Brewster with photography.

As of 1725 Johann Schulze had already been able to note that silver nitrate darkened when exposed to light. At that point in our technological development we had been poised to discover photography, something which had in fact been delayed for another one hundred and thirteen years. What a lag cycle! Why? —The answer to this pertinent question is perhaps to be found in Geoffrey Batchen's study BURNING WITH DESIRE: THE CONCEPTION OF PHOTOGRAPHY (Cambridge MA: The MIT Press, 1997).

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

33. One wonders how harmful the process of treating these plates with mercury vapor may have been to the daguerreotypist.

1839

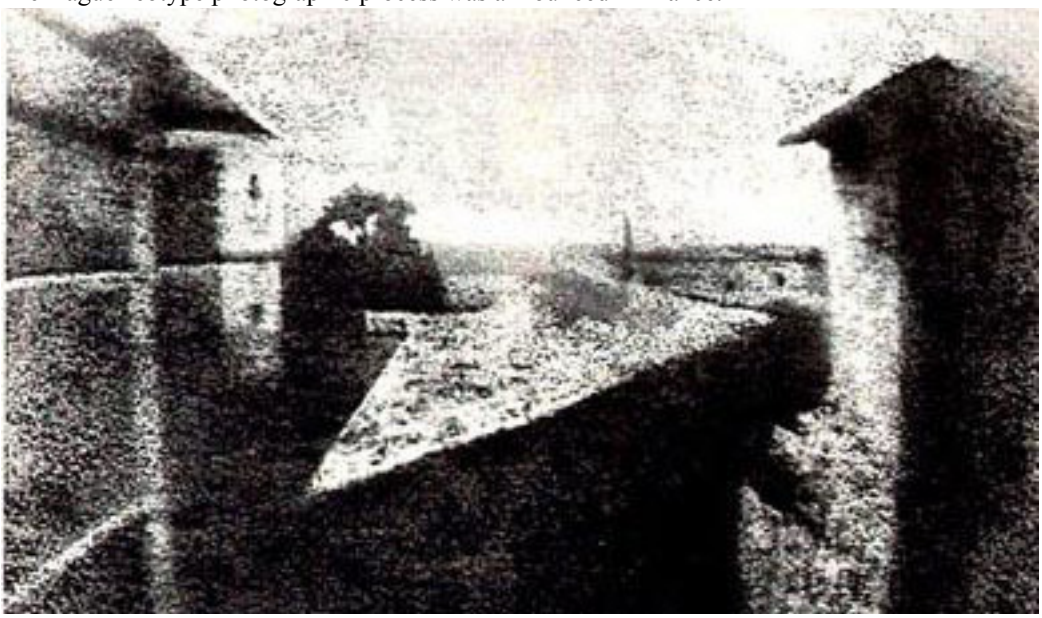
News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

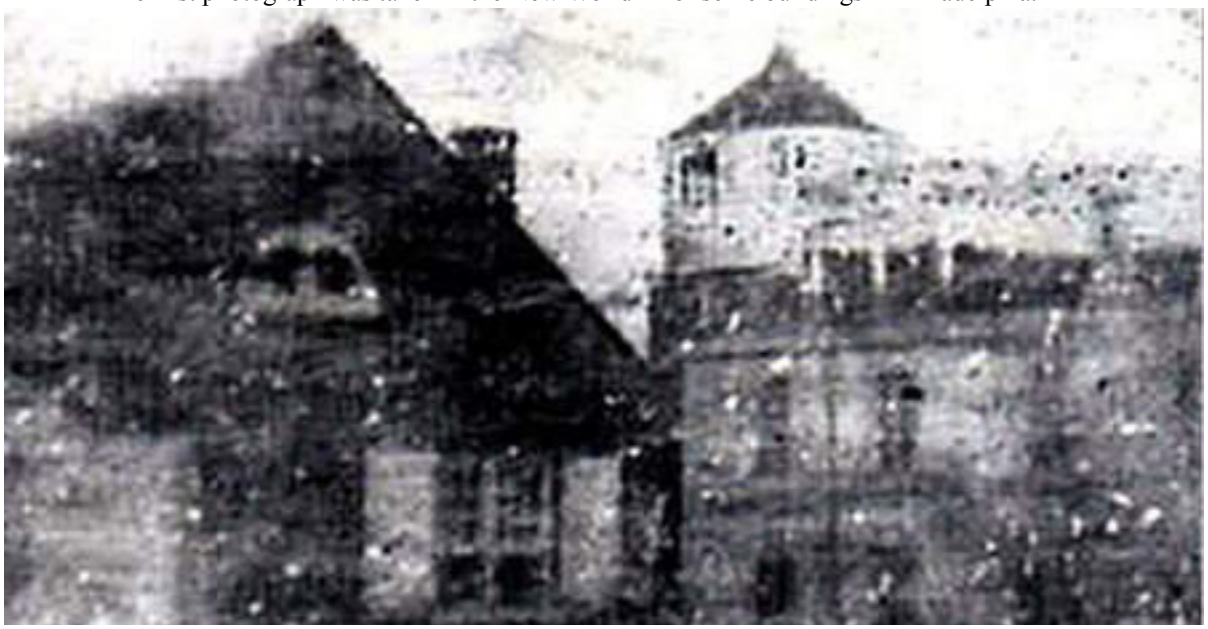
- In London, the first commercial electric telegraph line was installed.
- The first electric clock was built, by Carl August Steinheil (1801-1870).
- A mechanism termed a “typographer” was developed, by which type on a semicircular frame could be turned to bring a desired letter to the printing point, and then, by means of a lever, be pressed against paper.

Several early events in the development of photography:

- The Daguerreotype photographic process was announced in France.



- Sir John Herschel coined the term “photograph” on analogy with the existing term “telegraph.” Telegraphy, photography.
- The first photograph was taken in the New World — of some buildings in Philadelphia.



- A negative/positive “photogenic” process was announced, by William Henry Fox Talbot. Only five minutes of exposure were necessary:
- The very first “selfie” was taken, by Robert Cornelius (he removed the lens cap and stood still in front of the Daguerreotype box for a minute or more, before reaching out and replacing the lens cap).

1841

A news item relating to the development of ELECTRIC WALDEN technology: A book was published that was illustrated with engravings made from Daguerreotypes.

ELECTRIC WALDEN

Several early events in the development of photography:

- The first American patent for a photographic apparatus was issued, for the camera of Wolcott and Johnson.
- Since Daguerreotype plates needed lots of light and long exposure times, and this meant that sitting for a Daguerreotype portrait was quite hot and unpleasant, and since these plates responded best to blue light, sitters were being shielded from the light source by a blue vitriol screen.

1842

A news item relating to the development of ELECTRIC WALDEN technology: Since Charles Babbage was spending almost all of his time on his Analytical Engine project, his Difference Engine project was officially cancelled.

ELECTRIC WALDEN

Lady Ada Byron, Countess of Lovelace and daughter of Lord Byron, was documenting Babbage's work and writing programs for his engine.

Several early events in the development of photography:

- The 1st newspaper photograph.
- The 1st picture magazine, Herbert Ingram's Illustrated London News.

1843

A news item relating to the development of ELECTRIC WALDEN technology: Scheutz and his son Edvard Scheutz produced a 3d-order difference engine with printer, and the Swedish government agreed to fund their next development.

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: Commissioner of Patents Henry L. Ellsworth, a government bureaucrat not all that different from others of his breed, testified before a committee of Congress, and in the process of seeking to consolidate and expand his empire included in this testimony one gratuitous and unfortunate rhetorical flourish. He ventured to suggest that the rate of innovation among us had become so rapid that it "taxes our credulity and seems to presage the arrival of that period when human improvement must end." Over the years this flourish has been taken literally, by the more gullible or more malicious among us, to the point at which it has become one of our persistent pieces of fakelore. Most recently this tale has resurfaced in ghost-writing attributed to the richest man in the known universe, in a bestselling 1995 book about the Internet titled THE ROAD AHEAD. Bill Gates, CEO of MicroSoft Corporation, speaks with disdain and as if he had some idea what he was talking about, on his page xiii, of all the pretentious previous prognosticators who have been made by Microsoft to "look silly," and offers as case in point "the commissioner of US patents who in 1899 [*sic*] asked that his office be abolished because 'everything that can be invented has been invented'."

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: Since the "enlarger" is really merely a development of the basic "camera" concept, it was inevitable that enlarging be developed soon after the beginnings of photography. In this year the first such enlarger was patented, by Alexander Woolcott. It enabled the reproduction of a Daguerreotype in a larger format. (By the 1850s this mechanism would be fairly common. In the mid-1850s microphotographs would become popular — these were a bit like miniature portraits, in that they were reductions of photos to a very small size to be put in a locket, or on a ring, or even on a tiepin. By the 1860s it would have become routine to expose a series of *cartes de visite* in order then to enlarge only selected ones.)

ELECTRIC WALDEN

At the age of 18 Harriet Jane Hanson had her Daguerreotype exposed.

(This is as close to a smile as I remember having seen in an image of this period, a period during which one simply did not ever smile for the camera. One had difficulty holding one's head absolutely still for the length of exposure time that was required despite the iron headrest that restrained one's skull from behind, so a hand held to the jaw as above was an extra stabilizer. Maintaining a pleasant expression, and holding that expression constant, required a great deal of concentration, because if the sitter's eyes twitched or blinked or expression wavered, the exposure would wind up looking exactly like an image of a corpse. Miss Hanson, above, has done an excellent job of it — and it is very clear that she was aware that she was hot young camera fodder.)

A news item relating to the development of ELECTRIC WALDEN technology: Charles Thurber of Massachusetts patented a "mechanical chirographer" (typewriter) that was written up in Scientific American despite the fact that it was so unwieldy that it was actually inferior to what one might accomplish by hand.

ELECTRIC WALDEN

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: A mechanism consisting of two pens on two pendulums above an electrically conductive surface, with the two pens and pendulums connected to each other only by an electricity-carrying wire, was able to duplicate writing at a distance. This amounted to the 1st prototype FAX machine and was patented by the clockmaker Alexander Bain (1818-1903) who had previously developed an electric telegraph device and a synchronized electric clock. The inventor's electric telegraph had solved the transportation-of-message part of the new problem which he had set for himself, of writing at a distance, and his synchronized electric clock had helped with the synchronization part of the new problem. He prepared his message medium by the raising of metal blocks on a surface. As a metal stylus moved over the surface upon which the message had been prepared, the blocks that had been raised in lifting the stylus interrupted the flow of electricity. Unfortunately, this was merely a demonstration-of-possibility device as the preparation of such a surface was labor-intensive, and required considerable skill.

Which is more impressive — the speed of the fax's diffusion in the last five years, or the lapse of a century between its first commercial use in 1865 and widespread use?

"If you wish to make an apple pie from scratch, you must first invent the universe."
— *Carl Sagan*

J.I. Case introduced grain farmers to the 1st threshing machine.

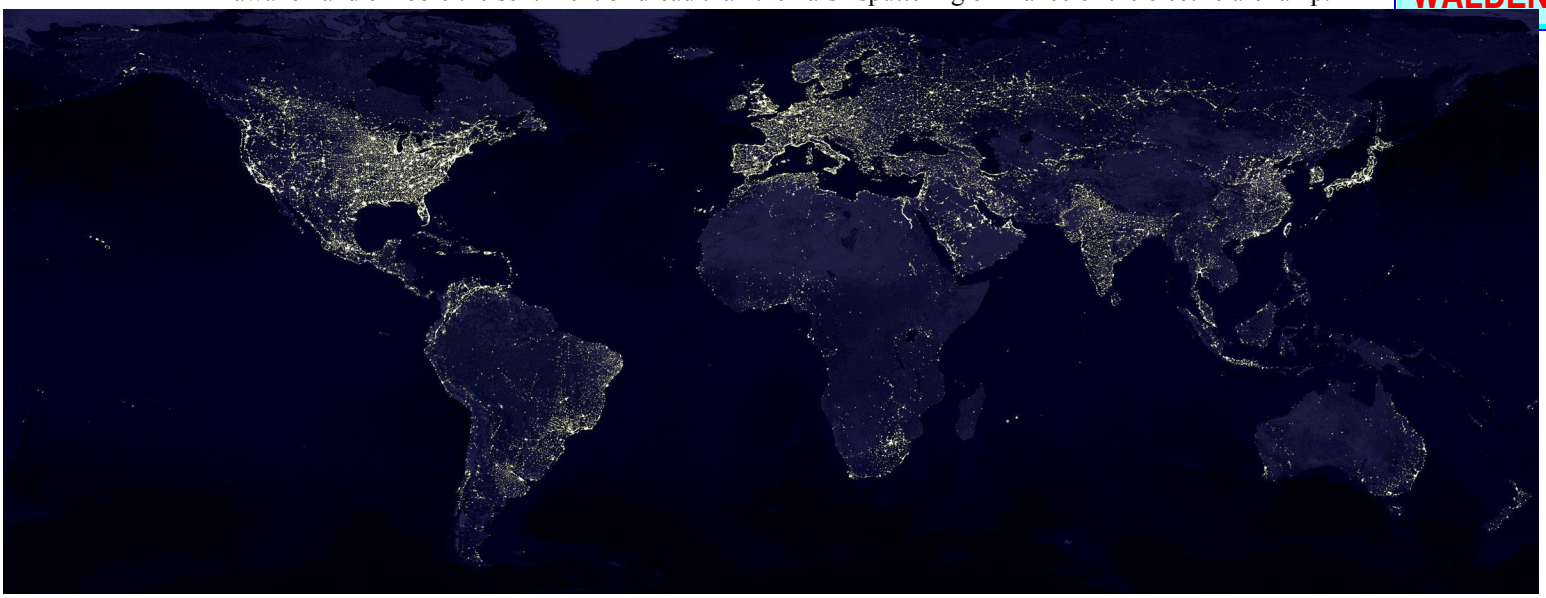
During this year as in the previous year and the following year Joseph Smith, Jr., John Taylor, and other members of the Mormon Church would be printing denials of polygamy in their newspaper even while they were practicing it.

Toward preventing working class uprisings, English academics began to advocate public education. The idea was to literally beat a proper respect for law and order into working class youth, who, without it, would amuse themselves by destroying property and having sex as early as fourteen years of age, as well as by swearing, drinking, fighting, smoking, and singing hybrid Negro songs (blackface minstrel shows having been popular in Britain since the mid-1830s).

1844

A news item relating to the development of ELECTRIC◻WALDEN technology: Jean Foucault (1819-1868) succeeded in lighting the Place de la Concorde in Paris with an electric arc lamp, but refrained from venturing the opinion that "No source of light probably tends more to awaken and ennoble the sentiment of dread than the harsh sputtering brilliance of the electric arc lamp."

ELECTRIC WALDEN



News items relating to the development of ELECTRIC◻WALDEN technology:

ELECTRIC WALDEN

HISTORY OF THE BIBLE

- The US Supreme Court ruled, in the case of Vidal vs. Girard: "Why may not the BIBLE and especially the NEW TESTAMENT be read and taught as a divine revelation in the schools? Where can the purest principles of morality be learned so clearly or so perfectly as from the NEW TESTAMENT?"[34]
- A spectacular discovery was made in the library room of St. Catherine's monastery on the Sinai Peninsula. Constantin Tischendorf was going through the old tomes, when he came across a codex which must have seemed remarkably antique. What he held in his hands would turn out to be more or less what one might be tempted to refer to as the earliest known extant copy of the Bible, that is to say, it was what we now denominate the *CODEX SINAITICUS* dating to the 4th Century of this common era. Lucky he got his hands on this, for at that time the monks of this monastery under Mt. Sinai were in the habit of burning old sheets of manuscript to keep warm during the night.[35] Not only was this *CODEX SINAITICUS* for Henry Thoreau's adult lifetime the earliest known bible *ms*, it was also I believe for awhile the earliest preserved thing in this codex format. A codex is, now get this, prototype hypertext. Which is to say, when you consider that these pages were created during

34. Clearly, from the point of view of the nine black-robed justices of the Supreme Court of the United States of America, there was nothing in the Bible that might suggest to the worshipful reader that children of color and white children ought to be offered precisely the same life opportunities.

35. Another 4th-Century version of the Greek *BIBLE* was sitting unperused on the shelves of the Vatican Library, but this one wouldn't be noticed until like 1868.

the reign of the scroll, a world in which the gospel according to “Matthew” alone would be lengthy enough that it would virtually fill up the largest practical scroll, the codex was a remarkable innovation. In among your scrolls would be this compact pile of leaves of parchment or paper fastened or stitched along one side, which you could open at once to any point in the text. What a difference it must have made, when the codex was pioneered and suddenly any point could be the entry point according to the user’s discretion, and when an abrupt segue could for the 1st time be made from say a point about $^{2}/_{3}$ds of the way through a scroll’s serial narrative to a point about $^{1}/_{3}$d of the way into that scroll’s serial narrative! What a triumph of user control, what a defeat for authorial authority! “Who’s in charge here, the writer or the reader?” Also, when text was paginated and written on both sides of the leaves in such a stack, it was possible to get for instance all of the four gospels into the same “research horizon,” and even add onto them within that same “research horizon” the Acts of the Apostles. So, one of the many things we can learn from the Bible, if we’re willing to, is just how liberating hypertext can be from the strictures of authorial control.

HISTORY OF THE BOOK

1847

March: A news item relating to the development of ELECTRIC WALDEN technology: In Scientific American there appeared a report of an early speech synthesizer, fashioned by a Professor Faber. The apparatus consisted of a series of adjustable India rubber "organs of articulation" which were connected to a series of keys or pedals and powered by a leather bellows. By manipulating the controls in various ways the apparatus could be made to produce recognizable sentences as quickly as they were suggested, sentences such as "'God bless the Queen,' which last sentence it concluded with a hurrah and then laughed loudly."

ELECTRIC WALDEN

SCIENTIFIC AMERICAN.

LEWIS'S WROUGHT-IRON PASSENGER-CAR.

PATENT LAWS.

1848

A news item relating to the development of ELECTRIC WALDEN technology: A working FAX design was patented by Frederick Bakewell (but his invention would not be commercialized).

ELECTRIC WALDEN

1849

News items relating to the development of ELECTRIC WALDEN technology:

- In England, George Boole created the first symbol system in which logical events were represented by symbols.

ELECTRIC WALDEN

"History is the why of now."

– Austin Meredith

- The New-York Herald installed a press built by Richard Hoe in which the type beds were mounted directly upon one of the rotating cylinders rather than held in a flat pan under the cylinders. By use of this device they found they were able to achieve 12,000 impressions per hour. (By 1860 this would be up to 20,000 impressions per hour.)

Another hardship of the early ink-maker was ... the amount of physical effort required to grind his pigments by hand. The development of hand- and power-driven grinding machines must have been greeted with open arms. Mechanical hand millers were available at the turn of the nineteenth century, but, so far as can be ascertained, the first really significant step was taken in the 1820s. The stimulus to produce a really good power-driven grinding machine was given by the development of the printing machine. By modern standards, inks ground by hand were very coarse and were found to be unsuitable for use on high-speed equipment. Although no exact date can be put to this innovation, Friedrich Koenig, the inventor of the first successful printing machine, found himself obliged to invent a new grinding machine to provide the inks to work on his machines. The accompanying illustration of the works of Lorilleux in Paris is dated 1824 ... a roller grinding mill driven by steam.... The adoption of the power grinding machine may be said to be the most significant event in the history of ink-making.... When ink-making became industrialized –and an arbitrary date for this would be 1850– and the printer who made his own inks became a rarity, some of the romance of ink-making departed. From being essentially a craft, the secrets of which were jealously guarded and passed on verbally, it became more a science, although not completely.

"Among all the manufactures which –for the mental and mechanical skill required in their prosecution, the remarkable steps by which they have attained their present rank, and the influence which they exert on society generally– claim our attention and admiration, none perhaps is more striking than the **manufacture of a book**."

— George Dodd's DAYS AT THE FACTORIES

HISTORY OF THE BOOK

1850

A news item relating to the development of ELECTRIC WALDEN technology: In England, Francis Dalton invented the teletype.

ELECTRIC WALDEN

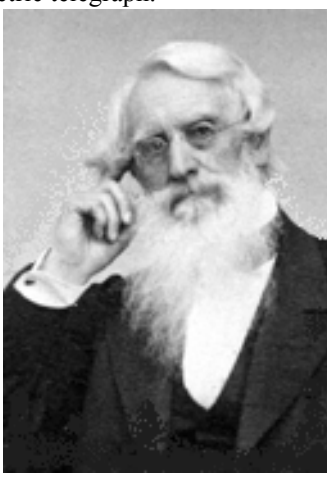
"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

1853

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- To Charles Babbage's delight, Scheutz and Scheutz completed the 1st really useful difference engine, operating on 15-digit numbers and 4th-order differences, with a printer.
- Chief Justice Roger Taney opinioned that although Samuel F.B. Morse had not invented all the different things that had gone together to produce his electric telegraph, at least it had been he who had succeeded in putting these various things together into a winning combination. Morse's patent was finally affirmed over the some 60 or so other attempts which had been being made concurrently to establish an electric telegraph.



These are telegraph-line insulators made according to the Wade patent during the 1850s:

1854

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- George Boole, whose CALCULUS OF LOGIC had appeared in 1848, published AN INVESTIGATION OF THE LAWS OF THOUGHT, ON WHICH ARE FOUNDED THE MATHEMATICAL THEORIES OF LOGIC AND PROBABILITIES, which articulated a binary system of "symbolic logic."
- Georg Riemann's "On the Hypotheses Forming the Foundation of Geometry," based on his famous June 10th lecture in Göttingen.

1855

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- George and Edvard Scheutz of Stockholm constructed a working model of Charles Babbage's calculating engine, exhibited it at the Paris Exhibition, and marketed it as a calculator.
- Two early events in the development of photography: The first aerial photograph, taken by Gaspard-Félix Tournachon, known as "Nadar," from a balloon; The first war photographs under enemy fire, taken by Roger Fenton in the Crimea.

1856

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: "Hey, Boss, you'll never guess what we found out in the back corner of the storeroom under a pile of crap. I'll give you a hot hint, it's in an old wreck of a packing crate labeled **JOHANNES GENSFLEISCH ZUR LADEN — STRASSBOURG — HOLD AGAINST OVERDUE STORAGE CHARGES**. What it is, it's Johannes Gutenberg's old printing press, the very first one, lost ever since he printed the BIBLE and a psalm-book and then declared bankruptcy when his typecase was seized by creditors, back in the 15th Century. So let's fix it up now and put it on display in a museum or something, and show those damned Chinese that they didn't invent just everything!"[36]

> "He who first shortened the labour of Copyists by device of Movable Types was disbanding hired Armies, and cashiering most Kings and Senates, and creating a whole new Democratic world: he had invented the Art of Printing."

36. **An ELECTRIC WALDEN entry for the year 2056?** –"Hey, Boss, you'll never guess what we found out in back of the warehouse under a pile of crap. I'll give you a hot hint, it's black and its beautiful. What it is, it's the famous "Allison," the first NeXT workstation sold in the State of Minnesota, back in the 20th Century. It's Austin Meredith's old development platform, lost ever since he put out the first "Stack of the Artist of Kouroo" CD-ROM and then had to sign off due to the fact that nobody had ever given him a swinging dollar to carry on the work, or so much as a word of encouragement. Now we can compare what he had on his hard drive with the current version of the Thoreau hypertext textbase, and publish a list of all his outrageous howlers! It'll be hilarious, we'll make millions of Eurocredits!"

1857

Giuseppe Garibaldi, who had returned to Italy in 1854 after several years working at Staten Island and in Nicaragua, founded the Italian National Association to promote the unification of Italy.

ELECTRIC WALDEN

According to the folks at the Garibaldi/Meucci Museum on Staten Island, which is housed in the former home of Antonio Meucci, it was he rather than Alexander Graham Bell who developed the 1st working telephone — and the creation of this apparatus dates to this year. Meucci, it seems, also fashioned his own furniture, which is currently on display. (There has also been a claim made, that a mechanic named Manzetti already had the bare **concept** of the electric telephone, before any such working models could be fabricated.)

1858

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Charles Wheatstone, the man who in 1829 had brought us the concertina, patented an automatic telegraph system.
- Hymen L. Lipman of Philadelphia began to manufacture and market a pencil with an attached eraser.[37]
- The difference engine of 1853 did its only useful calculation, producing a set of astronomical tables for an observatory in Albany, New York. The person who spent money on it was fired and the machine ended up in the Smithsonian Institute. (The Scheutzes did make a 2d similar machine, which had a long useful life in the British government.)

"History is the how of now."

– Austin Meredith

37. A bit of retroactive explanation, for those of us who live in the modern world: This "rubber" was a mechanical appliance, intended in the era before electronics to perform roughly the same function as your word-processing program's UNDO functionality. To utilize the device one rotated the "pencil" (inscribing stylus) in one's hand by 180 degrees, pressed its end firmly against the "paper" (recording surface) — and rubbed back and forth until the record was satisfactorily purged. (A problematic aspect of this was that before resuming the recording function, the user needed to remember to again rotate the device by 180 degrees.)

1859

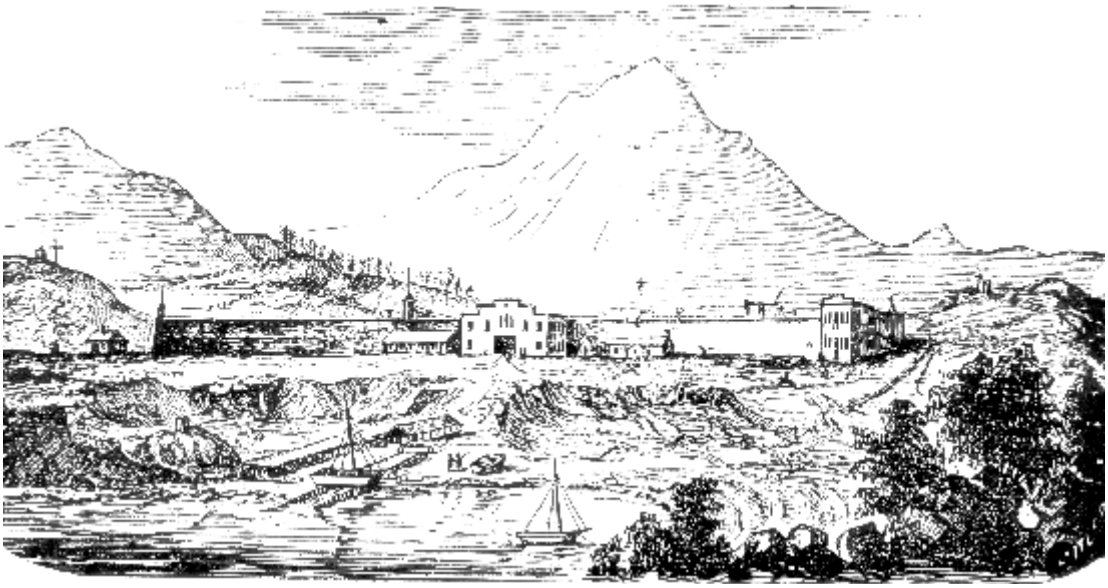
ELECTRIC WALDEN

A news item from this year which relates to the development of ELECTRIC WALDEN technology: The very 1st combination of the new art of photography with the old art of printing occurred when J.W. Osborne managed to fabricate in this year, on the basis of a Daguerreotype, a photolithographic transfer image that he could then place upon a printer's lithographic stone. This process would be used in New-York for the reproduction of steel engravings and government maps. Such photolithography would of course become universal.

However, this image of the gold diggings in California, published early in this year, made use of the older technology:

As did this woodcut, which is the earliest image that we still have of the San Quentin prison, created in this

year:



The large gate in the middle is the one through which 200-300 prisoners would flee in the great escape of 1862. The backdrop for the woodcut is a Mt. Tamalpais that has been greatly exaggerated and positioned in the wrong direction (one is grateful, at least, that the artist did not turn it into a volcano).

California promoter Sam Brannan founded a resort he designated “Calistoga,” a name with he intended to invoke the idea that this would become “the Saratoga Springs, New York of California.”

1860

ELECTRIC WALDEN

News items relating to the development of ELECTRIC WALDEN technology:

- Christopher Latham Scholes devised a primitive model of what would become a typewriter. (He would construct a model in 1867 and obtain a US patent on it in 1868.)
- Giuseppe Ravizza, quite taken with the concept of visible writing, began to develop a typewriter. (He would claim in 1872 that he had invented a mechanism in which the writing was visible as it was being done, but would not until 1883 file for a patent on such a device.)

"If you wish to make an apple pie from scratch, you must first invent the universe."
— *Carl Sagan*

Newspapers utilizing Richard Hoe's design of rotary printing press, in which the type beds were mounted directly upon one of the rotating cylinders rather than held in a flat pan under the cylinders, such as the New York Herald, were at this point able to achieve up to 20,000 impressions per hour. Between 1820 and 1860, it has been calculated, the productivity of the printing process had been increased by two full orders of magnitude. (The Thoreau family business would be deeply involved in this, through the production of industrial quantity shipments of the very finely ground graphite powder that was needed for the inks used in such presses.)

HISTORY OF INK

"The modern man's daily prayer is reading the daily newspaper."
— G.W.F. Hegel

In related news, in this year the first dime novel was published. It was Mrs. Anna Sophia Stephens's *MALAESKA*: THE INDIAN WIFE OF THE WHITE HUNTER, and in its first year it would sell 300,000 copies. Immediately Edward Ellis's SETH JONES, OR CAPTIVES OF THE WILD FRONTIER would appear, and would sell 450,000 copies. (Typically such material appeared in orange covers.)

"Among all the manufactures which –for the mental and mechanical skill required in their prosecution, the remarkable steps by which they have attained their present rank, and the influence which they exert on society generally– claim our attention and admiration, none perhaps is more striking than the **manufacture of a book.**"

— George Dodd's DAYS AT THE FACTORIES

HISTORY OF THE BOOK

1861

September 15, Sunday: Feng Kuei-fen 馮桂芬 authored the *Chiao-pin-lu k'ang-i* "Protest from the Chiao-pin Studio" document which recommended that China become capable of resisting the West by accommodating to the more powerful of the features of Western technology: this would be known as the Self-Strengthening Movement.

Technology? In China? For sure, for sure, some say! An example of this is that there has been a claim made that FAXes were already being transmitted in this year in the Chinese language, before this technology became feasible in the West, as a hardware alternative to having a software "Morse code" (not viable for a non-alphabetic language) — as witness a transliteration from Chinese into English of a FAX cover sheet bearing an 1861 date:

ELECTRIC WALDEN

> *September 15, the 10th year [1861] of the Xian Feng Reign [1851-61]*
>
> To: The Cabinet Majesty Emperor Xian Feng
>
> *From: [?]*
>
> *Re: Copy of treaties documented on the 11th and the 12th day of this month.*

Unless, that is, the above is a significant misunderstanding —and I have been unable to discover any independent attestation to its authenticity. (Bear in mind that in this year of 1861 also appeared the 1st photograph known to be an intentionally, politically doctored one: When King Wilhelm I of Prussia visited a livestock show in Berlin no photographer happened to be present, so later the 30 farmers reassembled and a photograph was made in order to paste upon it a trimmed image of Wilhelm.) According to Joshua Shi of the Shanghai Star,

> In 1865 ... a line was set up to establish telegraphic connections between Shanghai and Wusong, so that people in the foreign settlements could be informed of the shipping movements at the mouth of the Yangtze River. The farmers destroyed the poles, which they said had a bad effect on the "Fengshui" of the

> locality.... A year later, Russell and Company, with the permission of the foreign authorities, put up a line between the French Concession and the American Settlement in Hongkou. This was the first telegraph line to operate in China, but it was entirely within the settlement limits.... In 1870, when a cable was laid between Shanghai and Hong Kong, the cable at the Shanghai end was not to be landed on shore but on vessels anchored outside the limits. No part of the line went overland; and at each port where the company had an office, the telegraph service was conducted on hulks. The cable at Wusong was brought ashore secretly.... [I]n 1878 the Qing authorities permitted the construction of an overland line along the old Wusong Road, the poles being erected on foreign-owned land. ... In 1880 and 1881, the Qing authorities employed the Great Northern Telegraph Company (Danish) to construct a line connecting Shanghai and Beijing, the imperial capital, at a cost of 140,000 taels of silver.

It would appear, if the above account out of the Shanghai Star is correct, that there must have somehow been a misprint in the date of this above transmission –perhaps that instead of being dated September 15, 1881, it actually was dated September 15th, 1881– and that there must also have been a misunderstanding as to the nature of the document in question — perhaps instead of the sheet of paper in question being an actual transmitted FAX, it had instead been merely a temporary instruction sheet on the basis of which the numbers used for the Chinese characters in a telegram transmission had been coded!

1862

A news item in the development of ELECTRIC WALDEN technology: Giovanni Caselli devised a “pantelegraph” that added to Alexander Bain’s 1843 FAX device a synchronizing apparatus.

ELECTRIC
WALDEN

1863

A news item in the development of ELECTRIC ■ WALDEN technology: A functioning FAX machine was patented in the United States and a functioning FAX line was installed between Paris and Lyon, France.[38] Two Chinese gentlemen appeared at Paul Gustave Froment's FAX workshop outside of Paris to check out this Western invention, and expressed great amazement at the technological progress being made by the white people.[39] They politely remarked that such a device would be a most efficient manner in which to effect the transmission of the complex characters of their written language. And, in France, a publisher rejected a manuscript entitled *PARIS AU XX^e SIECLE,* which would not be revisited and published until the 20th Century (specifically, 1994). In this manuscript the author, Jules Verne, wrote of a Paris of the year 1960 in which a "photographic telegraph permitted the dispatch over long distances of the facsimile of any writing, signature or design." This was to be a sort of "photo-telegraphy" which by that remote future time would be allowing "any writing, signature, or illustration to be sent far away, and any contract to be signed at a distance of 20,000 kilometers." The sci-fi dreamer added that "Every house was wired."

ELECTRIC WALDEN

December: A news item in the development of ELECTRIC ■ WALDEN technology: the 1st use of continuous rolls of newsprint dates to this month.

ELECTRIC WALDEN

38. This was the first positive functioning of the system which Jonathan Coopersmith describes as an 1865 system ("Facsimile's false starts: The development of the 150-year-old concept underwent many twists and cost millions of dollars before soaring to success." IEEE Spectrum of February 1993, pages 46-9), where he mentions a patent by Abbé Caselli and the introduction of an ink-on-tinfoil system between Paris and Lyon in 1865, and another system employing a shellac-on-adhesive-ink system for raising the stylus and breaking the current. The late date, 1865, which he used in his article, was merely the date on which the system which the French government had under development had "gone public," to carry such business items as stock market citations, and he is evidently referring to the public ceremonial dedication of the system, which was staged on May 16, 1865. The system had been, however, authorized by the French legislature in 1861, and was already as of 1863 transmitting at 15 words per minute, with a general throughput of 40 telegrams of 20 words each per hour.

39. Were these guys industrial spies, checking to make sure that we weren't getting too far ahead of Chinese technology?

1866

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: Although the typeball of the Selectric typewriter of the 1940s would represent a radical change from the typebars of then-prevalent typewriters, that IBM machine would not be the 1st device to use a single print element, as several much earlier machines had in fact placed all type characters on a single part. A number of similar apparatuses would be manufactured during the 19th Century, including the Crandall device of 1879, the Hammond device of 1886, the Chicago device of 1890, and the Blickensderfer device of 1893. The first such design was a machine built by John Pratt in this year that had the type engraved on a cylinder, half an inch in diameter, that could be raised and rotated to select the character to be printed.

1867

News items relating to the development of ELECTRIC WALDEN technology:

- Giuseppe Ravizza created a writing machine having a moving ribbon of cotton fabric saturated with ink (silk fabric would produce a better quality ink transfer but would not hold as much ink; eventually tightly woven fabrics of nylon would solve this problem).
- The 1st practical typewriter was developed by Christopher Latham Sholes, a Milwaukee printer. On the keyboard of the Sholes & Glidden mechanism common letter combinations such as “qu” and “th” were separated, to create a natural pause between strokes so that it would be less likely for the “typewriter” (that is, for the operator of the machine, the person doing the typing) to get the mechanism’s hammers jammed against each other.

S.W. Soule had developed the swinging typebars that could pivot inward to land on a single target area. Carlos Glidden had obtained the initial funding. What Sholes himself had contributed was the way to space the letters.

ELECTRIC WALDEN

The first use of this new machine was to type out form letters seeking to raise additional capital. James Densmore, receiving one of these letters, would buy in, paying all the development expenses to that point and in return obtaining a 25% share of the stock.

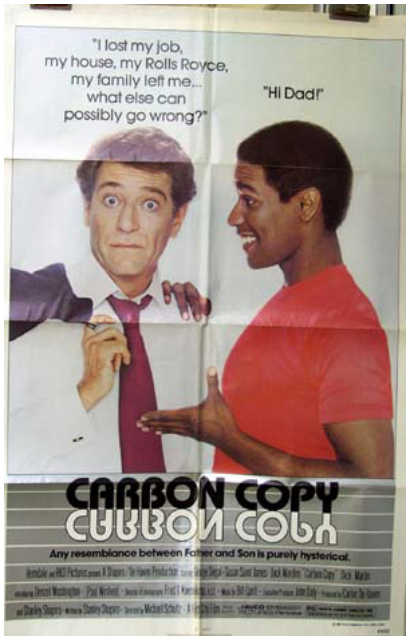
1868

Charles Hosmer Walcott got married at the Jonathan Ball House in Concord, and Waldo Emerson wrote one of his brothers that: "In your Ball House young Walcott was married day before yesterday with the good wishes of all the town." Edward Emerson would write, in MEMOIRS OF MEMBERS OF THE SOCIAL CIRCLE IN CONCORD (FOURTH SERIES, 1909): "The newly married pair began their housekeeping in the large old-fashioned house on the 'Great Road' to Boston.... The house, though low-studded, was very well built and homelike, snugly placed under the hill at the east corner of the Common. It had one drawback, its vis-à-vis was the 'Yellow Block' since removed, a tenement house well stocked with humanity of a humble class, not especially disorderly, however, and with much worthy leaven in the lump—also many children."

OLD HOUSES

ELECTRIC WALDEN

Lebbeus H. Rogers the balloonist had just made a promotional ascent in Cincinnati on behalf of a biscuit and grocery firm of which he had just been made a partner, and was giving an interview to the Associated Press in their offices after his ascent, when he observed them using Cyrus Dakin's invention, carbon paper.
He immediately lost all interest in going up in balloons and, abandoning his new interest in the biscuit business, went into the mass manufacture of carbon paper as the firm of L.H. Rogers & Co. in New York.[40]



Whereas carbon paper had been being made entirely by hand, by using a wide brush to apply a mixture of carbon black (a pigment) and oil in naphtha (a solvent) to sheets of paper, Rogers's company eventually would develop the first carbon-coating machine and introduce the use of hot wax applied by rollers to replace that messy oil applied by brush. In 1870 this firm would achieve its first major sale ($1,500), and it goes without saying, this sale would be to the United States Department of War.

40. Dakin allegedly had invented carbon paper in Concord, Massachusetts in 1823 and sold the rights to the Associated Press. None of this has been in any manner corroborated.

June 23, Tuesday: A news item relating to the development of ELECTRIC WALDEN technology: Christopher Lathian Sholes receives a patent for the first practical typewriter.

ELECTRIC
WALDEN

1871

A news item relating to the development of ELECTRIC WALDEN technology: Charles Babbage produced a prototype section of the Analytical Engine's "mill" (CPU) and printer. Nothing more was ever assembled.

ELECTRIC
WALDEN

1872

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

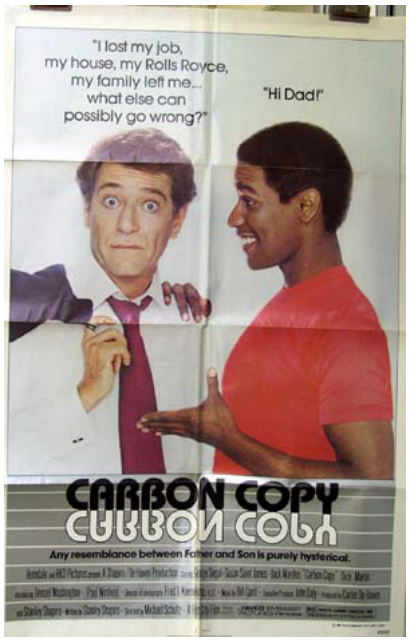
- Giuseppe Ravizza, who had begun in 1860 to develop a typewriter, claimed at this point to have invented a mechanism in which the writing was visible as it was being done (but he would not until 1883 file for a patent on such a device).
- Until the advent of the IBM Selectric, typewriter designs ordinarily involved holding the printing apparatus stationary while moving the paper carriage. In this year, however, Thomas Alva Edison took a patent on an electric type-wheel machine in which the paper was stationary while the printing apparatus moved.

1873

A news item relating to the development of ELECTRIC WALDEN technology: The Sholes typewriter went into production in the shop of an arms manufacturer, Remington. The Remington Type Writer would soon need to be superceded by a “Model 2” because on this original device, which could produce only capital letters, the operator was forced to type blind being unable to view the results.

ELECTRIC WALDEN

Lebbeus Rogers, who had in 1868 perceived the possibilities in the mass-manufacture of Cyrus Dakin’s 1823 invention, carbon paper, attended a demonstration of a Sholes and Glidden typing machine being manufactured by the gunmaker E. Remington and persuaded the “typewriter” (that is to say, persuaded the trained person who was typing on this typing machine) to insert one of his sheets of carbon paper into the machine. Rogers would go on to produce the first typewriter ribbons, which amounted to long thin strips of his carbon paper.



1875

ELECTRIC WALDEN

A news item in regard to the development of ELECTRIC WALDEN technology: The *LE GRAND ROBERT DE LA LANGUE FRANCAISE* of Paul Robert first offered a definition of "infrastructure." (No English dictionary would list such a term until the OXFORD ENGLISH DICTIONARY of 1927.) "Infrastructure" is made up of the basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices, and prisons. The term is generally applicable to all fixed and permanent installations, fabrications, or facilities for the support and control of military forces.[41]

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

41. The Kouroo Contexture is an attempt to fundamentally alter the infrastructure of scholarly research, and of education, by erasing the institutional barriers that have always existed between scholarly research and education, that have been forcing these two things to be two discrete activities bestowed upon two different groups of people.

1876

Does the name “Pa Bell” ring a bell? In Boston, Alexander Graham Bell invented the telephone — and promptly decided that the appropriate remark to make when picking up the earpiece of such a device was to be “Hello?”

ELECTRIC WALDEN

William Smith obtained a patent for a jet siphon water closet. This model would attract the attention of American sanitary engineer Colonel George E. Waring, Jr., who would develop it into larger pieces of what was then being referred to as “sanitaryware.”

WATER SUPPLY
GOD IN THE JAKES

February 14, Monday: Alexander Graham Bell and Elisha Gray applied separately for patents related to the telephone. The US Supreme Court would rule Bell’s to be the rightful patent, because his application had been presented to the patent clerk two hours earlier.

March 10, Friday: In Cambridgeport, Massachusetts, the 1st (one-way) telephone communication was effected when Alexander Graham Bell exclaimed, near the device, “Mr. Watson — come here — I want you” and this was heard clearly in the adjoining room.

Performed for the initial time, theme original et variations op.19/6 for piano, by Pyotr Illyich Tchaikovsky, in Moscow.

May 25, Thursday: At the Massachusetts Institute of Technology, Alexander Graham Bell demonstrated the telephone publicly for the first time.

Waldo Emerson’s 73d birthday.

August 10, Thursday: Edward William Lane died in Worthing, Sussex. The body would be placed in West Norwood Cemetery. Leila Ahmed would prepare a biography, EDWARD W. LANE, for publication in London by Longman during this year. He had been unable to complete his massive Arabic-English dictionary, arriving only at the letter *Qaf*, the 21st of the Arabic alphabet. Great-nephew Stanley Lane-Poole would be completing the work during the following two decades: AN ARABIC-ENGLISH LEXICON: DERIVED FROM THE BEST AND THE MOST COPIOUS EASTERN SOURCES (Williams and Norgate).

WALDEN :

the cornice of the palace

finished — the mason

returns to his hut

Alexander Graham Bell achieved the first long-distance telephone call (this consisted merely of being able to hear in the Dominion Telegraph Company office in White's Boot and Shoe Store in the town of Paris in Ontario, despite bubbling and cracking sounds, a one-way communication from the telegraph office in Brantford some six miles distant of audible musical notes and singing, plus his being able to distinguish between the voices of different persons who spoke into the mouthpiece).

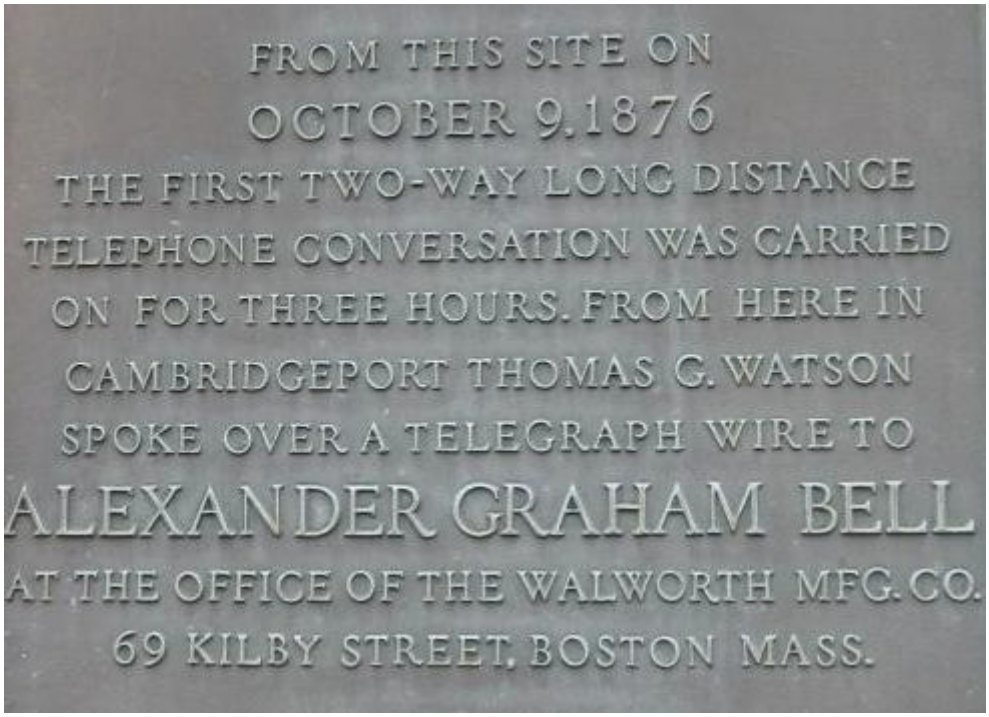
WALDEN :

the devil his due

improved means

unimproved end

October 9, Monday: The initial 2-way long distance phone conversation, between Cambridgeport and downtown Boston on the far side of the Charles River.[42]



42. Although the call lasted three hours, no-one would be billed an arm and a leg. Later in this same year the New-York telephone directory would spring into existence — as a card listing 252 names.

1877

In this year Thomas Alva Edison built his 1st phonograph and tried to brainstorm a use for the device.[43] "Why not," he speculated, "use this thing to record the last words of people who are dying?"[44] The first Bell telephone set was sold. Such a device was installed in the White House in Washington DC (its phonenumber was of course "1").

By this point about half the students at Yearly Meeting School in Providence, Rhode Island were not from Quaker families, with about one out of every five of the students who were Quakers coming to the school from outside New England. The board and tuition rate that was being charged of members of the New England Yearly Meeting was $100, while Quakers from outside New England were being charged $190, scholars only one of whose parents was a Quaker were being charged $190, and non-Quakers were being charged $300.

The School Committee having received $28,000.50 for land sold to the city of Providence for widening Hope Street and opening Lloyd Avenue from Hope Street to Arlington Avenue, and having sold other plots of land as well either to the city or to private parties, in this year a consent decree was sought, validating these transactions. The Rhode Island Supreme Court of course kindly obliged (such a consent degree did not, of course, free the school to do whatever it wanted with the moneys it had received).

This is what Providence looked like in this year:

READ EDWARD FIELD TEXT

Providence Gas installed gas pipes into the buildings of the Butler Hospital for the Insane. After 29 consecutive years of financial deficits the hospital was able to post its first "surplus," amounting to $742.

ASYLUM

During the late 1870s, the inmate population at the Dexter Asylum across the street from the Moses Brown School had stabilized at around 100, where it would remain until the asylum's closing. Living conditions, as depicted in early lists of rules and punishments, work records, and daily menus, were hardly desirable by

43. Edison was not an exceptionally dull person. There had for some time been a "phonautograph" device for the recording of sound waves in visible form –the voice of Abraham Lincoln in the White House had been recorded with such a device– but it had never once occurred to anyone that the result of such a recording might be "played back" for the re-creation of the original sound. It was not only Edison who was the victim of this failure of imagination, but literally everyone in this society.

44. He considered that, used in conjunction with a clock, his device might serve to announce the hours of the day: "It is now three o'clock in the afternoon." He also brainstormed that it might be useful in the teaching of proper spelling: "Aardvark: a-a-r-d-v-a-r-k, aardvark." When someone proposed that his device might be able to record music, so that the same performance might be heard over and over again, he was deeply offended.

present standards. Visitors were permitted only once every three weeks, male and female inmates were kept carefully segregated, the evening meal consisted merely of white bread and tea, and those found guilty of drinking, "immoral conduct," "loud talking or disrespectful behavior," or malingering to avoid work were subject to "confinement in bridewell [a jail cell] for a time not exceeding three days, and of being kept on short allowance of food."

The grassy enclosure of about 9 1/12 acres located west of Dexter Street near High Street, which had been for years in service as a militia training field, was by this point no longer being required for such purposes.

Eli Whitney Blake, Hazard Professor of Physics at Brown University, had been fascinated by the development of this new instrument of communication, the telephone, although he was not of the sort who would pursue financial benefit, and had been conveying this enthusiasm to his students, many of whom had constructed their own receiver devices. Dr. William Francis Channing had also been attracted into this project. Although Alexander Graham Bell had on February 14, 1876 submitted a crude working model to the US Patent Office and had secured a patent, his receiver device, which had been on exhibit at the Centennial Exhibition that summer, had turned out to unwieldy due to its weighing ten pounds. In late winter, or in the early spring of this year, at Professor Blake's lodgings in the house of Rowland Hazard, 45 Williams Street in Providence, Rhode Island, there was a demonstration of the telephone:

> The wire was strung between the reception room, just within the front door, and the study at the other end of the long hall, with a telephone at either end. Ely happened to be listening at the receiver in the study, where Prof. Blake was completing his preparation, when he heard a familiar voice at the other end of the wire and said "My father has just come in, I hear his voice; were you expecting him?" Prof. Blake was dumbfounded and elated, for not even in their wildest flights of fancy had the scientists dreamed of the possibility of recognizing individual voices.

Professor Blake and his students reduced the problem of the unwieldiness of the device by replacing the horseshoe magnet with a bar magnet, and found that in so doing they not only rendered the device more handy, but also improved the clarity of the communication. Their redesign was termed a “butterstamp” because it resembled a kitchen tool that embosses a design into a block of butter. You held the butterstamp-shaped receiver against your ear while pointing the butterstamp-shaped transmitter directly at your mouth.

January 31, Wednesday: Alexander Graham Bell demonstrated the practicality of the box telephone by means of a phonecall placed from the home of Mayor Converse in Malden, Massachusetts, to the offices of the mayor’s shoe company on Converse Street in Boston.

February 12, Monday: A news dispatch was sent by telephone for the 1st time, from Salem, Massachusetts to Boston.

April 2, Monday: A demonstration of long distance music was presented in Steinway Hall, New-York by Elisha Gray, almost-inventor of the telephone. Pianist Frederick Boscovitz performed at the Western Union office in Philadelphia by way of Gray’s “telegraphic reed transmitter.” The signals, sent over telegraph wire, activated 16 wooden tubes.

April 30, Monday: Russian troops occupied Bayazid just over their Caucasian border, inside Turkey.

The 1st known design for a phonograph was deposited with the French Academy of Sciences by Charles Cross.

May: One morning the Providence, Rhode Island newspaper was noticed to feature a description of the telephone transmitter/receiver apparatus used by Alexander Graham Bell, with an illustration — and this produced great agitation in a science classroom at Brown University:

> Prof. Blake came into the lecture-room in a state of great

excitement, a copy of the paper in his hand and addressed the class substantially as follows: "Gentlemen, you have seen the announcement of Professor Bell's telephone in this morning's paper. You are all familiar with the instrument; some of you have yourselves made them. I want to tell you that some time ago Prof. Bell came down from Boston to compare notes with Prof. Peirce, Dr. Channing and myself. He told us that he had mastered the principle of the telephone but had been unable to devise a receiver which was not too cumbrous for use. We showed him our receiver with which you are all familiar. I ask you to compare that with Prof. Bell's as pictured in the paper today."

THE SCIENCE OF 1877

July 8, Sunday: The Bell Telephone Company was formed (predecessor of AT&T).

July 18, Monday: Pyotr Illyich Tchaikovsky got married with Antonina Ivanovna Milyukova in the Church of St. George, Moscow. After the ceremony, the composer realized that they could never have either a physical or emotional relationship and began to panic. They left in the evening for St. Petersburg.

At his workshop in Menlo Park, New Jersey, Thomas Edison shouted "halloo" into his prototype phonograph and made the first recording.

July 23, Monday: The 1st telephone and telegraph line in Hawaii was completed.

November 21, Wednesday: Thomas Alva Edison announced the invention of the phonograph, which he described as a "talking machine."

December 2, Sunday: Louis-Paul Cailletete liquefied oxygen.

Samson et Dalila, an opera by Camille Saint-Saens to words of Lemaire, was performed for the initial time, in the Weimar Hoftheater, conducted by Franz Liszt. Gabriel Faure, in town for the premiere, met Liszt for the 1st time. Faure would later record that"being at that first performance was one of the greatest pleasures and one of the most moving experiences of my life."

Suite for String Orchestra was performed for the initial time, in Brunn (Brno), conducted by the composer Leos Janacek.

The Symphonic Variations op.78 by Antonin Dvorak was performed for the initial time, in Prague.

December 6, Thursday: In his Menlo Park, New Jersey workshop, Thomas Alva Edison made the 1st sound recording, on a cylinder of tinfoil: “Mary had a little lamb.” The device had just been constructed by John Kruesi on the basis of a sketch by Edison.

The 1st edition of the Washington DC Post (which has now become, if not the area’s best, at least the area’s oldest still-extant newspaper).

December 7, Friday: Thomas Alva Edison demonstrated his “gramophone” in the offices of Scientific American magazine.

December 15, Saturday: A patent was granted to Mr. Thomas Alva Edison, for a “phonograph.”

1878

A news item relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Ramon Verea, living in New-York, invented a calculator with an internal multiplication table; this was much faster than the shifting carriage or other digital methods. He wasn't interested in putting it into production; he merely needed to demonstrate that a Spaniard could invent just as well as an American.
- The Remington typewriter "Model 2" was able to print lower-case as well as upper-case letters. To avoid increasing the number of keys, the two type faces were on the same typebar and the letter key was operated in combination with a platen-shifting mechanism.
- According to a clipping preserved from an unidentified newspaper it would seem that in this year Alfred Munroe initially published his claim that Harrison Gray Dyar had preceded the portrait painter Samuel F.B. Morse by many, many years in the invention of the electric telegraph in America — and that the first test of this new apparatus had been conducted in 1826 along a road in Concord, Massachusetts (this news hadn't come to the attention of 9-year-old local schoolboy David Henry Thoreau as of 1826, hadn't come to the attention of Morse as of 1837, and as of 1878 hadn't come to the attention of local historian Edward Jarvis and is not to be found in his TRADITIONS AND REMINISCENCES OF CONCORD, MASSACHUSETTS 1779-1878).

January 28, Monday: George W. Coy was hired as 1st full-time telephone operator. The 1st commercial telephone exchange initiated, in New-York and in New Haven, Connecticut. There were 21 subscribers and service was available only during the day.

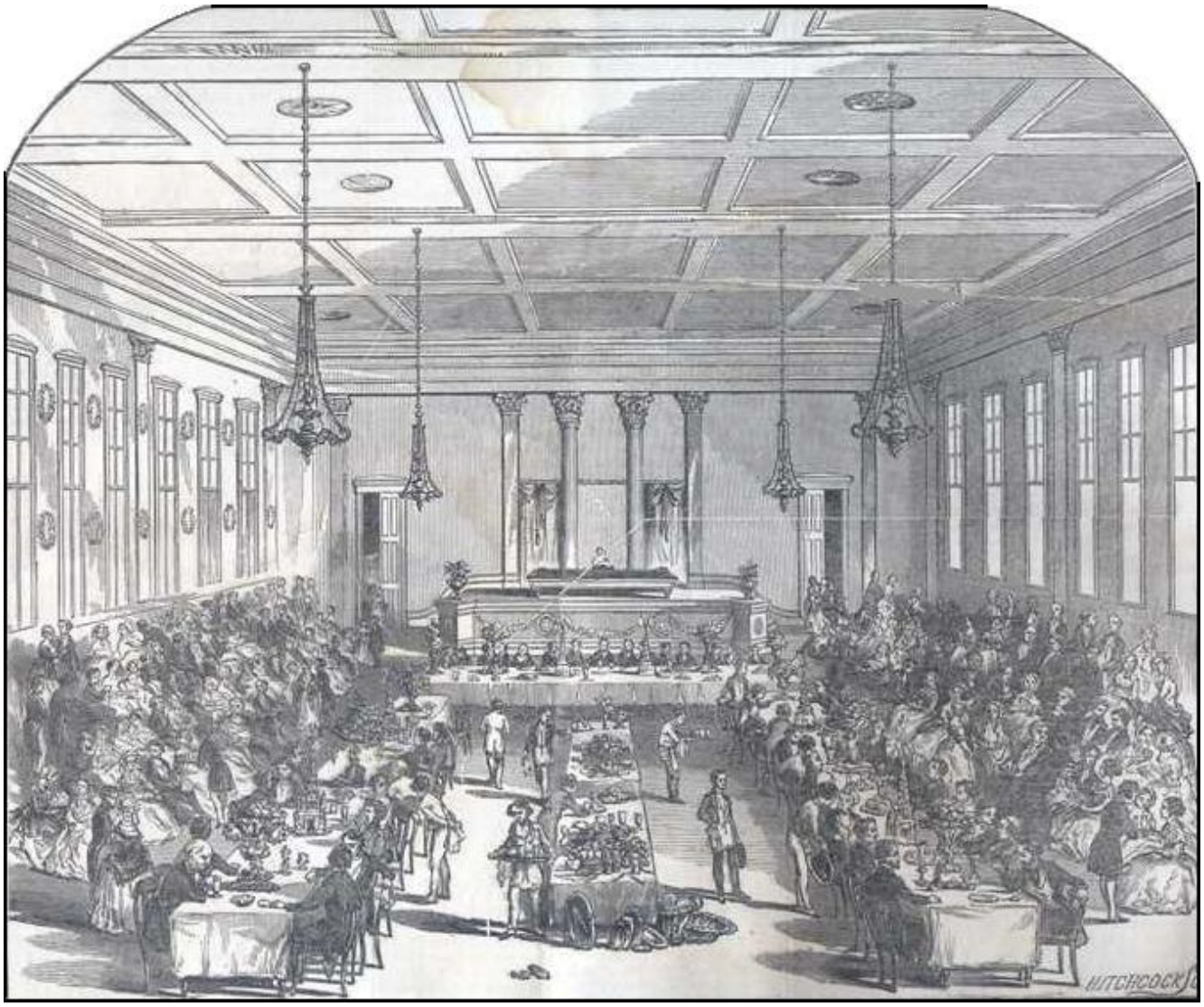
February 17, Sunday: The 1st telephone exchange in San Francisco opened, with 18 phones.

February 19, Tuesday: Mr. Thomas Alva Edison another US patent for a "phonograph."

Ballstrauschen op.380, a polka schnell by Johann Strauss, was performed for the initial time, in the Sophiensaal, Vienna.

February 21, Thursday: The 1st telephone book was issued, in New Haven, Connecticut.

March 14, Thursday: The phonograph and the telephone were exhibited in Rochester's Corinthian Hall.



May 4, Saturday: The phonograph was shown for 1st time at the Grand Opera House.

July 20, Saturday: The 1st telephone was introduced in Hawaii.

July 30, Tuesday: The Bell Telephone Company was incorporated in the Commonwealth of Massachusetts.

September 1, Sunday: Miss Emma Nutt becomes the 1st women telephone operator in America (until then all operators had been male).

November 13, Wednesday: The first telephone was installed on the floor of the New York Stock Exchange.

December 1, Sunday: Alexander Graham Bell installed the 1st telephone in the White House, Washington DC.

1879

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- A committee investigated the feasibility of completing Babbage's Analytical Engine and concluded that it was impossible since its developer was dead. The project became somewhat forgotten and was unknown to most later computer scientists during the course of their work.
- During this year each subscriber to the new telephone service in Lowell MA, which employed four switchboard operators, came for convenience to be assigned a unique phone number. This would assist the switchboard operators in a task which due to expansions of service was becoming onerous, to wit, deciding into which socket to insert a phone jack in order to complete a calling circuit. No longer would a child be able to pick up a receiver and turn the crank and go "Mrs. Ordfaecher, I want to talk to my Aunt Suzie please." (Pretty soon, phonebooks. Pretty soon, also, the phone monopoly will acquire the self-serving idea that they have preserved for lo these many years, that since your telephone number "belongs to them," they should be entitled to vend it in any way they choose, and along with it your name and address of course, to any merchandiser able to pay them enough to obtain their cooperation.)
- The Crandall typewriter of this year, like the IBM Selectric typewriter of the 1940s with its typeball, placed all type characters on a single part. This was not a first, however, as the Pratt device of 1866 had done likewise.

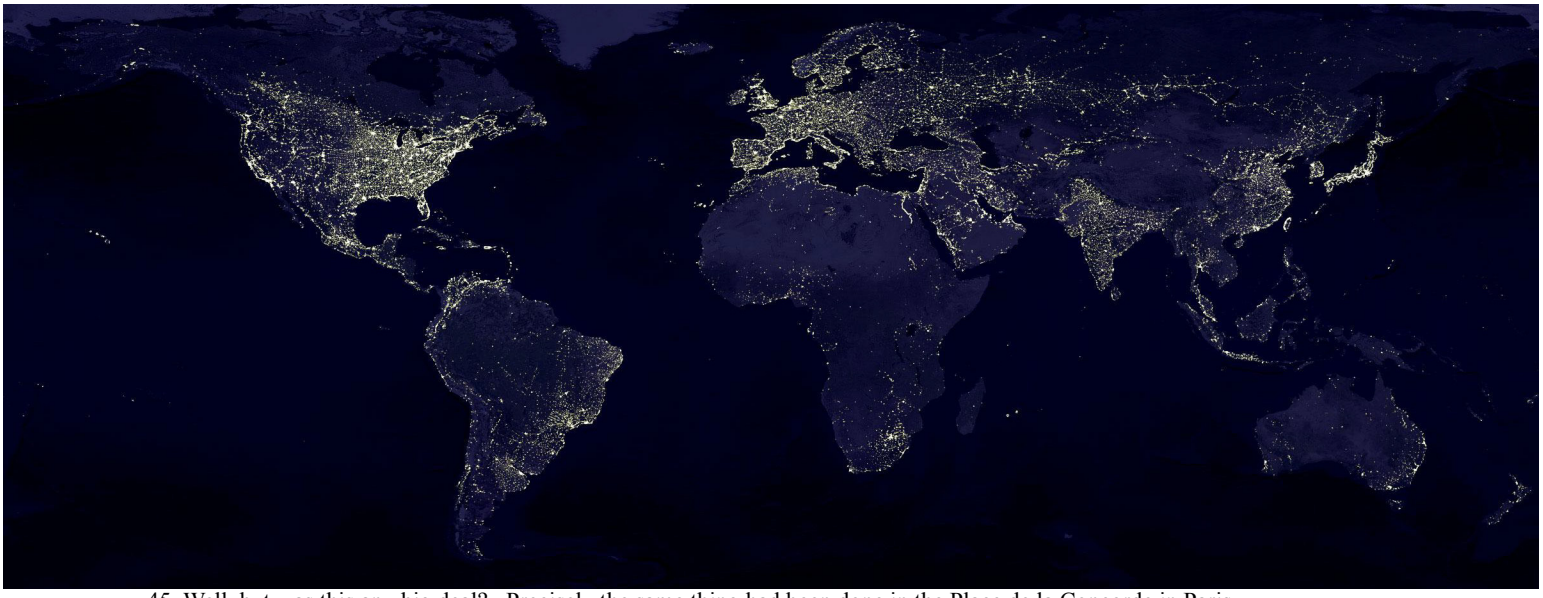
April 2, Wednesday: Toll-line commercial telephone service begins, between Springfield and Holyoke, Massachusetts, operated by District Telephone Co. of New Haven.

1880

February 2, Monday: The SS Strathleven arrived at the port of London with the very 1st successful shipment of frozen mutton from Australia.

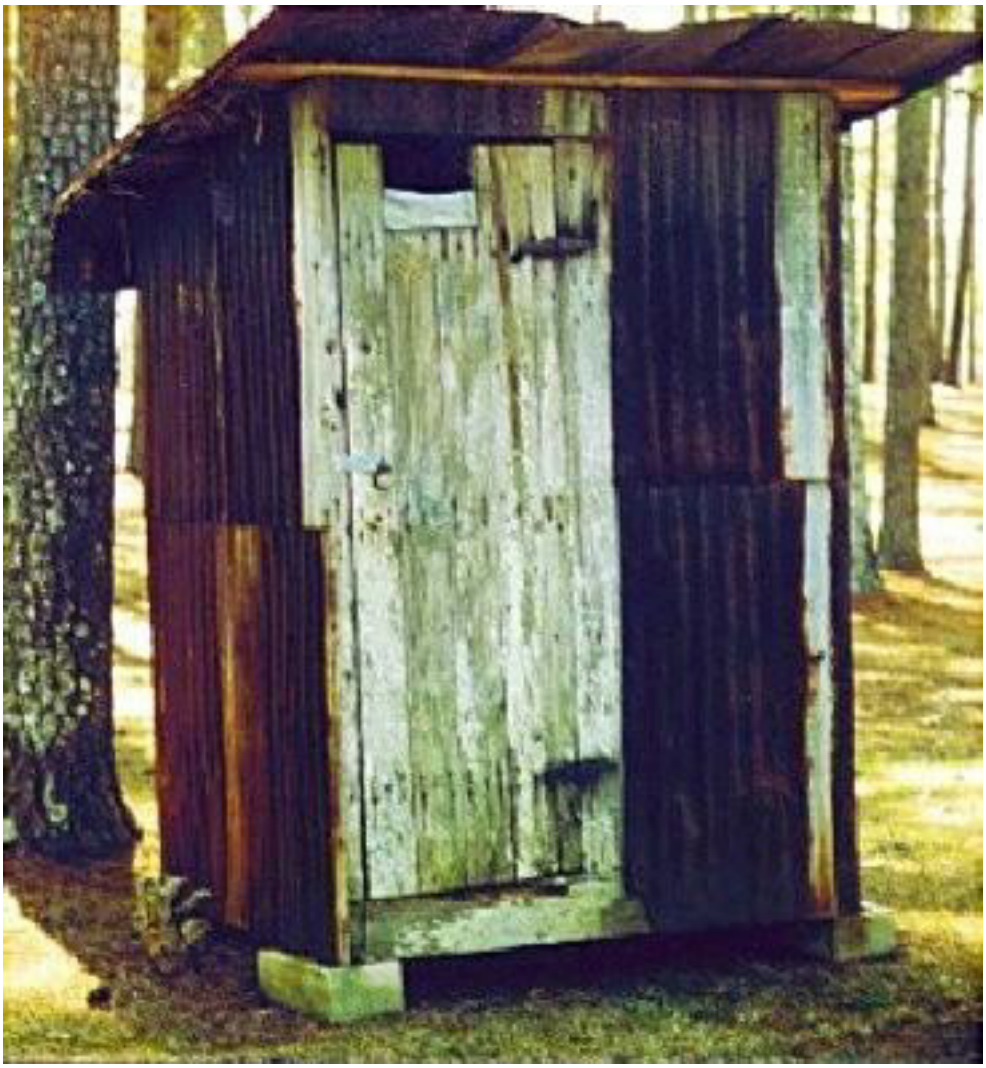
A news item relating to the development of ELECTRIC WALDEN technology: The Common Council of the town of Wabash, Indiana appropriated $100.00 to the Brush Electric Light Company of Cleveland, Ohio to allow them to make a test of their light, "[s]aid light to be placed at their expense on the dome of the Court House of Wabash with the view of contracting with said city for lighting the same with electricity." Was this any big deal? –Charles Brush had already successfully demonstrated his arc lights in his home city of Cleveland in the previous year, and precisely the same thing had been done in the Place de la Concorde in Paris, already in 1844!

March 31, Wednesday evening: A news item relating to the development of ELECTRIC WALDEN technology: At 8PM, as the clock atop the courthouse began to chime, the wire was connected and the four new Brush carbon-arc lamps attached to a pole outside the courthouse (Note: not yet atop the cupola of the building) of Wabash, Indiana began to glow.[45] A threshing machine steam engine generated the electricity. The test was a success. Mr. James Waldo, the telegraph operator, was busy sending special telegrams that night, to places like Lafayette, Fort Wayne, Chicago, Cleveland, Cincinnati, and even New York, places that had leading daily newspapers that would be interested in this sort of event. The mayor's wife would insist that she and her husband had been able to read the town newspaper on their front porch three or four blocks away. One visiting reporter would claim it had been still possible for him to see the face of his watch when he was on a train three miles out from Wabash. Therefore, a news item relating to the development of ELECTRIC WALDEN technology: My home town was laying claim to being the 1st electrically lighted city in this sector of the known universe.[46]



45. Well, but was this any big deal? –Precisely the same thing had been done in the Place de la Concorde in Paris, already in 1844!

April 8, Thursday: For an event relating to the development of ELECTRIC WALDEN technology: The Common Council of the town of Wabash, Indiana voted to accept the services of the Brush Electric Light Company of Cleveland OH and thus become (they supposed, or they bragged) the 1st electrically lighted city in the known universe. The courthouse atop which this light was mounted still sported an outhouse on its lawn, to the southwest of the building across from the town jail.



(This is not the outhouse on the courthouse lawn—Wabash's outhouse was masonry.)

April 17, Saturday: The American Bell Telephone Company was incorporated.

46. Former residents of this town have become notorious for their need for illumination.

June 1, Tuesday: The first pay telephone went into service in New Haven, Connecticut. Located at Connecticut Telephone Company offices in the Yale Bank Building, the telephone might be used after paying an attendant.

Through the offices of France and Great Britain, three Cuban rebel leaders surrendered to the Spanish in return for safe passage from the island (once they would be at sea, Spanish gunboats would arrest them and transport them to prisons in Africa).

Professor Henri-Frédéric Amiel, who would be referred to as the "Swiss Thoreau," wrote in his *JOURNAL INTIME*: "Stendhal's "La Chartreuse de Parme." A remarkable book. It is even typical, the first of a class. Stendhal opens the series of naturalist novels, which suppress the intervention of the moral sense, and scoff at the claim of free-will. Individuals are irresponsible; they are governed by their passions, and the play of human passions is the observer's joy, the artist's material. Stendhal is a novelist after Taine's heart, a faithful painter who is neither touched nor angry, and whom everything amuses — the knave and the adventuress as well as honest men and women, but who has neither faith, nor preference, nor ideal. In him literature is subordinated to natural history, to science. It no longer forms part of the humanities, it no longer gives man the honor of a separate rank. It classes him with the ant, the beaver, and the monkey. And this moral indifference to morality leads direct to immorality.
The vice of the whole school is cynicism, contempt for man, whom they degrade to the level of the brute; it is the worship of strength, disregard of the soul, a want of generosity, of reverence, of nobility, which shows itself in spite of all protestations to the contrary; in a word, it is inhumanity. No man can be a naturalist with impunity: he will be coarse even with the most refined culture. A free mind is a great thing no doubt, but loftiness of heart, belief in goodness, capacity for enthusiasm and devotion, the thirst after perfection and holiness, are greater things still."

1882

April 18, Tuesday: Annie Shepard Keyes Emerson, Dr. Edward Waldo Emerson's wife, made a telephone call to the Emerson home in Concord and was informed that Waldo Emerson was no worse.

Arthur Sullivan returned to London from a four-month tour of Egypt and Italy and immediately took up residence at 1 Queen's Mansions. He would reside there for the remainder of his life.

September 4, Monday: This is considered by many to be the inauguration of the Electrical Age — because on this day Thomas Alva Edison flipped a switch to activate the initial commercial electrical power plant, to illuminate a square mile of lower Manhattan Island MANHATTAN ISLAND.

ELECTRIC WALDEN

LIGHTING THE NIGHT

1883

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: Giuseppe Ravizza, who had begun in 1860 to develop a typewriter and who had claimed in 1872 to have invented a mechanism in which the writing was visible as it was being done, in this year finally filed for a patent on such a device.

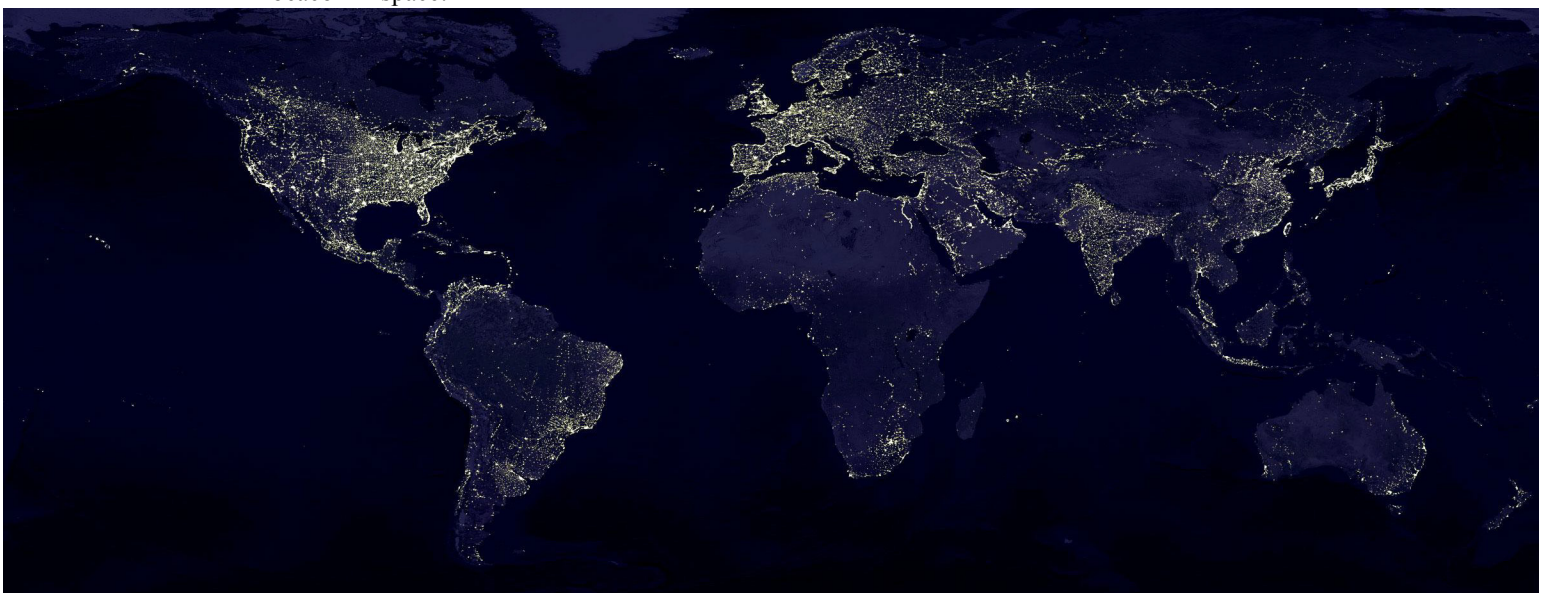
May 13, Sunday: For the celebration of his 41st birthday, Sir Arthur Sullivan had installed an elaborate telephone system in his home over which his dinner guests might hear selections from Iolanthe, sung by an opera company he had hired specifically for such a performance. Among his guests were the Prince of Wales, the Duke of Edinburgh, W.S. Gilbert, and Baron Ferdinand de Rothschild (although the sound quality wasn't that great, this was a novelty and the spirit flowed and a good time was had by all).

1884

Some news items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Herman Hollerith applied for patents for an automatic punch-card tabulating machine.
- The Institute of Electrical Engineers (IEE) was founded.
- Ottmar Mergenthaler patented a “Linotype” printing machine that cast type a line of type at a time (the fumes from the crucible of hot lead/antinomy mix rising directly into the noses of generations of typesetters hunched over their filthy keyboards) rather than a letter at a time.[47]
- In New York, George Eastman invented the 1st transparent photographic film.
- The municipality of Godalming, England terminated its experiment with electrical street lighting and returned to its previous gas-jet street lighting, for reasons now obscure but —we may speculate— for reasons of economy in replacing burned-out bulbs or generating the electricity to keep them illuminated. The earth would have to wait awhile longer before it could become a beacon in space:



March 27, Thursday: The Characteristic Suite op.9 for orchestra by Alyeksandr Glazunov was performed for the initial time, in the Great Hall of the Peter-Paul School, St. Petersburg, and was conducted by Nikolai Rimsky-Korsakov.

A news item relating to the development of ELECTRIC WALDEN technology: The first long distance telephone call was made (it was between New-York and Boston, by officials of the American Bell Telephone Company).

ELECTRIC WALDEN

47. This would be paralleled, in a later year, by the development of the chain-driven computer impact printers, for mainframe computer output, that could slap an entire line of characters against 11x14 green-and-white-striped fanfold perforated paper at a time instead of only one character at a time, thus deafening a generation of tape apes.

1885

A news item relating to the development of ELECTRIC WALDEN technology: Dorr E. Felt (1862-1930) of Chicago fashioned his “Comptometer” (this was the 1st calculator into which numbers were to be entered by pressing keys as opposed to being dialed or input by similar awkward methods).

ELECTRIC WALDEN

1886

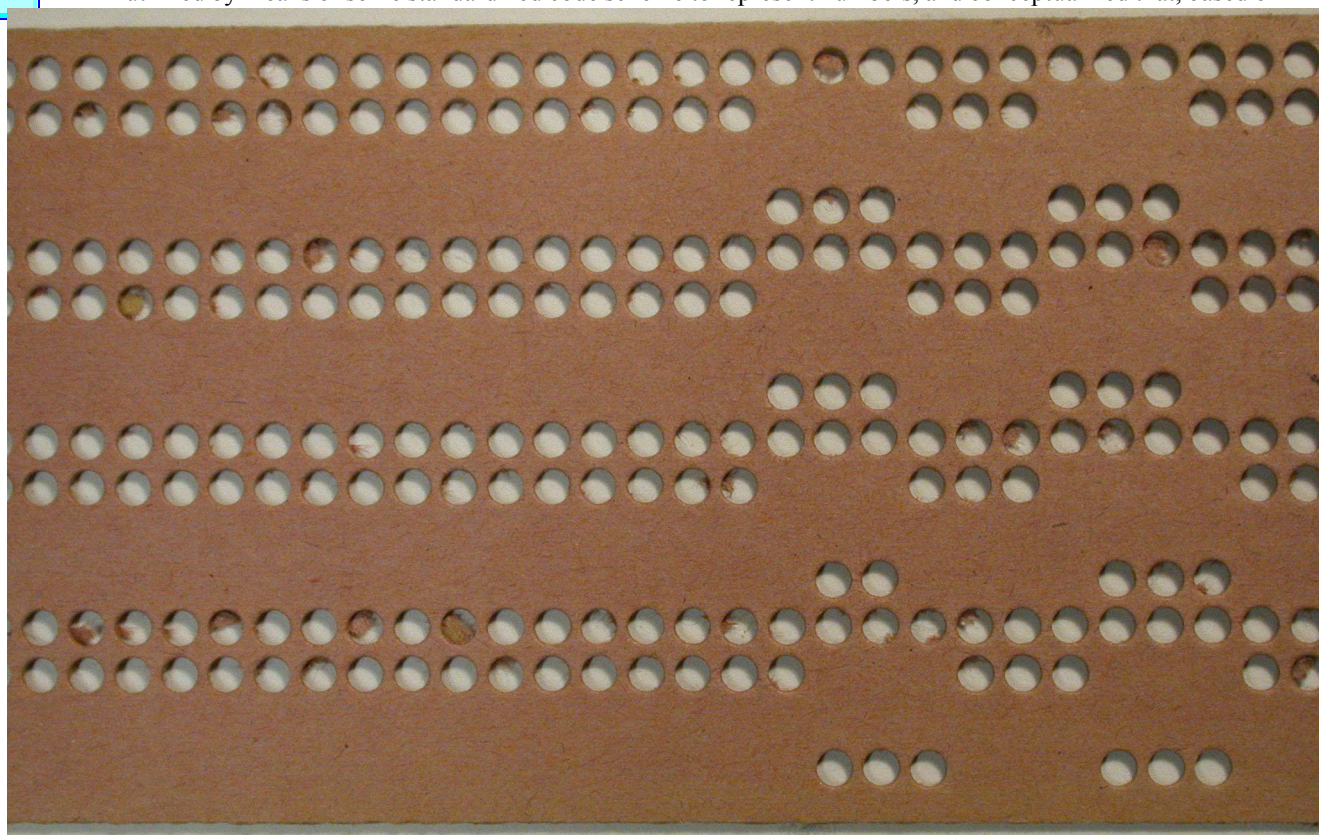
News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC
WALDEN

- William Burroughs developed the first commercially successful mechanical adding machine.
- The Hammond typewriter of this year, like the IBM Selectric typewriter of the 1940s with its typeball, placed all type characters on a single part. This was not a first, however, as the Pratt device of 1866 and the Crandall device of 1879 had done likewise.

ELECTRIC WALDEN

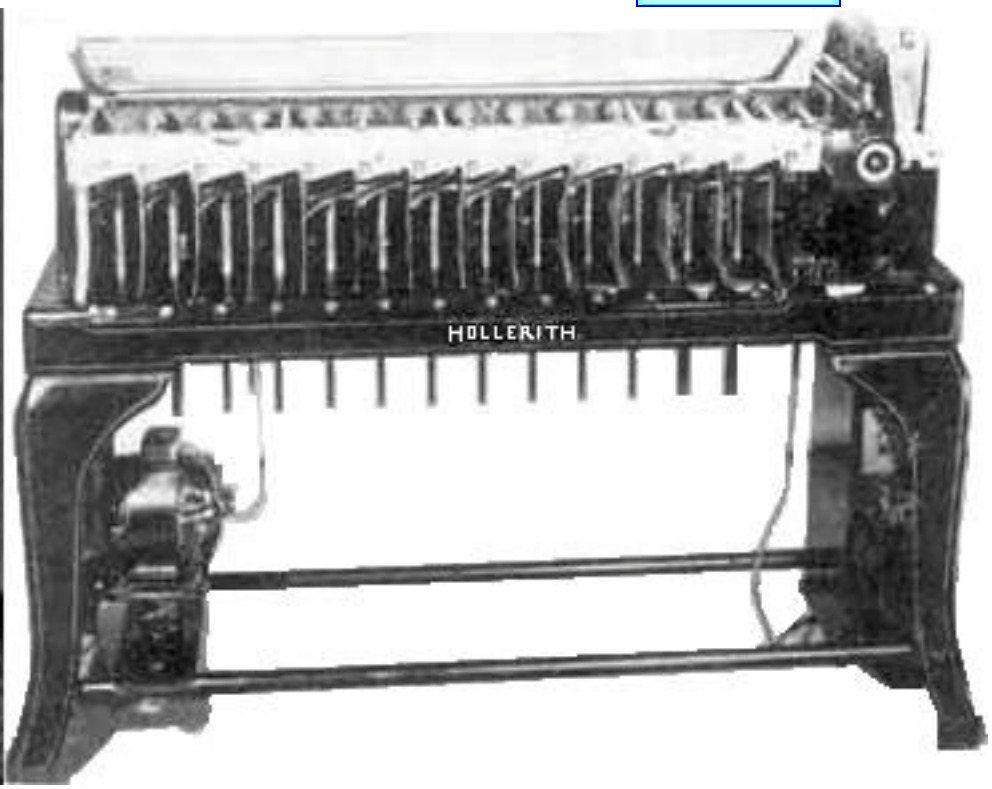
A news item relating to the development of ELECTRIC WALDEN technology: Herman Hollerith, a credited statistician working on the data obtained during the 1880 national census, conceptualized that a machine something like a Jacquard loom might be able to sense the presence or absence of circular hole punched in specific locations on a piece of stiff paper, and conceptualized that these circular holes might be utilized by means of some standardized code scheme to represent numbers, and conceptualized that, based on



this sensed numeric information, the machine might then be induced to perform sorting and arithmetic operations. By means of metal pins which descended through circular punched holes in cards to touch the liquid surface of mercury in trays beneath the cards and complete an electric circuit, the information obtained in the census of 1890 would be extractable in a third of the time which had been required to process the information obtained in the census of 1880. Out of this would come, in 1911, the Computing Tabulating

Recording Company, or CTRC — a forerunner of IBM, the International Business Machine Company.

THE CENSUS



July 3, Saturday: A news item relating to the development of ELECTRIC WALDEN technology: For the 1st time, Otto Mergenthaler, working for the New-York Tribune, succeeded in using his Linotype machine to print an entire newspaper page.

ELECTRIC WALDEN

September 14, Tuesday: A news item relating to the development of ELECTRIC WALDEN technology: The typewriter ribbon was patented.

ELECTRIC WALDEN

1889

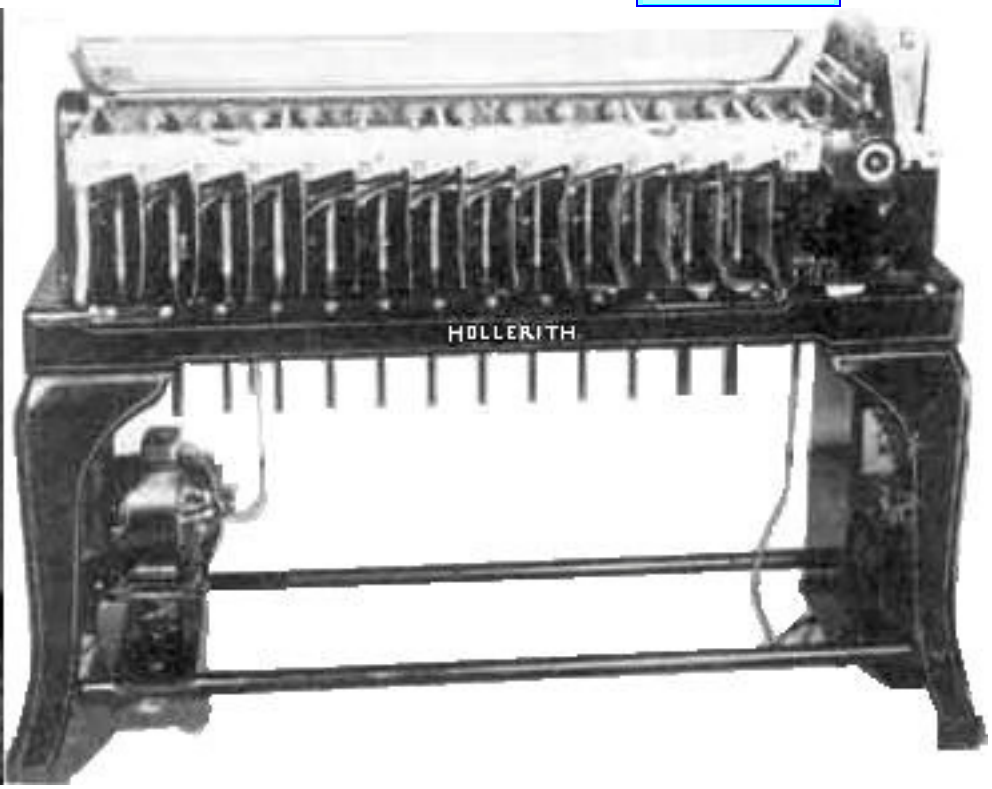
News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The conventional fixed-escapement typewriter required that all characters be of equal width. This squeezed large characters such as “M” and “W” while surrounding thinner characters such as “i” and “1” with empty space. In this year the Maskelyne typewriter featured proportional spacing (which was not exactly a novelty, since in 1833 Xavier Progin had allotted different spaces to upper-case versus lower-case letters), but this novel apparatus had the disadvantage of being exceedingly complex.
- Dorr E. Felt (1862-1930) of Chicago invented the 1st printing desk calculator.

- Herman Hollerith patented the 1st punch-card machine, for use in tabulation of the 1890 census.

THE CENSUS



"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

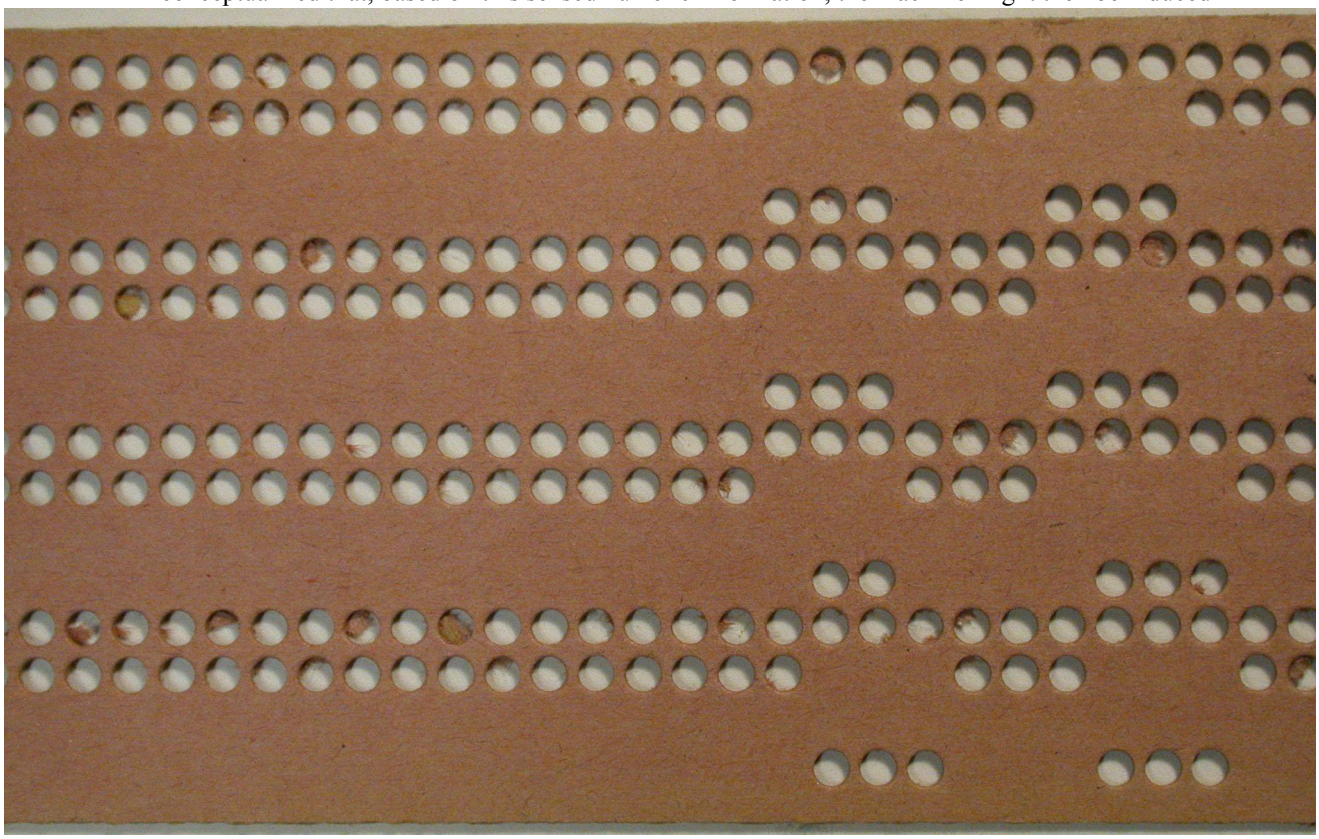
1890

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

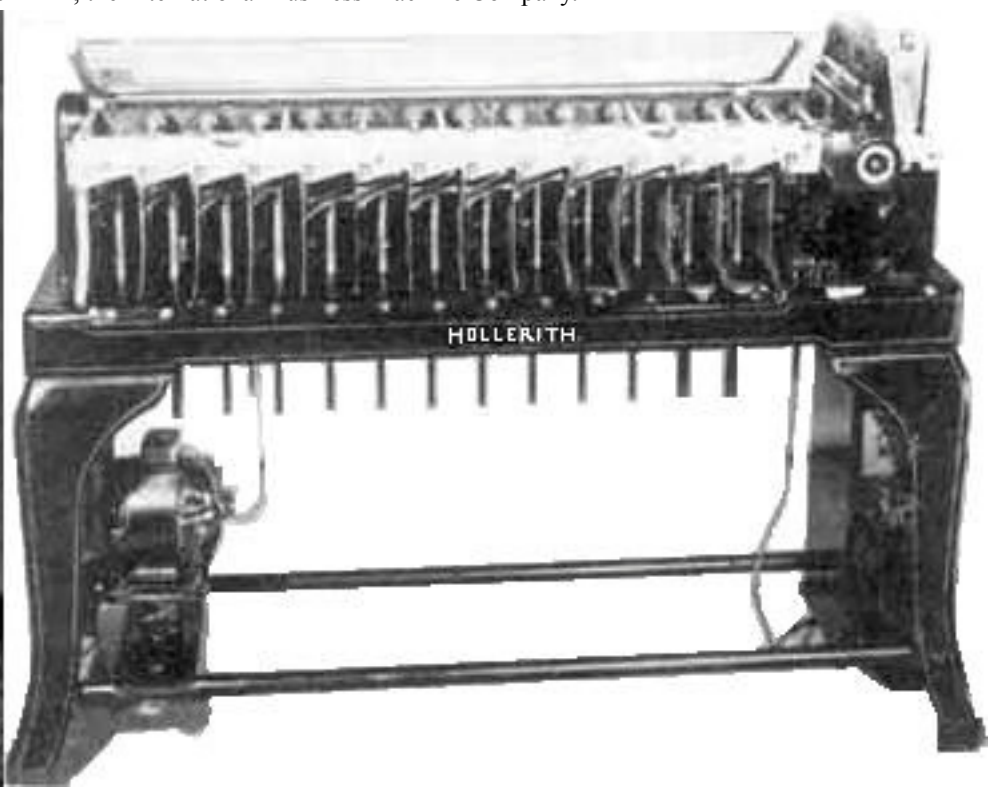
- When a delegation of Hungarian pilgrims in Turin, Italy recorded a short patriotic speech by an elderly Lajos Kossuth, he became the earliest-born person ever to have his voice preserved in such a manner (this was done on two wax cylinders for the Edison phonograph but, although they are still around, they are now barely audible due to excess playback and due to early restoration attempts that have further damaged the wax).

- The 11th national census. Herman Hollerith (1860-1929) of MIT, a credited statistician working in 1886 on the data obtained during the 1880 national census, had conceptualized that a machine something like a Jacquard loom might be able to sense the presence or absence of circular hole punched in specific locations on a piece of stiff paper, and had conceptualized that these circular holes might be utilized by means of some standardized code scheme to represent numbers, and had conceptualized that, based on this sensed numeric information, the machine might then be induced



to perform sorting and arithmetic operations. For the analysis of this year's national census data, metal pins would be descending through circular punched holes in cards to touch the liquid surface of mercury in trays beneath the cards, thus completing electric circuits and registering data at a blazing amazing speed. The information obtained in this 11th stab at a decent census would be

extractable in a third of the time which had been required to process the information obtained in the census of 1880. Out of this would come, in 1911, the Computing Tabulating Recording Company, or CTRC — a forerunner of IBM, the International Business Machine Company.



This was the start of the punchcard industry (thus establishing the size of the card, for obvious reasons the same size as a US $1 bill was at that time. The cost of the census tabulation rose by 98% from the previous one, in part because of the temptation to use the machines to the fullest and tabulate more data than formerly possible. The cost of the electricity used to read the cards was also

significant.

devices are exceedingly ingenious, and of interest to all accounting officers, whether they are likely to use them or not, we shall try in this article to describe them, though it will not be possible, in the space available, to do so in full detail. The simplest form of Hollerith's machine is that which was used in the compilation of the last

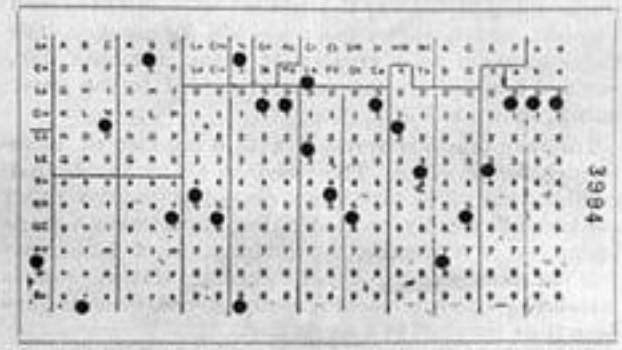


Fig. 4.—Sample of Punched Card, About One-fourth Size.

United States census, for assorting and adding *units* only. The principles of the device for doing this will be understood from the following brief description after which the application of the apparatus to the more complicated work of making up freight statistics, will be more readily understood.

suitable counters. To illustrate the method of connecting a machine for counting combinations of various

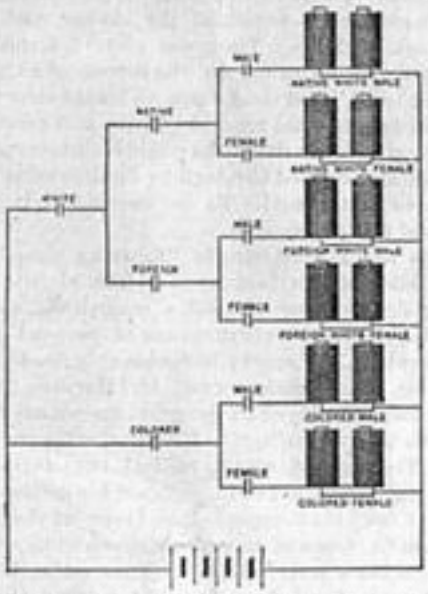


Fig. 5.—Electric Connections for Combination Counting.

facts reference is had to Fig. 5. In the present instance it is arranged to count combinations of race, sex and

As of 1790 the center of the human population of the USA had been a little town just about a day's

travel inland from Baltimore. By this period the center of population had relocated.

(Nowadays, of course, we've all been coming from one or another center in Missouri.)

1891

March 18, Wednesday: The 1st telephone message between Paris and London.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

April 1, Wednesday: The beginning of public telephone service between London and Paris.

ELECTRIC WALDEN

1892

A news item relating to the development of ELECTRIC WALDEN technology: William S. Burroughs (1857-1898) of St. Louis devised a machine similar to the one created by Dorr E. Felt (1862-1930) in 1889, but considerably more robust. This would be the one that would really start the office calculator industry. (Such personal computers were still hand powered at this point, but electrified ones would follow.)

ELECTRIC WALDEN

1895

A news item relating to the development of ELECTRIC WALDEN technology: A report on Herman Hollerith's computer punchcards:

ELECTRIC WALDEN

RAILROAD GAZETTE

FRIDAY, APRIL 19, 1895.

HOLLERITH'S ELECTRIC TABULATING MACHINE.

A number of prominent railroad accounting officers have recently examined, with much interest, an invention for doing the great mass of the figuring in a freight auditor's office by machinery, at a considerable saving in time and expense, and with perfect accuracy; and as the devices are exceedingly ingenious, and of interest to all accounting officers, whether they are likely to use them or not, we shall try in this article to describe them, though it will not be possible, in the space available, to do so in full detail. The simplest form of Hollerith's machine is that which was used in the compilation of the last

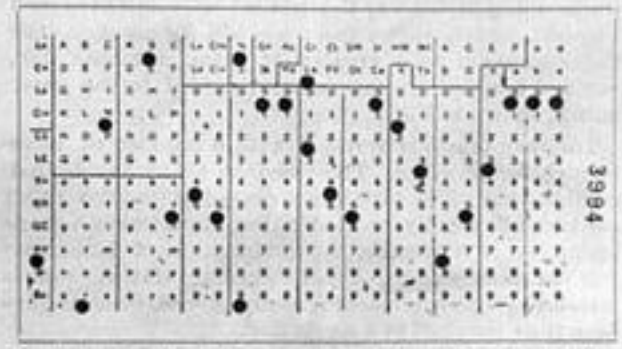


Fig. 4.—Sample of Punched Card, About One-fourth Size.

United States census, for assorting and adding *units* only. The principles of the device for doing this will be understood from the following brief description after which the application of the apparatus to the more complicated work of making up freight statistics, will be more readily understood.

In the last census a card was punched for each one of the sixty million *units* or persons enumerated. The cards described the characteristics of the respective persons by the *location* of the holes. In this way there was a record of the sex, age, race, conjugal condition, birthplace, occupation, etc., of each person. For counting the simple elements these cards were passed through the electric tabulating machinery in which the punched holes controlled the circuits through electro-magnets of suitable counters. To illustrate the method of connecting a machine for counting combinations of various

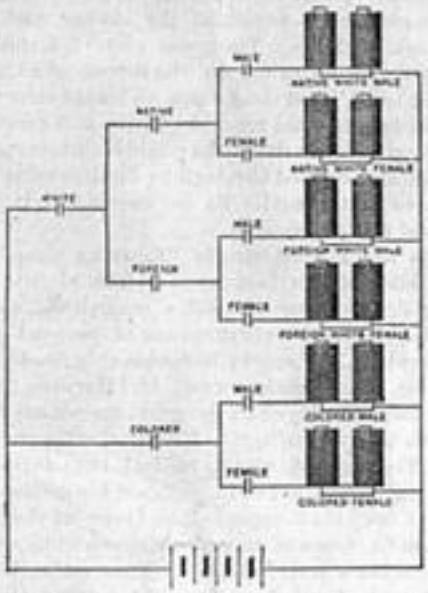


Fig. 5.—Electric Connections for Combination Counting.

facts reference is had to Fig. 5. In the present instance it is arranged to count combinations of race, sex and general nativity. Relays are operated directly by means of the punched cards. These relays close secondary circuits, as shown in the diagram. For example, in the present instance the current comes from the battery to

ELECTRIC WALDEN

1896

A news item relating to the development of ELECTRIC WALDEN technology: Herman Hollerith founded the Tabulating Machine Co., and constructed a sorting machine.

ELECTRIC
WALDEN

1897

Some news items relating to the development of ELECTRIC WALDEN technology:

- J.J. Thomson's discovery of the electron. (Don't ask how many of these things he discovered.)
- Lord Kelvin delivered himself of the scientific judgment that "Radio has no future" (of course, as we now know, given a long enough timeframe he was absolutely correct).
- When Alexander Graham Bell got into financial difficulties and offered to sell out for a mere $100,000.00 the president of Western Union, William Orton, took a dismissive attitude: "What use could this company make of an electrical toy?"[48]
- Graphite began to be manufactured by synthesis (rather than extracted as an ore and then processed).

ELECTRIC WALDEN

ELECTRONIFICATION

PRINTING INK

48. Hello?

1898

November 6, Sunday: Gustav Mahler conducted his 1st performance with the Vienna Philharmonic, a program of Beethoven and Mozart.

ELECTRIC WALDEN

Jules Massenet conducted an all-Massenet program at the Concerts Colonne in the Théâtre du Châtelet, Paris.

A news item relating to the development of ELECTRIC WALDEN technology: Nicola Tesla patented the first remote control, as a “method of and apparatus for controlling mechanism of moving vessels or vehicles.”

1900

Just before Easter: An event in the history of ELECTRIC WALDEN: A party of Dodecanese sponge divers working off a tiny island called Antikythera found at a depth of 200 feet the remains of an ancient ship. Among the items that would be recovered was a calcified lump of corroded bronze which would turn out under analysis to be the remains of a clocklike mechanism some two millennia old, in a wooden case that had degenerated, and under further analysis, the mechanism now appears to have been for the calculation of the motions of stars and planets. —Which is to say, this is a carefully crafted, heavily utilized early mechanical computing device. Refer to the article by Derek J. de Solla Price "An Ancient Greek Computer" in the Scientific American magazine for June 1959. Was this item merely some piece of modern detritus that had more or less recently fallen on top of the wreck? Nope! The settings found in the gears as recovered indicate to us that the computer was likely manufactured about 82BCE and relied upon for astronomical calculations for about two years subsequent to that manufacture. —For any other period of astronomical history, the settings found on the gears simply would not have been correct or useful!

ELECTRIC WALDEN

"History is the how of now."

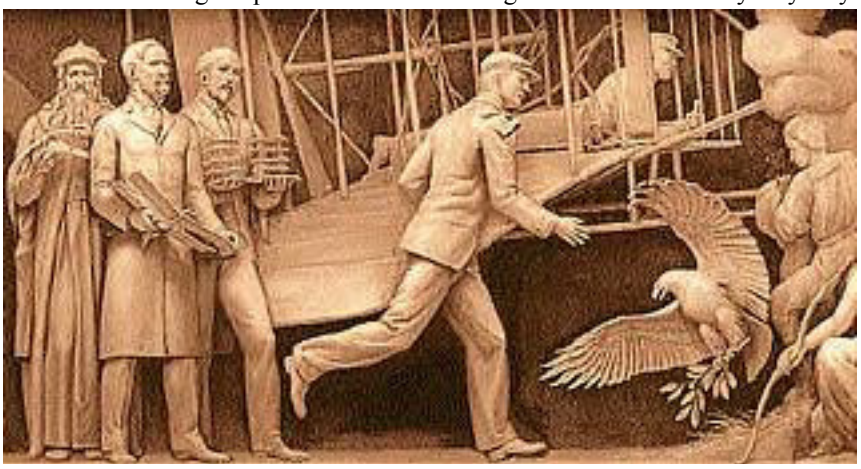
— Austin Meredith

1901

News items relating to the development of ELECTRIC WALDEN technology:

- Brother Wilbur commented to brother Orville that it would probably be another 50 years before humans learned the trick of how to fly in heavier-than-air machines.
- The 1st transatlantic radio transmission, by Guglielmo Marconi.

In this year H.G. Wells also was prognosticating that we would be flying around in heavier-than-air aircraft "very probably before 1950." Was he getting it from Wilbur — or was Wilbur getting it from him? These predictions would prove somewhat conservative, as of course the brothers would be flying around in their heavier-than-air aircraft, at the Kill Devil Hills, in merely a couple more years. —But that's the way it goes, the most incredible technological predictions often turning out to have been way way way too timid!



1902

News items relating to the development of ELECTRIC WALDEN technology:

- Arthur Korn (1870-1945) devised a process termed “telephotography” which improved FAX transmission by providing a way to break down and transmit and receive still photographs by means of electrical wires.
- The Blickensderfer device — a 1st attempt at creating a typewriter that ran on electricity.

1903

A news item relating to the development of ELECTRIC WALDEN technology: Nikola Tesla, a Yugoslavian who worked for Thomas Edison, patented electrical logic circuits now called gates or switches.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

1904

March 22, Tuesday: A news item relating to the development of ELECTRIC WALDEN technology: The London Daily Illustrated Mirror contained the 1st color photograph ever published.

ELECTRIC WALDEN

In Steinway Hall, London Think of Me, a song by Ralph Vaughan Williams to anonymous words (translated by Ferguson), was performed for the initial time.

William Stephen Coleman died after a prolonged illness at 11 Hamilton Gardens, St. John's Wood.

May 18, Wednesday: In Salle Erard, Paris, La véranda op.3 for voice, female chorus and piano or orchestra to words of Leconte de Lisle was performed publicly for the initial time, with the composer Charles Koechlin himself conducting. Meanwhile a dozen 12 nations none of whom were named "The United States of America" signed an International Agreement for the Suppression of the White Slave Trade (another 48 countries and territories none of whom were named "The United States of America" would follow over the succeeding 6 years).

In Morocco an American, Ion Perdicaris, was kidnapped.

A news item relating to the development of ELECTRIC WALDEN technology: German engineer Christian Hülsmeyer gave the initial public demonstration of his telemobiloscope on the Hohenzollern Bridge at Cologne, by successfully detecting the approach of a ship on the Rhine River (this was the 1st practical radar).

ELECTRIC WALDEN

ELECTRIC WALDEN

1906

A news item relating to the development of ELECTRIC WALDEN technology: Lee De Forest modified the Fleming vacuum tube to create the Audion valve.

ELECTRIC
WALDEN

1907

News items relating to the development of ELECTRIC WALDEN technology:

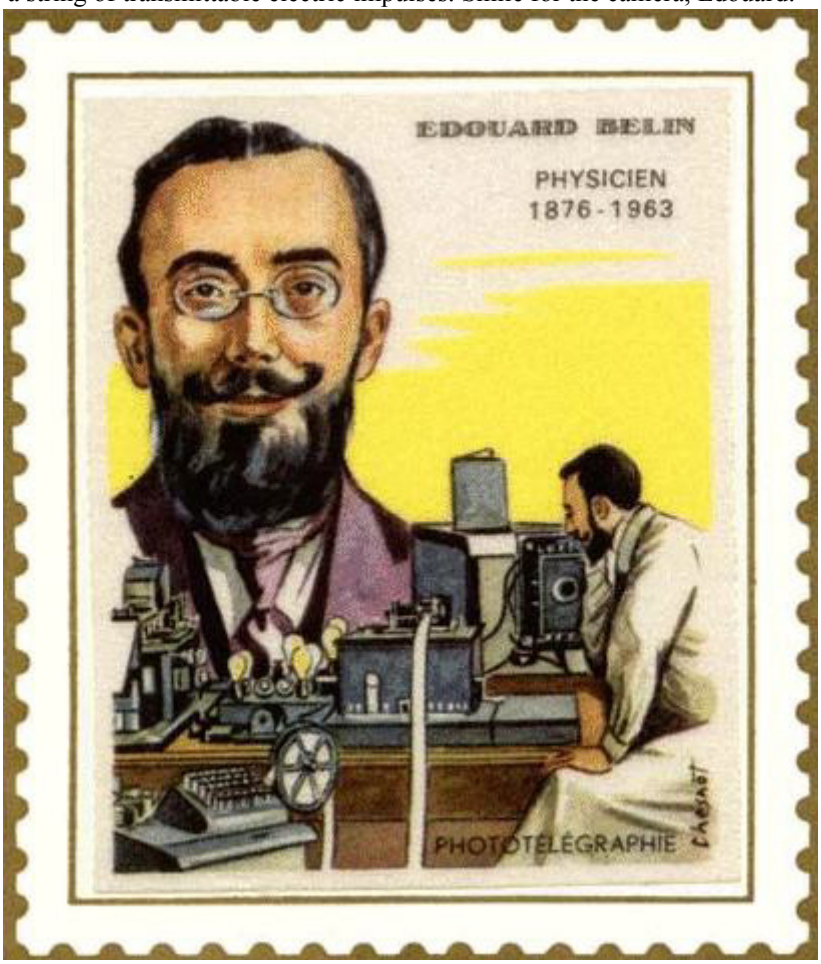
ELECTRIC WALDEN

- Plastic was patented by L.H. Baekeland. Industrial production of a compound they decided to term "Bakelite" would begin in 1909.
- In an attempt to gain acceptance for their powered heavier-than-air aircraft, the Wright brothers packed it up and Wilbur went with it to France. At the port it was impounded for many months by French customs officials. Meanwhile, back in the USA, Orville had transported another model to the army base at Ft. Myer, Virginia, and on September 3rd flew it around the parade ground there. However, on September 17th, on a flight with Lieutenant Thomas E. Selfridge as a passenger, one of the guy wires snapped and fouled a propeller, the machine dove into the ground, and the lieutenant was killed and Orville seriously injured. Finally, in France, Wilbur was able to get his machine uncrated and assembled and into the air over Le Mans on August 8th. Then on December 31st he won the Michelin Prize by flying $77^{1}/_{2}$ miles in two hours and twenty minutes, and the Wrights finally had achieved the press coverage which the novelness of their invention demanded.

However, the military enacted a curious specification for aircraft: before they would be interested, they said, the inventors would have to demonstrate that their machine could readily be disassembled, and transferred from place to place in a standard horse-drawn army wagon.

- Arthur Korn sent his 1st intercity FAX, from München to Berlin.
- Edouard Belin, who had been experimenting with FAX transmission since 1897, achieved with his invention, the "Belinograph," the 1st telephoto transmission, from Paris to Lyon to Bordeaux and back to Paris. His device used a photoelectric cell to scan a cylinder as it rotated. A black-and-

white photo mounted on this cylinder would, depending on the light or dark portions of the image, generate a string of transmittable electric impulses. Smile for the camera, Edouard:



1908

LESSONS FROM THE WORLD OF MATTER AND THE WORLD OF MAN: SELECTED FROM NOTES OF UNPUBLISHED SERMONS BY THEODORE PARKER EDITED WITH A PREFACE BY RUFUS LEIGHTON (Boston: American Unitarian Association, 25 Beacon Street). These Sunday morning Boston Music Hall sermons of the Reverend Theodore Parker had been taken down "phonographically," which is to say, stenographically, during the period 1849-1859 and the tubercular Reverend Parker had given his consent for the creation of this volume in the latter part of January 1859 as he prepared to board ship in Boston harbor for the West Indies in an attempt to recover his health.

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: During the second half of the 19th Century there had been this great battle between those typewriter advocates who held that such a device would need to enable visual writing, in which one could see what one was typing as one typed it, versus those typewriter advocates who held that one ought not to be able to see what one was typing until afterward. This battle of the visibles versus the nonvisibles had raged on and on — but by this point in time most manufacturers of typewriters had gone visible.

ELECTRIC WALDEN

1911

A news item relating to the development of ELECTRIC WALDEN technology: The Computer-Tabulating-Recording Company was formed through a merger of the Tabulating Company (founded by Hollerith), the Computing Scale Company, and the International Time Recording Company.

ELECTRIC WALDEN

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

ELECTRIC WALDEN

1912

A news item relating to the development of ELECTRIC WALDEN technology: Lee De Forest became able to use his Audion valves for powerful amplification.

ELECTRIC WALDEN

ELECTRIC WALDEN

1914

A news item relating to the development of ELECTRIC WALDEN technology: Thomas J. Watson became the president of the Computing-Tabulating-Recording Company.

ELECTRIC
WALDEN

1915

January 25, Monday: Alexander Graham Bell and Thomas Watson effected the 1st transcontinental telephone communication, from Bell in New York to Watson in San Francisco.

Two Songs and La lune blanche, both for solo voice and orchestra by Frederick Delius to words of Verlaine, were performed for the initial time, at Grafton Galleries.

To Thee! America for chorus and orchestra by Henry F. Gilbert to words of Manly was performed for the initial time, in Peterborough, New Hampshire.

Madame Sans-Gêne, an opera by Umberto Giordano to words of Simoni after Sardou and Moreau, was performed for the initial time, at the Metropolitan Opera, New York.

Germany introduced bread cards.

1917

A news item relating to the development of ELECTRIC WALDEN technology: Connectivity was growing: by this point one in every ten American citizens had access to a telephone.

ELECTRIC WALDEN

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

1918

A news item relating to the development of ELECTRIC WALDEN technology: Edwin Armstrong developed the superhetrodyne circuit used in today's radios and TVs for reception/amplification.

ELECTRIC
WALDEN

1919

A news item relating to the development of ELECTRIC WALDEN technology: Hugo Koch's "secret writing machine," which during World War II would be known as the Enigma, demonstrated yet again that technology which in and of itself is quite innocent may have wicked as well as benevolent applications.

ELECTRIC
WALDEN

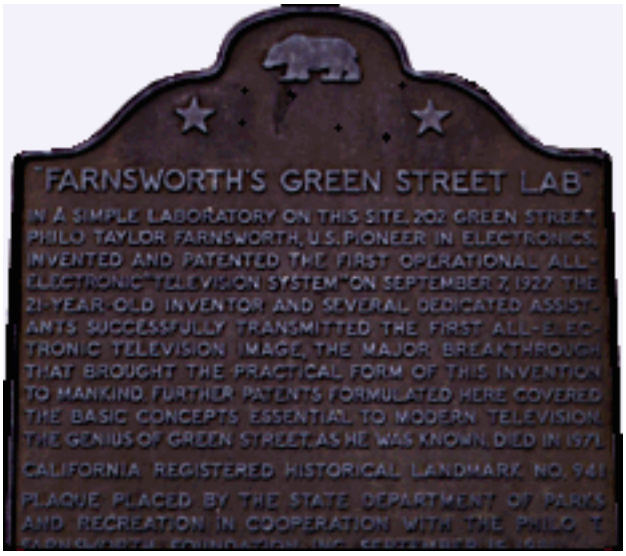
1921

A news item relating to the development of ELECTRIC WALDEN technology: In the play *R.U.R.* by Karel Capek, the Czech word *robot* was used to describe mechanical workers.

ELECTRIC
WALDEN

1922

A news item relating to the development of ELECTRIC WALDEN technology: Philo T. Farnsworth, who in 1927 would create the 1st all-electronic TV system, in this year wrote up a plan for this.



"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

April 11, Tuesday: While on a trip to Italy during his European studies, Aaron Copland arrived in Florence from Rome.

A news item relating to the development of ELECTRIC WALDEN technology: The New York Philharmonic made its first recording, for the Victor Company, Beethoven's Coriolan Overture (this was pressed on a couple of 12-inch one-sided discs).

1923

News items relating to the development of ELECTRIC WALDEN technology:

- In this year and the next Vannevar Bush was first toying with his idea of a “memory extender” technology: the “memex” proposal.
- Vladimir Zworykin patented his “ionoscope” TV transmission tube.

ELECTRIC WALDEN

“History is the how of now.”

– Austin Meredith

1924

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: The work of Herbert Ives on the photoelectric effect allowed Bell System engineers to stage a public demonstration that it had become possible to transmit pictures over telephone wires (this would lead, in 1927, to the 1st US long-distance television transmission by wire and radio).

February 14, Thursday: A news item relating to the development of ELECTRIC WALDEN technology: A company based in the state of New York changed its name from “Computing-Tabulating-Recording Company” (CTR) to “International Business Machines” (IBM).

February 22, Friday: A news item relating to the development of ELECTRIC WALDEN technology: Live from the White House in Washington DC, President Calvin Coolidge addressed the American people by means of a radio broadcast (and yes, he did utter more than two words).

June 5, day: A news item relating to the development of ELECTRIC WALDEN technology: Ernst Alexanderson sent the 1st facsimile (FAX) across the Atlantic Ocean, to his father in Sweden.

November 30, Sunday: News items relating to the development of ELECTRIC WALDEN technology:

- Radio Facsimilie Transmission, the transmission of photographs from the Marconi wireless telegraph offices in London to New York City, was demonstrated by the Radio Corporation of America.
- The 1st radio station in Mexico, established by Educación Pública, began broadcasting in Mexico City.

Tzigane, rapsodie de concert, in the version for violin and orchestra, by Maurice Ravel, was performed for the first time, in Paris.

The first issue of Der deutsche Rundfunk containing the writing of their new music correspondent, Kurt Weill, was published.

Two works for chamber orchestra by Arthur Honeger were performed for the first time, at a League of Composers concert in the Klaw Theater, New York: L’ombre and L’homme et la mer.

1925

News items relating to the development of ELECTRIC WALDEN technology:

- John Logie Baird transmitted the 1st still TV picture. (The device by which he accomplished this feat was mechanical rather than electronic.)
- Vannevar Bush's "Differential analyzer," a predecessor of the analog computer.

ELECTRIC WALDEN

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

1926

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The 1st public test of radiotelephone service between New York and London, marking the beginning of non-wire communication across the Atlantic.
- Using equipment developed at Bell Labs, Warner Brothers presented the 1st full-length motion picture with synchronized sound accompaniment.

June 7, Monday: Adli Yegen Pasha replaces Ahmad Ziwar Pasha as prime minister of Egypt.

Kazys Grinius replaced Aleksandras Stulginskis as president of Lithuania.

A news item relating to the development of ELECTRIC WALDEN technology: Lev Sergeyevich Termen (Leon Theremin) defended his thesis at the Physico-Technical Institute in Leningrad by demonstrating before 200 students and faculty an ability to generate, at a remote distance by means of what he termed his "Mechanism of Electric Distance Vision," moving albeit blurry television images. It was the first TV broadcast.

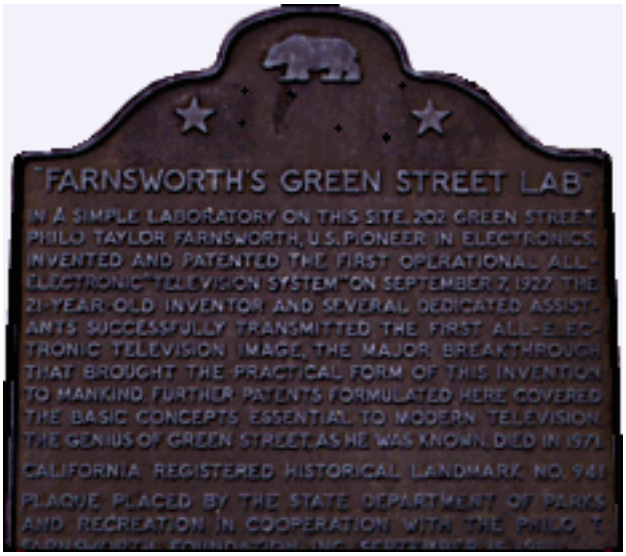
October: A news item relating to the development of ELECTRIC WALDEN technology: Dr. Julius Edgar Lilienfield of New York filed for a patent on a "Method and Apparatus for Controlling Electric Currents." The application completely describes an NPN junction transistor and its use as an amplifier (the 1st solid-state amplifying transistor).

1927

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Harry M. Warner, one of the Warner brothers, asked "Who the hell wants to hear actors talk?" This was a sensible enough question, but, it would turn out, Warner had not grasped what was the correct answer — everyone.
- Bell Laboratories created the 1st live cable-TV, and demonstrated the process by sending live images of Herbert Hoover over the telephone lines from Washington DC to New York City.
- Harold S. Black of Bell Labs created the negative-feedback amplifier. Because it radically reduces distortion in communication signals, this device would enable the development of long-distance telephony, and better radio and high-fidelity amplifiers.
- In 1875, the *Le grand Robert de la langue francaise* of Paul Robert had first offered a definition of "infrastructure." At this point the Oxford English Dictionary picked up the term as it was being employed in the English language. "Infrastructure" is made up of the basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices, and prisons. The term is generally applicable to all fixed and permanent installations, fabrications, or facilities for the support and control of military forces.[49]
- The idea that matter behaves like waves was a fundamental discovery yielding a new tool for analyzing surfaces, leading to improved vacuum tube operation.
- In San Francisco, on Green Street, Philo T. Farnsworth created the 1st all-electronic TV system:



49. The Kouroo Contexture is an attempt to fundamentally alter the infrastructure of scholarly research, and of education, by erasing the institutional barriers that have always existed between scholarly research and education, that have been forcing these two things to be two discrete activities bestowed upon two different groups of people.

August 29, Monday: Telephone service began between Washington DC and Mexico City.

At the Broadway Theater, Long Branch, New Jersey, “Strike Up the Band,” an operetta with book by Kaufman, lyrics by Ira Gershwin and music by George Gershwin, was performed for the initial time. One of the new songs was “The Man I Love.” The play would never reach New York.

1928

In regard to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Pfleumer of Germany provided the 1st magnetic tape for use as a data-storage device in computers.
- A Russian immigrant, Vladimir Zworykin, invented the CRT cathode ray tube.
- Baird constructed the 1st mechanical color TV.
- Ralph Hartley, an engineer at Bell Labs, used the term "information" to describe the amount of message, as opposed to static, that flowed through a telephone wire. He described it as the useful part, the part that the engineer would attempt to preserve and magnify. At that early point, no attempt was yet being made to distinguish between information and meaning, so if you transmitted the message "Yes, I will marry you" to a recipient who already knew you would, the information content of the message was taken to be zero rather than one bit. It would not be until 1948 that this separation of information from meaning would map the social distinction between the engineering functionary whose job it was to get a message from here to there with a minimum of distortion, and who was therefore intent upon maximizing information transfer without regard for meaning, and, on the other hand, the information providers and recipients whose concern it was to maximize the meaningfulness of their communication without regard for the technical theory of intermediate information transfer. By focusing on maximizing information rather than taking any concern for meaningfulness, the engineer may embrace the task of getting the probability of error in transmission as close to zero as might be desired, which is what is now referred to as the "fundamental theorem" of information theory. –And this is the reason we can now toss around our CDs in a way that we would never have dared in the days of LP vinyl records: because there are now built-in error correction codes to eliminate noise due to scratches and fingerprints, and because we are now relying upon digital rather than analog techniques of mediation.
- In his "minimax theorem," John von Neumann established the groundwork for a mathematical theory of games (this would appear in 1944 as a treatise written jointly with Oskar Morgenstern, THEORY OF GAMES AND ECONOMIC BEHAVIOR). His minimax theorem is that for a large class of 2-person zero-sum games, there's just no point in playing. Either player may consider, for each possible strategy of play, the maximum loss that he can expect to sustain with that strategy and then choose as his "optimal" strategy the one that minimizes the maximum loss. If a player follows this reasoning, then he can be statistically confident of not losing more than that value called the minimax value. Since (this is the assertion of the theorem) that minimax value is the negative of the one, similarly defined, that his opponent can guarantee for himself, the long-run outcome is completely determined by the rules.

1929

News items relating to the development of ELECTRIC WALDEN technology:

- AT&T patented coaxial cable.
- An artificial larynx was developed, that makes speech possible for people whose larynxes have been surgically removed.
- John von Neumann became a *privatdocent* (lecturer) at the University of Hamburg. He was still working mainly on quantum physics and operator theory. Largely because of his work, quantum physics and operator theory can be viewed as two aspects of the same subject.

1930s

ELECTRIC WALDEN

H.G. Wells lamented that, while the world was becoming smaller and moving at increasing speed, the way information was distributed remained old-fashioned and ineffective, and prescribed a “world brain,” a collaborative, decentralized repository of knowledge that would be subject to continual revision. More radically –with “alma-matricidal impiety,” as he put it– Wells indicted academia; the university was itself medieval. “We want a Henry Ford today to modernize the distribution of knowledge, make good knowledge cheap and easy in this still very ignorant, ill-educated, ill-served English-speaking world of ours.”

There would be more executions in the USA during the 1930s than in any other decade in American history, an average of 167 per year.

CAPITAL PUNISHMENT
COLDBLOODED MURDER

ELECTRIC WALDEN

1931

A news item relating to the development of ELECTRIC WALDEN technology: A 1st calculator, the Z1, was built in Germany by Konrad Zuse.

ELECTRIC WALDEN

"If you wish to make an apple pie from scratch, you must first invent the universe."
— *Carl Sagan*

1932

A news item relating to the development of ELECTRIC WALDEN technology: At MIT, Vannevar Bush constructed his mechanical computer known as the “differential analyzer.”

ELECTRIC WALDEN

“History is the how of now.”

– Austin Meredith

1933

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The 1st electronic talking machine, the Voder, was built by Dudley (he would follow this in 1939 with the Vocoder voice coder).
- Armstrong developed FM (frequency modification) radio broadcasting.
- The 1st stereophonic sound: Bell Labs transmitted a symphony concert in stereo over phone lines, from Philadelphia to Washington.
- We were curious about why there was so much static in overseas radio signals. Discovery, by Karl G. Jansky, of radio waves from the Milky Way, led toward a new science, that of radio astronomy.
- James Fields Smathers, deriving his inspiration from the rollover cam action of a hayraking machine, had a few years earlier devised a rollover cam driven by a rubber power roll by which he could power the typebar action of a typewriter. His idea was to create a typing office on the order of a machine shop, with a single motor conveying the power of motion to a bank of typewriters by way of an overhead belt and rollers. However, when IBM had entered the picture in this year, the concept changed to that of each standalone machine having a small electrical motor built into it, with a mechanically operated clutching device that would power various functions of that machine. In this year IBM purchased the Electromatic Typewriter Company of Rochester, New York, a company with the ownership of some patents that would be needed, 30 employees in its manufacturing facility, and 6 salesmen.

1934

ELECTRIC WALDEN

A news item relating to the development of ELECTRIC WALDEN technology: IBM invested more than $1,000,000 in an attempt to improve the design of the sort of typewriter that was being produced by the Electromatic Typewriter Company of Rochester, New York, the company it had purchased in the previous year, diversifying its product line and modernizing its manufacturing facilities. The acquired company would be producing a modern powered typebar typewriter able to make more carbon copies, cut a better stencil, make a clearer ditto master, etc. The product line would come to include an Automatic Formswriter that would eliminate some of the manual operations required to advance and detach multipart forms while inserting and removing interleaved sheets of carbon paper, a Toll Biller for easier generation of telephone bills, and something they would term a Hektowriter — a device that could prepare masters for the then-popular duplicating process, liquid hectograph.

1935

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- International Business Machines (IBM) developed a machine, descended from the Markograph, to score tests for the New York State Regents and the public schools of Providence, Rhode Island.
- The Kludge paper feeder, as an adjunct mechanism to mechanical printing presses. (Nowadays we term a software patch a “kludge” if it has been jury-rigged and quick-and-dirty programmed to temporarily solve a crisis situation, but can be counted on to generate problems of its own.)
- G. Domagk discovered the sulphonamides.
- At Dupont, W.H. Carothers made the 1st nylon fibers.
- As part of their attempt to intercept the constantly growing percentage of Jewish students, Harvard University began to require all candidate for admission to take the Scholastic Aptitude Test (SAT). This, supplemented by “interviews,” ought to do the trick.

April 12, Friday: A news item relating to the development of ELECTRIC WALDEN technology: Kodak announced the introduction of Kodachrome, the 1st commercially available color film. This had been invented by two musicians, Leopold Godowsky and Leopold Mannes.

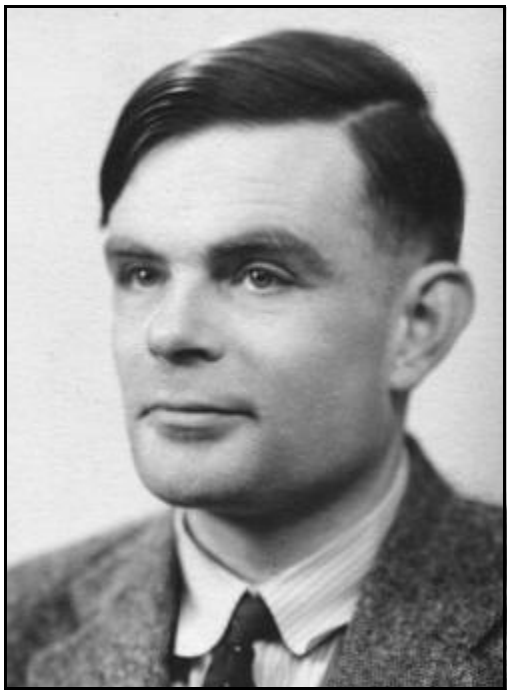
Four Marian Songs for chorus by Bohuslav Martinu to traditional Czech words, was performed for the initial time, in Prague.

The 1st exhibition of paintings devoted entirely to the work of Carl Ruggles opened at Bennington College, Vermont.

1936

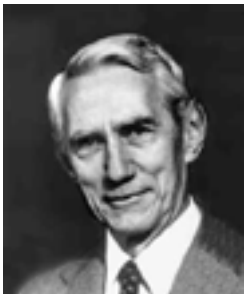
ELECTRIC WALDEN

News items relating to the development of ELECTRIC WALDEN technology: In the 1936-1938 timeframe Alan Turing would be at Princeton University working on a PhD and writing papers in logic, algebra, and number theory. In this year he published a description of his universal computer in “The Turing machine: On Computable Numbers....”



While at Princeton University he would be formalizing the notion of calculableness and adapting the notion of algorithm to the computation of functions. Turing’s machine is defined to be capable of computing any calculable function.

- The 1st speech synthesis machine that could recreate human speech was publicly demonstrated.
- Claude Shannon received his BA in mathematics and electrical engineering from the University of Michigan.



1937

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

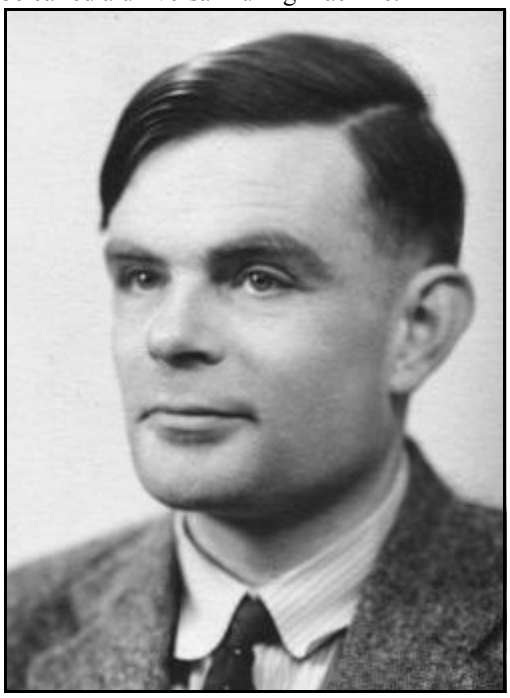
- At Bell Telephone Laboratories, George Stibitz displayed his binary calculator, the 1st electrical digital computer and the forerunner of today's computer technology — a device that he had ingeniously constructed out of existing telephone switches and electro-mechanical relays.
- Dr. Vannevar Bush began his pioneering work on the intellectual apparatus that would become known in the 1960s as "hypertext," but which he was terming "memex" or memory-expander.
- This one a significant one: On September 17th, at 4 in the afternoon, in a hospital in Lacrosse KN, my mother Mildred Geraldine Mattox Smith gave birth to a baby boy, not yet at this point deformed. Was this a case of transmigration of souls, with the Reverend Gleason's questing soul finding itself a new home? – **"News at 11."** This person who came to prefer to be known as Austin Meredith was born in the year in which the first (not the last) great American ecological disaster,

termed the "Dust Bowl," swept across that community sending streams of economic refugees toward all points of the compass. These displaced persons would come to be contemptuously referred to in their places of refuge as Okies:

> **See that dog over there, son? That must be an Okie dog – because notice it's got that telltale little brown O!**

- George Stibitz (*circa* 1910-) of Bell Labs at New York City constructed a demonstration 1-bit binary adder using relays.
- John Vincent Atanasoff built a logic unit out of an array of 7 triode tubes that operated as a 12-bit, 2-2ord digital computer at the 60-Hertz frequency of a wall AC plug. The device was capable of adding and subtracting binary numbers.
- H.H. Aiken made plans for an electronic calculator.

- Alan Turing of Cambridge University, England, published a paper on “computable numbers” which solved a mathematical problem by considering as a mathematical device the theoretical simplified computer that came to be called a universal Turing machine.

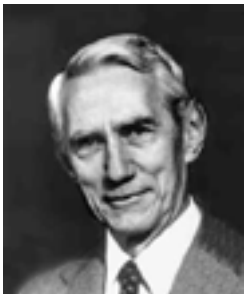


1938

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Konrad Zuse (1910-) of Berlin completed a prototype mechanical programmable calculator, later called the "Z1." Its memory used sliding metal parts and stored about 1000 bits. The arithmetic unit was unreliable.
- The Hewlett-Packard Co. was founded, to make electronic equipment.
- Radio altimeter: In the 1st public display of the device, radio signals were bounced off the ground to indicate to the pilots the altitude of their aircraft.
- Claude Shannon published a paper on the implementation of symbolic logic using relays.



"History is the how of now."

– Austin Meredith

October 22, Saturday: A news item relating to the development of ELECTRIC WALDEN technology: Chester F. Carlson produced the 1st xerographic (that is, dry-process) copy of a piece of writing. The writing which he copied in this new manner said "10.-22.-38 ASTORIA." The invention of xerographic copying would more or less languish until 1946: in what manner was either this or wet copying superior to reliance upon foresight, and ordinary carbon paper?

But what they had done in Astoria, Queens was coat a zinc plate with sulphur and then rub it with a handkerchief to give it an electric charge. They then had placed a slide atop it and shined a light through the slide. The slide had written upon it: "10.-22.-38 ASTORIA." They had then sprinkled an electrically reactive powder over the plate and blown the excess powder away. Well, the process wasn't efficient yet, to say the least. But they had demonstrated that it did work, would work, that one actually could produce "dry writing," that is, one could accept the constraint of using no processing fluids. In 1997, some 1,750,000 machines based upon this principle would be sold in the USA alone. The "Pentagon Papers" scandal would be a product of this xerography.

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

December 6, Tuesday: A news item relating to the development of ELECTRIC WALDEN technology: Vladimir Kosma Zworykin received a US patent for the cathode-ray tube, an essential element of television.

A Franco/German pact of friendship and peace was signed.

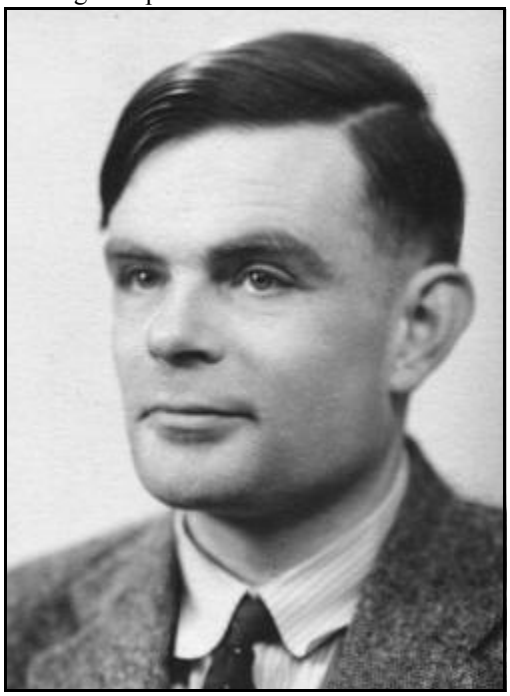
READ THE FULL TEXT

1939

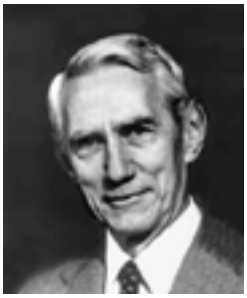
News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- William R. Hewlett and David Packard formed Hewlett-Packard.
- RCA broadcasted from the World's Fair.
- Alec Reeves developed a pulse-code modulation system that was able to convert analog info into digital on/off signals.
- The 1st Radio Shack catalog was published.
- At Iowa State College, with the help of graduate student Clifford Berry, John J. Atanasoff designed a prototype for the ABC (Atanasoff-Berry Computer). –In 1973 a judge would recognize this to have been the 1st automatic digital computer.
- During this year and the following one, Alan Turing was building his Bombe, a machine for decryption of the German Enigma cipher.



February 16, Thursday: A news item relating to the development of ELECTRIC WALDEN technology: Graduate student Claude Shannon wrote to his thesis adviser, Dr. Vannevar Bush, that "Off and on, I have been working on an analysis of some of the fundamental properties of general systems for the transmission of intelligence, including telephony, radio, television, telegraphy, etc." This letter, which is now preserved in the archives of the Library of Congress, lays out many of the ideas which Shannon would be offering in July 1940 as "A Mathematical Theory of Communication."



October: News items relating to the development of ELECTRIC WALDEN technology:

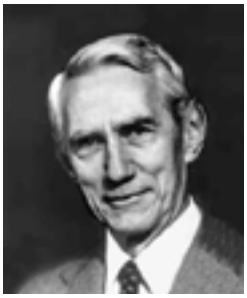
- Stibitz and Samuel Williams completed the "Model I," a calculator using relay logic. It was controlled through modified teletypes and these could be connected through phone lines. Later machines in the series also had some programmability.
- John V. Atanasoff (1903-) and Clifford Berry, of Iowa State College in Ames (where the Ames strain of anthrax was first stockpiled, after it was found in a small town in south Texas), completed a prototype 16-bit adder. This was the 1st computer to calculate using vacuum tubes.

1940

News items relating to the development of ELECTRIC WALDEN technology:

- At about this point Professor John von Neumann began to focus more on applications than on new pure research into number theory.

- At Bell Labs, George Stibitz demonstrates the Complex Number Calculator, which may be the 1st digital computer.
- First color TV broadcast.
- Remote processing experiments, conducted by Bell Laboratories, create the 1st terminal.
- It was at about this point that Zuse completed the "Z2," keeping the mechanical memory but using relay logic. He couldn't interest anyone in funding him.
- It was early in this decade that Howard Aiken's Mark I electromechanical calculator was being built for IBM, the calculator which unlike Charles Babbage's 1830 machine lacked a "conditional branch," the If ... then statement of computing which would make it possible to create subroutines.
- Jorge Luis Borghes's "Garden of Forking Paths" gave us an early idea of what narrative hypertext was going to look like, once we had the technology properly to implement such an idea.[50]
- Having already taken a MA in electrical engineering from the Massachusetts Institute of Technology, for a Master's thesis "A Symbolic Analysis of Relay and Switching Circuits" on the use of Boolean algebra to analyze and optimize relay switching circuits, in this year Claude Shannon received also a PhD in Mathematics, for a Doctoral thesis on theoretical genetics. While at the Massachusetts Institute of Technology he had also been working on the differential analyzer, a type of non-electronic mechanism for obtaining approximate numerical solutions to ordinary differential equations that had been developed by Dr. Vannevar Bush.



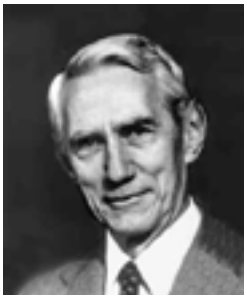
50. For Jorge Luis Borghes's idea, monolingual *gringos* can refer to the collection of stories published in English as LABYRINTHS.

1941

Claude Shannon published “Mathematical theory of the differential analyzer.”

> The most important results [mostly given in the form of theorems with proofs] deal with conditions under which functions of one or more variables can be generated, and conditions under which ordinary differential equations can be solved. Some attention is given to approximation of functions (which cannot be generated exactly), approximation of gear ratios and automatic speed control.

He then joined AT&T Bell Telephones in New Jersey, where he would remain until 1972, as a research mathematician. He only rarely had lunch with the other researchers and became noted there both for his habit of keeping his office door closed — and for riding a unicycle in the halls at night.



Here are some other news items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The Colossus computer was designed by Alan M. Turing and built by M.H.A. Neuman at the University of Manchester, England.
- The 1st TV commercial, by NBC, tied this new technology to a source of funding for its development.
- Visible speech: The spectrograph revealed speech patterns for the 1st time.
- Introduction of a typewriter with proportional spacing (which was not exactly a novelty, since in 1833 Progin had allotted different spaces to upper-case versus lower-case letters, and since in 1889 the Maskelyne mechanism had featured proportional spacing). The new IBM design used a rotary type of escapement mechanism of three separate escapement wheels designed to provide 2, 3, or 4 units of carriage motion. When used in combination, these escapements could produce 2, 3, 4, 5, or 6 units of carriage travel, producing much greater legibility and much more rapid readability of typed text.

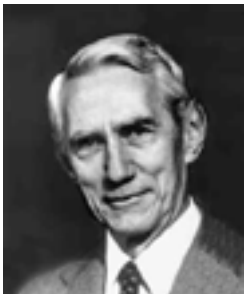
June: A news item relating to the development of ELECTRIC WALDEN technology: John W. Mauchly visited John V. Atanasoff, an Iowa State professor who in the early 1940s was working on a digital calculating machine.

December: A news item relating to the development of ELECTRIC WALDEN technology: Konrad Zuse, having promised to a research institute a special-purpose calculator for their needs, actually built them in Germany the “Z3,” which was the 1st electromechanical operational program-controlled floating point binary calculator with a store and a programming language, on that had 64 22-bit words of memory. However, its programmability didn’t include a conditional- jump instruction; this was an idea that Zuse never had. The program was on punched tape. The machine included 2600 relays, and a multiplication took 3 to 5 seconds.

1942

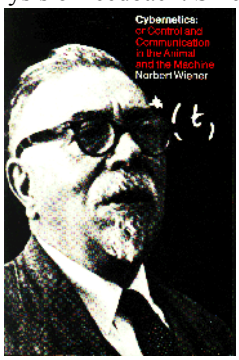
A news item relating to the development of ELECTRIC WALDEN technology: Working with John Riordan, Claude Shannon prepared a paper on the number of two-terminal series-parallel networks. This paper extended results obtained by MacMahon who had published his early contribution in the Electrician in 1892.

ELECTRIC WALDEN

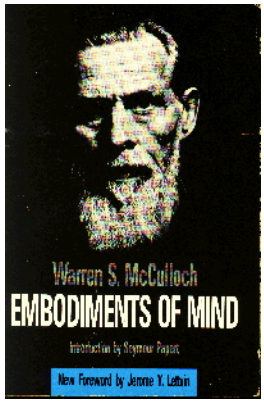


"If you wish to make an apple pie from scratch, you must first invent the universe."
— *Carl Sagan*

Friend Warren Sturgis McCulloch is now perhaps best known for “A Logical Calculus Immanent in Nervous Activity,” which he co-authored during this year with the young Walter Pitts. This paper created the “neural network” model of brain function and has been widely credited as a seminal contribution to neural network theory, the theory of automata, the theory of computation, and cybernetics. It had been inspired by Norbert Wiener, Bigelow, and Roseblueth’s analysis of feedback. Since the neural network was capable of the same



sort of output as the Turing machine that Alan Turing had described in 1936, there must be an underlying set of principles which governs both dry and wet computing (as the authors put it, “man-made or begotten”).



J.C.R. Licklider received his PhD degree from the University of Rochester.
His thesis was “An Electrical Investigation of Frequency-Localization in the Auditory Cortex of the Cat.”
For the early years of World War II, he would be at Swarthmore College in Swarthmore PA, as a Research Associate studying Gestalt psychology with Wolfgang Koeller.

Spring: A news item relating to the development of ELECTRIC WALDEN technology: Atanasoff and Berry completed a special-purpose calculator for solving systems of simultaneous linear equations, later called the "ABC" ("Atanasoff-Berry Computer"). This had 60 50-bit words of memory in the form of capacitors (with refresh circuits) mounted on two revolving drums. The clock speed was 60 Hz, and an addition required 1 second. For secondary memory it used punch cards, with the holes being burned rather than punched in them, moved around by the user. (The punch card system's error rate was never reduced beyond 0.001%, which wasn't good enough.) Atanasoff then left Iowa State, and apparently lost all interest in digital computing machines. [An article in Scientific American would characterize this as the 1st computer.]

August 11, Tuesday: A news item relating to the development of ELECTRIC WALDEN technology: Actress Hedy Lamarr of Hollywood, California (previously known as Hedwig Maria Eva Kieler of Vienna, Austria) and George Antheil, an experimental musician of Hollywood, had developed a technique called Serial Communication which could be used to steer torpedoes and win the war. They obtained US Patent 2,292,387 for their invention. The invention would not be used to defeat Adolf Hitler and Benito Mussolini and Tojo Hideki and win World War II, probably because in attempting to explain the nature of the serial communication solution to signal transmission problems to US weaponry evaluators they made the tactical error of analogizing their device to the mechanism operating a player piano. Presumably this analogy between the arts of music and the arts of war disgusted the military, which they referred to as "reverend and brass-headed gentlemen," and turned their minds against the invention, which we now know would have worked quite well. Antheil explained that "In our patent Hedy and I attempted to better elucidate our mechanism by explaining that certain parts of it worked like the fundamental mechanism of a player piano. Here, undoubtedly, we made our mistake."[51] In addition, when actress Hedy volunteered to make her technical skills and understanding of electronics available in Washington DC during the war by work on the National Inventors Council, she was rebuffed. A woman sexually attractive enough to star in a movie entitled "Ecstasy" couldn't possibly also be an electronics whiz! "People assume perhaps she wasn't intelligent because she was so beautiful. But she really had a mind ... she held her own with anybody." How can we be sure that this invention of serial communication would have worked quite well? Because it is now an integral and essential part of our electronic spread-spectrum scheme known as "frequency hopping," for expanding the Internet into those rural or undeveloped areas of the world which have been lacking in an adequate wiring infrastructure (such as, for one example, Latvia). The CMDA Code Division Multiple Access technology uses this spread-spectrum scheme. Cell phones also use this scheme. Now that the patent has expired and military secrecy has been overcome, Hedy's and George's unused wartime invention has been being used not only to increase the security of signal transmission, but also to decrease interference between multiple simultaneous signal transmissions.

Mobs continued to riot in major Indian cities. Government buildings were attacked in New Delhi. Hundreds were injured and arrested.

German troops took Kalach, southeast of Voronezh.

51. I made a similar mistake when I presented this database project to the National Endowment of the Humanities. When I told them proudly that the database would even include sound recordings of the bird calls being described by Henry Thoreau in his journal, their evaluators expressed shock and disgust and disdain, and questioned the seriousness of our entire effort. All funding was refused. They gave an equivalent amount of money instead to a group of scuba divers that wanted to go down to the South Pacific and swim around in the surf looking for Amelia Earhart's plane crash. For an amount of money that would have published this database on CD-ROM, these scuba divers proceeded to discover on an isolated island in the South Pacific what may or may not be the heel of one of Earhart's shoe, and what may or may not be the top of one of her medicine bottles.

The Germans began the deportation of French civilians for slave labor.

The HMS *Eagle*, a British 22,600-ton aircraft carrier (Captain L.D. Mackintosh) was torpedoed in the Mediterranean, north of Algiers, while escorting a convoy (Operation Pedestal) to the island of Malta, by Kapitän-Leutnant Helmut Rosenbaum's U73. 4 torpedoes hit the ship on its port side slewing it to starboard and shedding the parked Sea Hurricanes on deck into the sea. Listing to port it rolled slowly over and sank in just a bit longer than 7 minutes. Of its crew of 1,087, 2 officers and 158 ratings died. Many of the 927 floaters were severely injured by concussion when the boilers exploded before they could be picked out of the sea by the destroyers HMS *Lookout* and HMS *Laforey* and the tug *Jaunty*. (On December 16, 1942, when U73 would be sunk off Oran by US destroyers *Woolsey* and *Trippe*, 16 of its German crew would die and 34 survive.)[52]

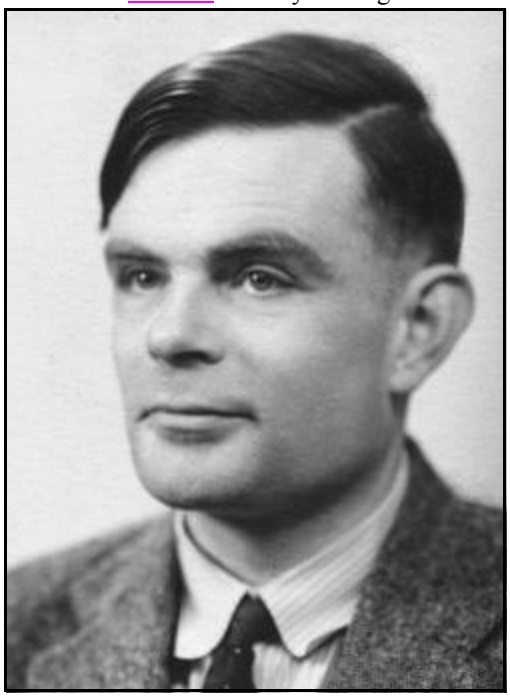
52. Isn't is curious, the macabre way these statistics are routinely kept? The number of officer deaths gets cited, then the number of "ratings" deaths? Imagine trying to say to a "rating" who is going down for the third time, "Look, fellow, you're obviously taking this pretty hard –it's your death and all that– but can't you at least derive some consolation from the fact that this would have been a significantly greater loss to us, had you been an officer? God must have loved you enlisted types, he made so many of you. Soon you will lose consciousness — and then you'll be a mere nameless, painless statistic who has given your life for your country! Don't sweat it, it's the way things are. Come on now, at least you can hum a bit from 'There'll always be an England'...."

1943

January: A news item relating to the development of ELECTRIC WALDEN technology: Howard H. Aiken (1900-1973) and his team at Harvard University (with backing from IBM) completed the "ASCC Mark I" (Automatic Sequence-Controlled Calculator, Mark I). This was the 1st program-controlled calculator to be widely known. The machine had 72 accumulators. It was about 60 feet long and weighed 5 tons.[53]

ELECTRIC WALDEN

December: A news item relating to the development of ELECTRIC WALDEN technology: Alan Turing and his team at Bletchley Park near Cambridge, England completed the 1st or "Mark I" version of their "Colossus." This was a secret special-purpose decryption machine, not exactly a calculator but close. It used 2400 tubes for its logic calculations, and read characters optically from five long paper-tape loops moving at 5000 characters per second. The machine would break the German military message code.



53. You can start holding your breath now. Remarkable miniaturization will follow shortly.

1944

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Harvard University's computerization began in this year on the basis of the work of Professor Howard H. Aiken as the IBM ASCC, a relay-based computer (also known as "Mark I"), became functional. Grace Murray Hopper began her career in the computer industry by becoming the first programmer for this Mark I.
- The Colossus Mark II was being built in England. (Although it is commonly presumed that the 1945 ENIAC was the 1st electronic digital computer, now that more of the WWII papers have been declassified we learn that the British machine series named Colossus, the 1st of which had gone into operation in 1943 for helping with cryptanalytic problems, used thousands of thyratron tubes, was flexible in its programming, and avoided the tube reliability problem by leaving the machine always switched on, achieving levels of about 100 billion operations before encountering outcome-affecting error situations. This Colossus device thus deserves consideration as the 1st large-scale electronic computer.)

February 5, Saturday: Fantasy Sonata for clarinet and piano by John Ireland was performed for the initial time, in Wigmore Hall, London.

Soviet forces occupied Lutsk and Rovno in the Ukraine.

The Colossus Mark 1 began decyphering German coded messages at Bletchley Park, Milton Keynes, northwest of London (this was the initial electronic, programmable, digital computer and had been designed by Alan M. Turing and built by M.H.A. Neuman at the University of Manchester).

US Submarine *Narwhal* (SS-167) delivered supplies and evacuated certain personnel from near Libertad on the island of Panay in the Philippine Islands.
Japanese submarine sunk: Submarine I-21, by destroyer *Charrette* (DD-581) and destroyer escort *Fair* (DE-35), Marshall Islands area, 6 degrees 48 minutes North, 168 degrees 8 minutes East

WORLD WAR II

1945

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Friedrich Hayek's free-market manifesto "The Use of Knowledge in Society" argued that a single person's knowledge was by definition partial, and truth could be achieved only by people pooling their insights.
- Arthur C. Clarke proposed the use of geostationary satellites for world communications.
- John W. Mauchly and J. Presper Eckert at the University of Pennsylvania created ENIAC (Electronic Numerical Integrator and Computer), the first working digital, general-purpose, electronic computer ever built, on government contract, secretly, to calculate trajectories for World War II artillery shells. While ENIAC was being built a team member met with John von Neumann, who was interested in crunching numbers for the Manhattan Project to produce a nuclear weapon, and von Neumann would contribute ideas for ENIAC's successor, EDVAC (Electronic Discrete Variable Calculator) and write "First Draft of a Report on the EDVAC," which would include certain of Eckert's and Mauchly's concepts without crediting them for these concepts. Mauchly would explain why von Neumann was given all the credit to the fact that when our historians go to assign credit for discoveries, they always strive to attribute these discoveries to whatever person had at the time the biggest reputation. In other words, von Neumann would get away with this simply because he was already famous — and they, working in anonymity on a classified military project, were not.
- A new writing implement was introduced at this point, which somewhat joined the convenience of the pencil with the permanence of ink. This new technology, the "ballpoint pen," was characterized in Scientific American in the following manner:

  > Using a miniature ball bearing as its writing contact and viscous ink, a new writing instrument which rolls the ink onto the surface dry, instead of inscribing it wet with a pen point, has just been announced. It is claimed that the pen cannot leak or drip and that ink cannot be shaken out of it.

  (Yeah, but this was a gravity-flow device and US scientists had yet to figure out how to make it write while upside down. The Russkis, going into space, would solve the problem by reverting to pencils.)
- John von Neumann joined the ENIAC team and during this year and the next would be writing a report describing the future computer that eventually would be built under the name "EDVAC" ("Electronic Discrete Variable Automatic Computer"). This report happens to have been the 1st description of the design of a stored-program computer. An early draft which failed to credit other team members such as Eckert and Mauchly received too-wide distribution, leading to von Neumann getting too much credit, e.g., the term "von Neumann computer" which was derived from this paper — and the term "von Neumann bottleneck" which was derived from "von Neumann computer" as people became more and more irritated with the inherent limitations of exclusively serial processing.

Our national birthday, Wednesday the 4th of July: In Berlin, Germany in a formal ceremony involving a 48-gun salute, the Stars and Stripes was being hoisted over the Adolf Hitler Barracks (before this year, as everyone present for the ceremony appreciated, it would have been hard to imagine something like this being allowed to happen on the 4th of July).

CELEBRATING OUR B-DAY
WORLD WAR II

With written permission from the park authorities, Roland Wells Robbins, an amateur archeologist who lived on the old Cambridge turnpike, began to search for the remains of Henry Thoreau's habitation near the shore of Walden Pond.

In the July issue of The Atlantic Monthly, which was on the newsstand in Concord while Robbins was digging at Walden Pond, we saw another signal event in the development of ELECTRIC WALDEN:
Dr. Vannevar Bush, a bomb expert, had finally found a forum for his pioneering article "As We May Think," the foundation thinking on the MEMEX or memory-expander (an idea for a personal computer of sorts, and on hypertext).

450 US bombers drop 3,000 tons of incendiaries on Tokushima, Takamatsu, Kochi, and Himeji.

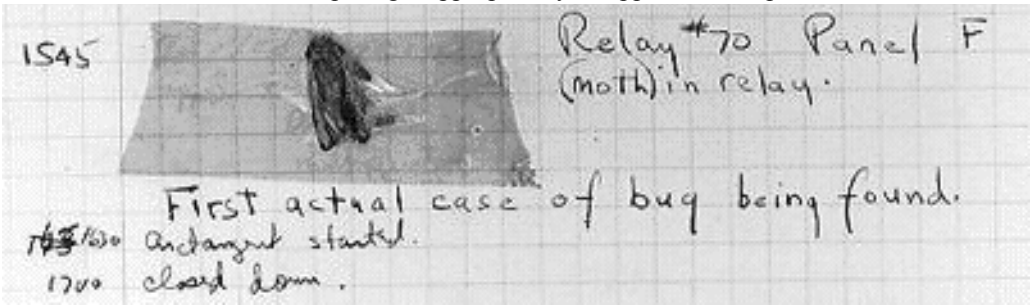
Several works by Charles Koechlin were performed for the initial time, at the Ecole Normale, Paris: Six of Les chants de Nectaire for flute op.198, Soir païen op.35/4 for voice and piano to words of Samain, and Il pleure dans mon coeur op.22/4 for voice and piano to words of Verlaine, 44 years after it was composed.

Late Summer: Douglas Engelbart was a 20-year-old radar technician working in the Philippines as part of the Army demobilization effort. Fortunately, in his vicinity was a nice Red Cross library, up on stilts, a cool, airy structure with lots of polished bamboo, that could be a sort of refuge for him from the insanity of it all — and in this refuge he chanced upon the July 1945 issue of The Atlantic Monthly, and its signal event in the development of ELECTRIC WALDEN, a bomb expert's — Dr. Vannevar Bush's — "As We May Think" article about a "Memex" devise based upon microfilm technology.

"The inheritance from the master becomes, not only his additions to the world's record, but for his disciples the entire scaffolding by which they were erected."

— Dr. Vannevar Bush, "As We May Think," The Atlantic Monthly, September 1945

August: A news item relating to the development of ELECTRIC WALDEN technology: Grace Murray Hopper, working in a temporary World War I building that was still standing (fancy that!) at Harvard University on the Mark II computer, found the 1st computer bug pinched in the jaws of a relay. "Things were going badly; there was something wrong in one of the circuits of the long glass-enclosed computer," she said. "Finally, someone located the trouble spot and, using ordinary tweezers, removed the problem, a two-inch moth. From then on, when anything went wrong with a computer, we said it had bugs in it." Thereafter when the machine stopped (which was frequently) they would inform Howard Aiken that they were "debugging." Later, on September 9, 1947, she would glue the actual bug into the logbook of the computer. This very 1st computer bug still exists at the National Museum of American History of the Smithsonian Institution. The text of the log entry is "1545 Relay #70 Panel F (moth) in relay. First actual case of bug being found." This wording establishes that the term was already in use at the time in its current specific sense. Hopper has herself reported that the term "bug" was already regularly being applied to problems in radar electronics during the WWII period. The word "bug" and the concept "debugging" had been used previously by Thomas Alva Edison and others, but this was probably the 1st verification that the concept might appropriately be applied to computations.



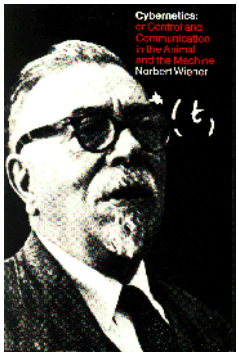
Here was how Edison had glossed the term: "The first step is an intuition and it comes with a burst, then difficulties arise — this thing gives out and then that — 'Bugs' — as such little faults and difficulties are called..." By 1878 when Edison penned this, more than 12,000 Western Union telegraphers were on line with

one another and the term had already become standard jargon among such technocrats. The clerks of course chatted with one another constantly along the wire (why not?) and it is known that one of the topics of their casual conversation in Morse Code was the gymnastics of the insects which were cavorting in the filthy cloakrooms provided for them by this benignly neglectful company. It is hypothesized that use of the word had originated as telegraphers' slang, a short word available to indicate technical difficulty.

We find this usage already in an electrical handbook dating to 1896, HAWKIN'S NEW CATECHISM OF ELECTRICITY (Theo. Audel & Co.): "The term 'bug' is used to a limited extent to designate any fault or trouble in the connections or working of electric apparatus." This 1896 source reported that the term was being "said to have originated in quadruplex telegraphy and have been transferred to all electric apparatus."

October: News items relating to the development of ELECTRIC WALDEN technology: Jay Forrester, who was in charge of developing a flight simulator that could be reprogrammed to give aircraft training on various aircraft rather than being confined to the parameters of a single model of plane, was persuaded by Perry Crawford to develop it as a digital rather than an analog device — so that the parts that would be changing so as to reflect different features of different aircraft could be captured in easily modified computer instructions rather than in hard-to-alter hardware. What this would mean was that they would have to change such computers over from being batch-oriented (solve a problem and stop) to being real-time (continue to respond to a series of fresh inputs). This "Whirlwind" project would be the largest and most expensive of its era.

- Norbert Wiener was so aghast at what had been being done offensively with his wartime mathematical research, which supposedly had been into the defense topic of antiaircraft fire control, that he was going around in scientific meetings referring to the "Massacre of Nagasaki." One of his more belligerent colleagues would characterize him as "a man in a confused dream."



ATOM BOMB

(Actually, of course, what had happened was that Norbert had wakened from a confused public

dreamstate which still was obscuring the thought processes of this colleague.)

November: A news item relating to the development of ELECTRIC WALDEN technology: John W. Mauchly (1907-80) and J. Presper Eckert (1919-) and their team at the Moore School of the University of Pennsylvania completed the “ENIAC” (“Electronic Numerator, Integrator, Analyzer, and Computer”) for the US Army’s Ballistics Research Lab (too late for the war and 200% over budget — problems that would hound Eckert and Mauchly again on later projects). The machine was a secret (until February 1946) program-controlled calculator. Its only memory was 20 10-digit accumulators (4 were originally planned). The accumulators and logic use vacuum tubes, 17,648 of them altogether. The machine weighed 30 tons, covered about 1000 square feet of floor, and consumed what was either 174 kilowatts (233 horsepower) or 174 horsepower (130 kilowatts). Its clock speed was 100 kHz; it could do 5,000 additions per second, 333 multiplications per second. Mauchly and Eckert applied for a patent. The university disputed this, but eventually settled. The patent was finally granted in 1964, but was overturned in 1973 in part because of previous work by Atanasoff.

Late in the year: A news item relating to the development of ELECTRIC WALDEN technology: ENIAC, still secret, was ready to carry out its first real calculation. It read in its data from decks of punchcards, and the calculation it would be performing would need to be set up as a program on a plugboard (this was considered reasonable back then, since the same program or a similar program would tend to be used for weeks at a time). But what would that initial calculation be? It did a simulated explosion of one of Edward Teller's hydrogen superbombs which turned out to consume three weeks of machine time.[54] It would not be until 1950 that ENIAC would be turned loose to do work on decent tasks, such as the calculation of weather predictions. John von Neuman, who allegedly knew how to think, was a Cold Warrior and he didn't mind this at all:

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I believe there is no such thing as saturation.
I don't think any weapon can be too large.[55]
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ATOM BOMB
WORLD WAR II

54. Eventually we would figure out, by this sort of calculation, that the design proposed by Teller simply could not work. Although during his life he actively suppressed this information, in fact, when we would eventually build an H-bomb, we would build it to a design proposed by one of his competitors, Stanislaw Ulam.
55. Maybe this machine's first calculation should have been to figure out how somebody who allegedly knew how to think, such as John von Neuman, could be such an idiot when it came to things that are truly important.

1946

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The head of 20th-Century Fox, Darryl F. Zanuck, declared that the craze for TV would be over in six months. “People will soon get tired of staring at a plywood box every night.”
- J. Presper Eckert and John Mauchly began work on a BINAC Binary Automatic Computer, the 1st computer to operate in real time (this would not be completed until 1949).
- Lin Yutang’s Chinese typewriter
- Development of an experimental single-element high-speed printer for accounting machines. The success of these single-element printers for data processing operating at speeds up to 2,000 characters per minute (eventually 3,000 cpm in the IBM 370 Printer), entirely eliminating any problem of clashing typebars as experienced in conventional typewriters, would lead during the early 1950s to IBM’s development of the basic Selectric typewriter configuration: a spherical single printing element mounted on a moving carrier and a fixed paper carriage.

February 14, Thursday: A Valentine’s Day news item relating to the development of ELECTRIC WALDEN technology: In Philadelphia PA, the Electronic Numeric Integrator and Computer, ENIAC, was switched on and asked to compute where a falling bomb was going to strike. In a few years, prescient pundits would begin to prognosticate a future in which there might even be dozens of such computers, and in which, instead of having to be on reinforced foundations because they weighed the 30 tons that ENIAC weighed, might weigh, say, as little as a ton and a half each. This ENIAC had a substantially lesser capability than today’s hand calculator, but its vacuum tube based technology was demonstrably a thousand times faster, three full orders of magnitude faster, than any other device of the time. Had the locomotive been even one order of magnitude faster than the stagecoach, the automobile even one order of magnitude faster than the locomotive, or the airplane even one order of magnitude faster than the automobile? –No, the airplane, as originally introduced, had been hardly one order of magnitude faster than one could trot on one’s unassisted two legs!

(It may well have been on this day that the term “computer” was first applied to a device, rather than used as the job descriptor for a human worker. This coinage was created by Friend Warren Sturgis McCulloch.)

Spring: A news item relating to the development of ELECTRIC WALDEN technology: J. Presper Eckert and John Mauchly, who were working with the ENIAC (Electronic Numerical Integrator and Computer) at the University of Pennsylvania –an electronic computer utilizing 18,000 vacuum tubes, occupying 8 by 100 feet of floor space and weighing some 80 tons, that could perform 5,000 additions and 360 multiplications per second– typed up 8 pages of business plan and proposal for venture capital for a company they desired to form that would sell such “electronic computers.” Their company, named Electronic Control Company and headquartered in Philadelphia, would begin to produce and vend the Universal Automatic Computer (UNIVAC).[56]

56. Eventually, in 2005, when this 8-page typescript would be offered at auction at Christie’s New York, the holders would expect that they were going to get paid something like $70,000 for it as an important historical document.

Late in the year: A news item related to the development of ELECTRIC WALDEN technology: John Tukey joined a discussion of what to call the binary digit, the fundamental unit of information. “Binit” and “bigit” had been proposed and of course nobody was greatly impressed. “Bit,” Tukey suggested. Claude Shannon would agree and, in a 1948 paper in which he would offer the term for the first time in print, credit would be given to Tukey for this 1946 suggestion.

“Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics.”

— Nicholas Metropolis, “The Age of Computing: A Personal Memoir,” DAEDALUS, Winter 1992: 119-30

1947

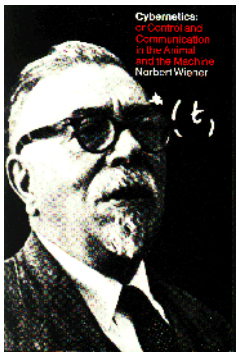
News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Alan M. Turing published an article on Intelligent Machinery which launched artificial intelligence.
- The Association for Computing Machinery (ACM) was formed.
- American computer engineer Howard Aiken calculated that merely 6 computers would satisfy all the future computing needs of the United States of America.

June: A news item relating to the development of ELECTRIC WALDEN technology: Deciding to build a business around their ENIAC wartime invention of 1945, John W. Mauchly and J. Presper Eckert belatedly filed for a patent. (As entrepreneurs they would prove inept and in 1950 would be forced to sell out to Remington Rand, a typewriter maker, which five years later would itself succumb to Sperry Rand which, inheriting this patent for the ENIAC, would sign a cross-licensing agreement with IBM, which by the 1960s had become the leading seller of computers. Challenging this agreement, Honeywell in 1967 would sue Sperry Rand over the validity of their inherited ENIAC patent, and win, effectively opening up the computer industry to competition. The trial would turn on the issue of whether Mauchly had himself given proper credit to Professor John V. Atanasoff of Iowa State, whom Mauchly had visited, who in the early 1940s had been working on his own digital calculating machine.)

Fall: A news item relating to the development of ELECTRIC WALDEN technology: Norbert Wiener decided to name his new science *cybernetics*, after the Greek meaning “steersman,” *kybernetes*. In his book on the topic he would point out that “this new development has unbounded possibilities for good and for evil.” (Maybe this was going to be a mental device that ought not to be unleashed upon the world without a governor? ;-)



Curable Optimist

"It is not by chance that the American union is in the state in which by far the greatest number of bold, sometimes unbelievably so, inventions are currently taking place. The achievements of a thousand racially questionable Europeans cannot equate with the capabilities of a thousand racially first-rate Americans."

— Adolf Hitler, 1928

December: A news item relating to the development of ELECTRIC WALDEN technology:[57] Three technologists at Bell Telephone Laboratories, John Bardeen, Walter Brattain, and William "Hush Baby Your Daddy Is A Rich White Man" Shockley, demonstrated their new invention, the point-contact transistor amplifier, that would soon be renown as "the transistor":

> [A] group of physicists at the Bell Telephone Laboratories has made a profound and simple finding. In essence, it is a method of controlling electrons in a solid crystal instead of in a vacuum. This discovery has yielded a device called the transistor (so named because it transfers an electrical signal across a resistor). Not only is the transistor tiny, but it needs so little power, and uses it so efficiently (as a radio amplifier its efficiency is 25 per cent, against a vacuum tube's 10 per cent) that the size of batteries needed to operate portable devices can be reduced. In combination with printed circuits it may open up entirely new applications for electronics.

57. Nowadays Nobel Laureate Shockley makes his sperm available, through a special Southern California sperm bank, for the proliferation of fresh generations of genius bastard — true fact, as photos of such offspring have appeared here in the press.

1948

ELECTRIC WALDEN

Lest we forget in our rush to praise ourselves over ELECTRIC WALDEN, the 1st electronic computer (the EDSAC Electronic Delay Storage Automatic Calculator developed at the University of Cambridge by Maurice V. Wilkes) and the 1st computer able to store a computer program (the Mark One developed at Manchester University) were created in this year not in the US but in Britain.

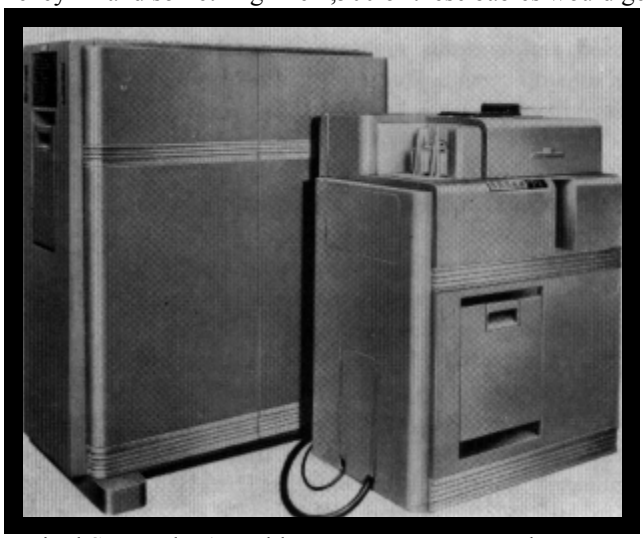
- However, it was in the USA that a stone racist named William Bradford "Hush Baby Your Daddy Is A Rich White Man" Shockley teamed up with John Bardeen and Walter H. Brattain to patent, in this year, the transistor. (Isn't it too bad this couldn't have happened to a nicer guy than Shockley?)

"It is not by chance that the American union is in the state in which by far the greatest number of bold, sometimes unbelievably so, inventions are currently taking place. The achievements of a thousand racially questionable Europeans cannot equate with the capabilities of a thousand racially first-rate Americans."

— Adolf Hitler, 1928

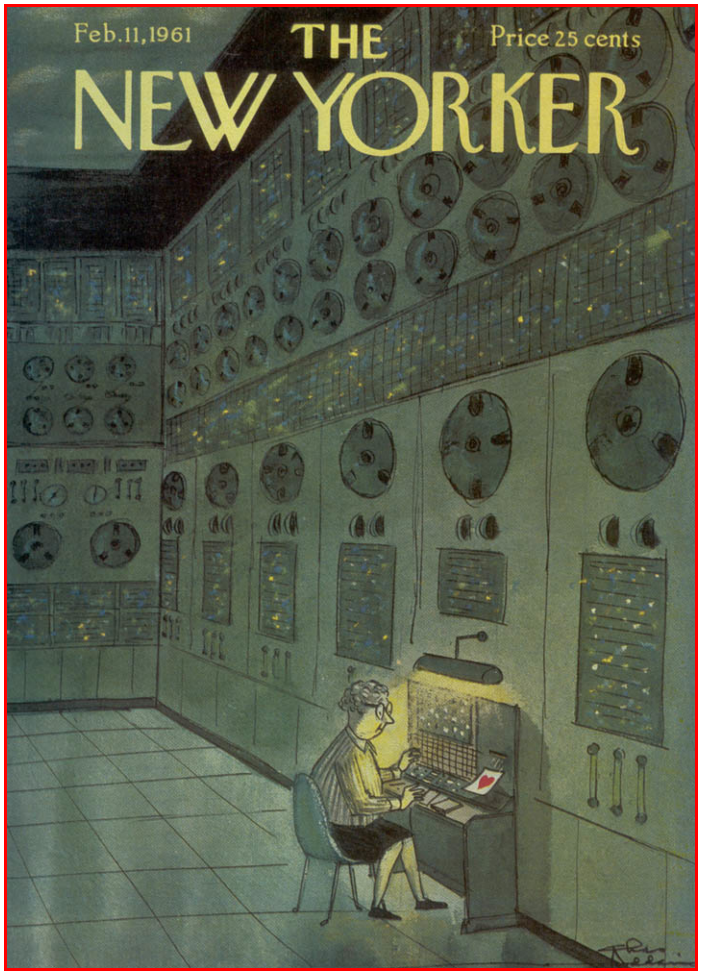
- Richard W. Hamming invented error-correcting codes for computers.
- Douglas Engelbart took his BS, in Electrical Engineering, from Oregon State University, and went to work at the NACA Ames Laboratory in Mountain View CA (it's now NASA).

- IBM introduced its 604 Electronic Calculating Punch, weighing in not at 604 but at 640 kilograms. This sold, when combined with auxiliary memory units and a printer, for something like a million bucks in today's currency — and something like 2,500 of these babies would get sold!

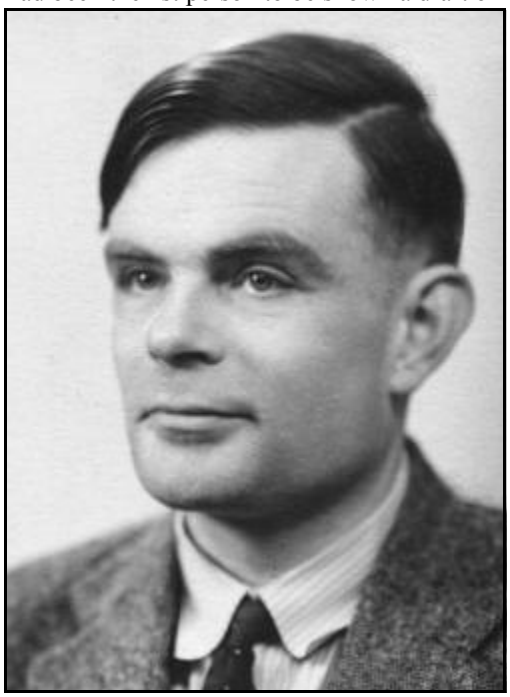


- In rural areas of the United States, the 1st cable TV systems appeared.

January: A news item relating to the development of ELECTRIC WALDEN technology: At IBM, Wallace Eckert (1902-1971, no relation to Presper Eckert) built what IBM considers its 1st computer, the SSEC Selective Sequence Electronic Calculator, a computer with a logic unit made up of 12,500 vacuum tubes, requiring as much space as half a football field. Demonstrations would be offered, in which the monster was able to utilize its 8 20-digit registers, 150 20-digit words of relay memory, and a program that was partly stored but also controlled by a plugboard to provide the correct answer to an equation in but seven minutes of calculating time. This machine's appearance, passing into the popular imagination, would eventuate the humor of a magazine cover:

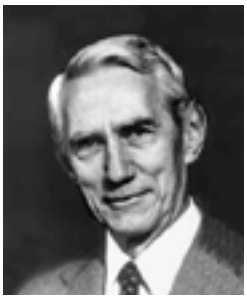


June: A news item relating to the development of ELECTRIC WALDEN technology: Max Newman, F.C. Williams, and their team at Manchester University, England, completed a prototype machine called the “Mark I.” This was the 1st machine that everyone would agree was a computer, because it was the 1st with a true stored-program capability. It used a new type of memory invented by Williams, which used the residual charges left on the screen of a CRT after the electron beam had been fired at it. (The bits were read by firing another beam through them and reading the voltage at an electrode beyond the screen.) This was a bit unreliable but was fast, relatively cheap, and much more compact (with room for about 1024 or 2048 bits per tube) than any other memory then existing. The Mark I used six of them, but we don’t know of how many bits. Its programs were initially entered in binary on a keyboard, and the output was read in binary from another CRT. Later Alan Turing joined the team and devised a primitive form of assembly language, one of several developed in different places. (Newman had been the 1st person to be shown a draft of Turing’s 1937 paper.)



June 30, Wednesday: A news item relating to the development of ELECTRIC WALDEN technology: Bell Labs announced the transistor.

July: A news item related to the development of ELECTRIC WALDEN technology: Claude Shannon's "A Mathematical Theory of Communication" appeared in the Bell System Technical Journal. This paper founded the subject of information theory. In it he proposed an entirely new idea, a linear schematic model of a communications system. Communication was then thought to require that analog signals be sent along the wire. The idea that one might accurately transmit analog materials such as pictures, spoken words, sounds, etc. by first modulating them into digital signals, sending mere streams of 1's and 0's down the wire, and then demodulate them afterward into accurate analog replicas, something that now seems utterly familiar and common-sensical, was then quite novel and remarkable.



The ideas in this paper would soon be picked up by communication engineers and mathematicians around the world. They would be elaborated upon, extended, and complemented with new related ideas. The subject would thrive and grow to become a well-rounded and exciting chapter in the annals of science. For the first time there would be an adequate distinction between information and meaning. R.G. Gallager, a colleague of Shannon's at the Massachusetts Institute of Technology, would offer that:

> Shannon was the person who saw that the binary digit was the fundamental element in all of communication. That was really his discovery, and from it the whole communications revolution has sprung.

1949

News items relating to the development of ELECTRIC WALDEN technology:

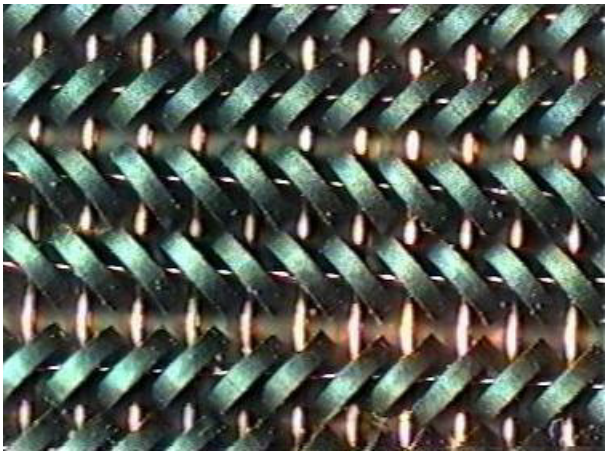
ELECTRIC WALDEN

- Printed electronic circuit boards were being developed in this year and the next.
- Claude Shannon continued with his project of showing how Boolean algebra could be used to synthesize and simplify relay switching circuits. He was also making progress in figuring out how to plan the coloring of edges on a graph so that no two edges of the same color would meet at any vertex. Another important paper was “Communication theory of secrecy systems.”
- EDVAC (Electronic Discrete Variable Automatic Computer) supported the first tests of magnetic disks.
- Claude Shannon of MIT built the 1st chess-playing machine.
- During the period from 1949 into 1951 Jay W. Forrester and his team at MIT would be gradually constructing the “Whirlwind,” using iron cores as main memory, for the US Navy’s Office of Research and Inventions. Originally this device was to have 3,300 tubes and 8,900 crystal diodes. It would come to occupy 2,500 square feet of floor area. Its 2,048 16-bit words of CRT memory would burn out vacuum tubes so fast that they would be costing the project $32,000 per month. This, the 1st computer designed for real-time work, having approximately the computing power of the TRS-80 (“Trash Eighty”) that would be being retailed to the general public out of Radio Shack stores, would be able to perform 500,000 additions or 50,000 multiplications per second — hence a short word size.

(Forrester’s patent would be issued in 1956.)

Spring: A news item relating to the development of ELECTRIC WALDEN technology: The “Whirlwind” computer that Jay W. Forrester and his team at MIT were constructing for the US Navy’s Office of Research and Inventions was crashing so often that people were referring to it as the “Headwind.” This was just terrible, for a computer that was supposed to be ready for air defense 24-7-365. What was the enemy supposed to do, interrupt their attack if our computer went down, and wait patiently for us to get it rebooted and on line again? The problem was that the machine’s internal memory was in 32 computer tubes that needed to be fabricated by hand at a cost of about $1,000 each, that would burn out unpredictably, often after only a couple of weeks of use.

Forrester began to play with some Deltamax, which was a new magnetic material just then going on the market, fashioned into little donuts they were terming “cores.” Since they were calling these little donuts “cores,” of course what they produced would be referred to as a “core memory.” The basic concept for core memory was currently being patented by An Wang of Harvard University, but Wang’s technique involved stringing these cores onto single wires in such fashion as to form delay lines. Forrester conceived the technique of stringing the cores onto a matrix of wires to create the possibility of random access. If you strung these cores into a grid of criss-crossing wires so that one horizontal wire and one vertical wire passed through the hole in each core, each core could represent a stored binary 0 if it was magnetized in one direction, or a binary 1 if it was magnetized in the other direction, and sending current through the correct pair of wires would flip this magnetism, and once flipped, it would stay flipped.



This 1st really practical form of magnetic core memory, 4 years later, would replace the Whirlwind’s integral CRT memory and render all then existing types of integral computer memory obsolete, not only because it solved the reliability problem, of tubes burning out, but also because of this new capability of random access. It was a great advantage, to be able to go directly to a particular memory address which you desired to access, and not have to wait for the electronic machine to go through first a whole series of other addresses before it could get to that desired memory location.

June: A news item relating to the development of ELECTRIC WALDEN technology:
Maurice Wilkes (1913-2010) and his team at Cambridge University completed the EDSAC (Electronic Delay Storage Automatic Computer), which was closely based on the EDVAC design report from John von Neumann's group. This was the 1st operational stored-program computer that wasn't a prototype. Its I/O was by paper tape, and it had a sort of mechanical read-only memory for booting, consisting of rotary telephone switches. Its main memory was of another new type, invented by Eckert: the "ultrasonic" or "delay line" memory. In this type, the data was repeatedly converted back and forth between electrical pulses and ultrasonic pulses; only the bits currently in electrical form were accessible. (The ultrasonic pulses were typically fired from one end of a tank of mercury to the other, though other substances were also used.) In the EDSAC, 32 mercury tanks 5 feet long gave a total of 256 35-bit words of memory.

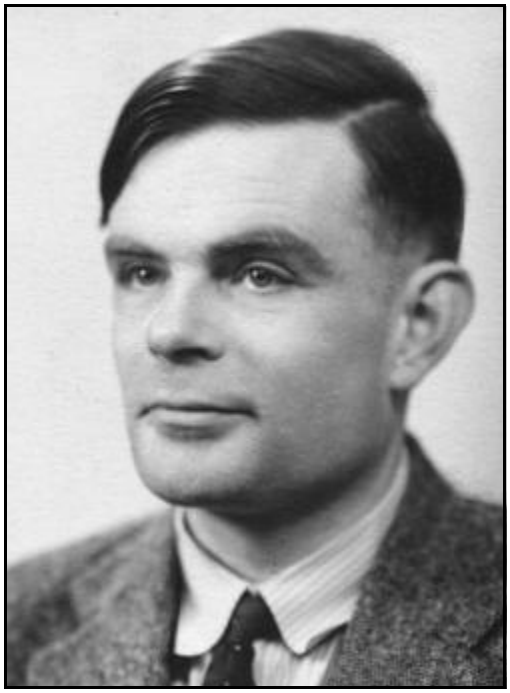
August: A news item relating to the development of ELECTRIC WALDEN technology: Eckert and Mauchly, having formed their own company, completed the BINAC (Binary Automatic Computer) for the US Air Force. Designed as a 1st step to in-flight computers, this had dual (redundant) processors each with 700 tubes and 512 31-bit words of memory. Each processor occupied only 4 square feet of floor space and could do 3500 additions or 1000 multiplications per second. The designers were thinking mostly of their forthcoming UNIVAC (Universal Automatic Computer) and didn't spend much time making the BINAC as reliable as it should be, but the tandem processors compensated for this to some extent.

1950

News items relating to the development of ELECTRIC WALDEN technology:

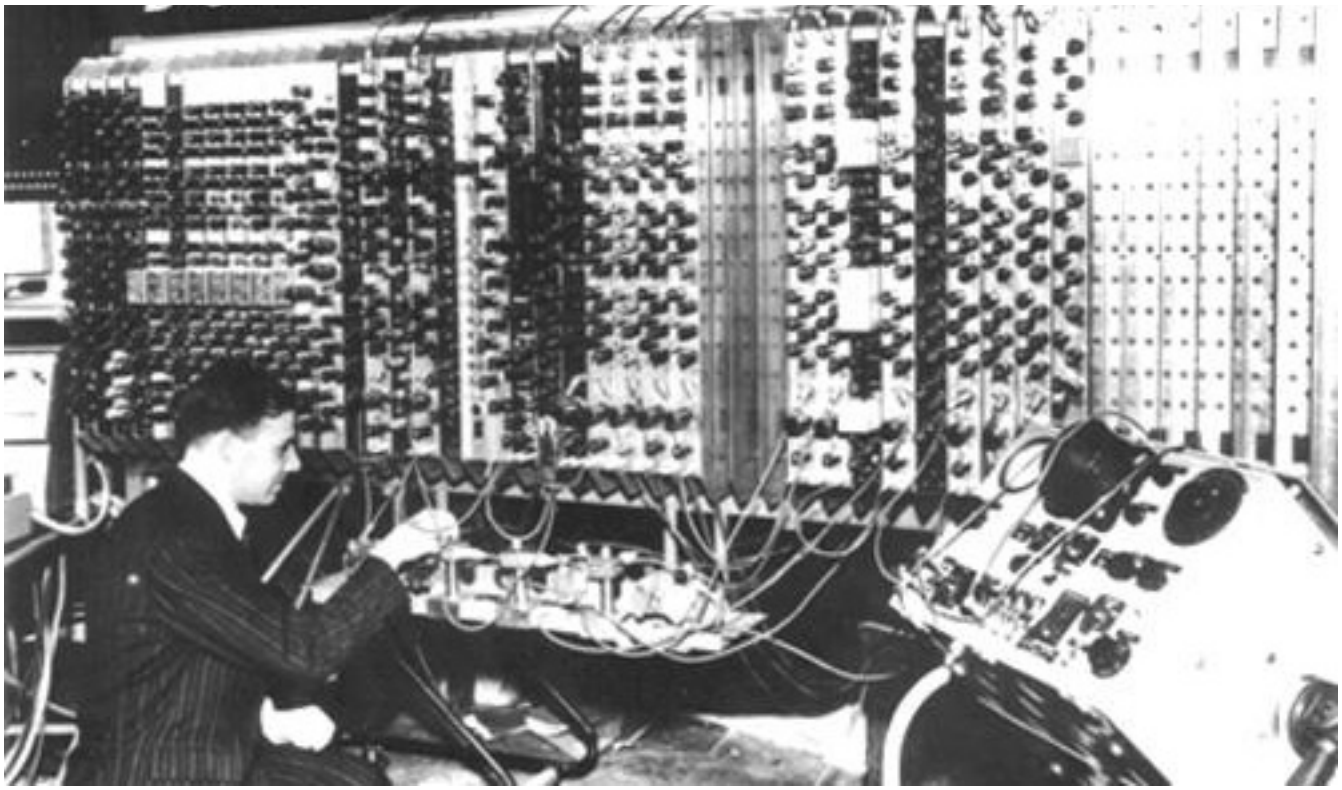
ELECTRIC WALDEN

- On the EDSAC computer at Cambridge University, Maurice V. Wilkes used an “assembler” (symbolic assembly language).
- The SEAC Standards Eastern Automatic Computer was delivered to the National Bureau of Standards.
- Douglas Engelbart proposed the establishment of a national information network.
- The “Lazy Bones,” the 1st TV remote control, allowed a couched viewer to click though the available three or four channels (a wire, for people to trip over, snaked across the floor of the living room from this couch potato to his set).
- Leo Beranek and Richard Bolt at this point accepted a third partner, becoming BBN, “Bolt Beranek and Newman.”
- Remington-Rand acquired Eckert-Mauchly Computer Corporation.
- Alan Turing’s “Computing Machinery and Intelligence” appeared in the prime philosophical journal Mind.



After World War II and his work at Bletchley Park, Turing had joined the staff of the National Physical Laboratory at Teddington, England, with plans to build his own computer. His design for the Automatic Computing Engine (ACE) had been completed in 1947 but the director of the Laboratory had assigned the task of construction to the Physics rather than the Mathematics department in which Turing was situated. In consequence, Turing left NPL for a position with his wartime boss, Max Newman, at the University of Manchester. The work on a prototype machine, the Pilot ACE, based on Turing’s plans, had been designed by Harry Huskey in 1948 and would be

completed in 1951. The full-scale version would be completed several years later by the Department of Scientific and Industrial Research. Internally this device could store 1½ KB of data, slightly more than one of our virtually obsolete vest pocket "high-density" floppies of today. It required 32 microseconds to perform its simplest operation but, with a large number of wires, electronic tubes, and tubes filled with mercury, it occupied a space the size of a small kitchen. Most of its remains can now be seen in the Science Museum at South Kensington. Based on it, English Electronic would develop the DEUCE (Digital Electronic Universal Computing Engine), and then over six years they would sell about 40 of these babies at a cost of £30,000-£40,000 each.



"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

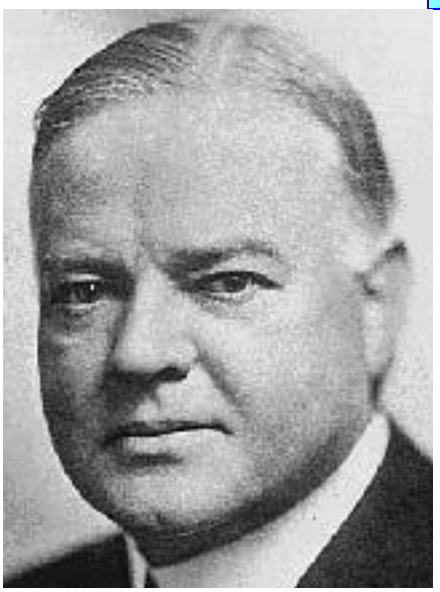
— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

February 4, Saturday: A news item relating to the development of ELECTRIC WALDEN technology: The first electric portable typewriter was sold in Syracuse, New York.

December: A news item relating to the development of ELECTRIC WALDEN technology: Douglas Engelbart had his flash of intuition, that the human situation was getting out of control because of rapidly increasing complexity, but that with the assistance of some sort of tightly coupled personal computer device "beginning from memories of the radar-screen consoles I used to service," the complexity of it all might be still be reducible to manageable proportions. In half an hour he was drawing sketches of a new kind of computer desk with a console upon which he could interact by the use of symbols.

(Former President Herbert Hoover, whom some Quakers allege without much foundation was a closet Friend, seems to have been in sad need of some sort of personal computer as above, to help him out in his thought processes. He was in this month being quoted in the New York Times as backing up President Harry S Truman's discourse about "Genghis Khan and Tamerlane, the greatest murderers in the history of the world," while adding his own racist remarks about "Asiatic hordes" and characterizing the Sino-Soviet empire as being but "a congeries of thirty different races" —not at all like the people of the Free World but mere "cannon fodder"— an interracial conglomeration which "will someday go to pieces."[58])

CHINA
KOREA
RELIGIOUS SOCIETY OF FRIENDS



58. Why wait out the inevitable? —Let's blow 'em to pieces **right now**! —Hoobert Heeverize 'em!

1951

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Maurice V. Wilkes introduced the concept of microprogramming.
- William G. Pfann developed a "zone-refining" process for producing the purest semiconductors. A technique of ion implantation also developed in this year would enable traces of other materials to be selectively imbedded into such pure semiconductors. (Computer chips were on their way.)
- Direct distance dialing enabled customers to complete long-distance calls within the United States without operator assistance.
- The IEEE Computer Society was formed.
- The 1st Joint Computer Conference was held.
- It was during this year and the next that the EDVAC was finally completed. It had 4000 tubes, 10000 crystal diodes, and 1024 44-bit words of ultrasonic memory. Its clock speed was 1 mHz.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

February: A news item relating to the development of ELECTRIC WALDEN technology: Ferranti Ltd., of Manchester, England completed the 1st commercial computer, the "Mark I" (8 of these gizmos would be sold).

March 31, Saturday: Advance elements of the UN force crossed the 38th Parallel.

Dmitri Shostakovich played 12 of his 24 Preludes and Fugues at the Composers' Union, Moscow. He had just finished composing them and had not had time to learn them. He was nervous, especially about the political atmosphere, and did not play well. Those who speak were not complimentary. The same thing would happen with the 2d 12 on the following day.

The Group Areas Act went into force in South Africa. It allowed the Interior Minister to divide the country on racial lines.

The UN Security Council voted 8-0-3 to accept a new peace plan for Kashmir.

München: ein Gedächtniswalzer by Richard Strauss was performed for the first time, in Vienna.

Speaking in Los Angeles, US Ambassador-at-large John Foster Dulles explained the outlines of a peace treaty with Japan.

Los cuatro soles, a ballet by Carlos Chávez to his own scenario, was staged for the first time, in the Palacio de

Bellas Artes, Mexico City.

Fairy Tale op.48 for orchestra by Vincent Persichetti was performed for the first time, in Philadelphia.

A news item relating to the development of ELECTRIC WALDEN technology: William Mauchly and John Presper Eckart, having sold their company to Remington Rand, completed the 1st UNIVAC (Universal Automatic Computer), which was the initial US commercial computer. Installed in 200 square feet of room space at the US Bureau of the Census, containing 5,000 vacuum tubes and using magtape for its buffer memory, it had 1,000 12-digit words of ultrasonic memory and could achieve a speed of 8,333 additions or 555 multiplications per second.[59]

April 20, Friday: Petite Suite for orchestra by Witold Lutoslawski was performed for the first time, in Warsaw.

The US State Department denied a visa to French actor Maurice Chevalier on the grounds of his known "Communist associations." Maurice Chevalier, one scary dude.

Dr. Moises Lebenshohn, a leader of the Argentine Radical Party, was convicted of having slandered President Juan Perón.

General Douglas MacArthur, returning from Korea after having been relieved of his command by President Harry S Truman, was given a ticker tape parade through the streets of central and lower Manhattan in New York City, delaying the opening game of the first series between the Giants and the Dodgers.

KOREAN WAR

A news item relating to the development of ELECTRIC WALDEN technology: Since 1949, Jay W. Forrester and his team (Ken Olsen) had been gradually constructing the "Whirlwind" for the US Navy's Office of Research and Inventions. This device had come to contain 3,300 vacuum tubes and 8,900 crystal diodes. It occupied 2,500 square feet of floor area at MIT. When it became operational its 2048 16-bit words of memory burned out its vacuum tubes so fast that they were costing the project $32,000 per month. This, the 1st computer designed for real-time work, having approximately the computing power of the TRS-80 ("Trash Eighty") that would be being retailed to the general public out of Radio Shack stores, could perform 500,000 additions or 50,000 multiplications per second — hence a short word size.

On this day the "Whirlwind" demonstrated that it could simultaneously track three propeller aircraft across the Massachusetts skies, repeatedly computing interception trajectories that might be followed by fighter pilots as they scrambled from the ground.

59. Yes, yes, I know, this is pitifully poor and inadequate and incompetent.

June 14, Thursday: Senator Joseph R. McCarthy, on the floor of the US Senate, attacked Secretary of State George C. Marshall, who had it seems been the cause of everything from Pearl Harbor to the Korean War.

Six Metamorphoses after Ovid op.49 for oboe by Benjamin Britten was performed for the first time, from a boat in the Meare, an artificial lake at Thorpeness.

Jackson Pollock, a film with music by Morton Feldman, was shown for the initial time, at the Museum of Modern Art in New York.

A news item relating to the development of ELECTRIC WALDEN technology: The first commercial computer, UNIVAC 1, designed for the United States Bureau of the Census, was publicly demonstrated in Philadelphia.

June 25, Monday: The earthly remains of Pietro Mascagni and his wife were moved from the Campo Verano Cemetery in Rome to the Cimitero della Misericordia in Livorno and placed next to those of his parents and brothers.

A news item relating to the development of ELECTRIC WALDEN technology: The Columbia Broadcasting System broadcast the 1st commercial color television program to Boston, Philadelphia, New York, Baltimore, and Washington (unfortunately, no one in the general public as yet owned a color TV).

1952

From this year into 1953, J.C.R. Licklider would be participating in Project Charles, an Air Force study of air defense. “At that time, some of the more impressionable ones of us were expecting there would be 50,000 Soviet bombers coming in over here.” This would lead to the creation of Lincoln Laboratories. “I was trying to model how the brain works in hearing with an analog computer .... My time was divided a third time acoustics lab, a third time trying to build a psychology section ..., and one third in the Lincoln Laboratory... really had to learn digital computing, because I couldn’t do this stuff with analog computers.”

At this point Herman Kahn became involved with von Neumann in the design of the hydrogen bomb. Soon he would join the Strategic Objectives Committee at the government’s military consultation group, RAND Corporation, and would, as a thought experiment, propose the creation of a “Doomsday Machine,” an exceedingly secure computer that would automatically under certain conditions detonate an entire enormous stockpile of hydrogen bombs, making the entire planetary environment unsurvivable. If we are going to be threatening total retaliation in order to preserve world peace, Kahn argued, would it not improve our deterrence threat if we were to take the unreliable components, such as missiles and human decisions to launch, entirely out of the loop? He would write, “War is a terrible thing, but so is peace. The difference seems to be a quantitative one of degree and standards.” (This was what Stanley Kubrick would have reference to in 1964 in an “anticipatory documentary” entitled “Dr. Strangelove or: How I learned to stop worrying and love the bomb.” Rent this videotape, you’ll love Peter Sellers.)

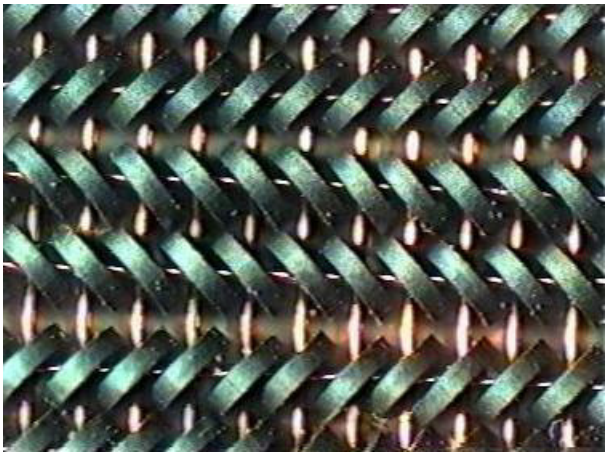
News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The US Department of Justice sued IBM for monopolizing the punched-card accounting machine industry.
- The IBM “Defense Calculator,” later renamed the “701,” its first electronic stored-program computer, the 1st IBM computer but for the SSEC, entered production at Poughkeepsie, New York. The memory was electrostatic and had 4,096 36-bit words; It did 2,200 multiplications per second. (The 1st one would be delivered during March 1953; 19 would be sold altogether.)
- Grace Murray Hopper (1906-) of Remington Rand implemented the 1st compiler, the “A-0.” (As with “computer,” this was a somewhat arbitrary designation.)
- G.W. Dummer, a radar expert from Britain’s Royal Radar Establishment, presented a paper proposing that a solid block of materials be used to connect electronic components, with no connecting wires.
- The 1st computer manual was written, by Fred Gruenberger.
- Nixdorf Computer was founded in Germany.

- Remington-Rand acquired Engineering Research Associates.
- RCA developed Bizmac, with iron-core memory and a magnetic drum supporting the first database.
- Just one hour after the polls closed, UNIVAC I predicted an Eisenhower landslide with 7% of the votes.

May: A news item in the development of the technology for the ELECTRIC WALDEN project: We began to spend a million bucks on a computer that would test the concept of the random-access core memory. In just a little over a year, this project would transform the memory of the Whirlwind air-defense computer from being by far the least-reliable component of the device into its most-reliable component.



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— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

1953

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- At Wayne State University, the Burroughs Corporation installed the UDEC Universal Digital Electronic Computer.
- The 1st high-speed printer was developed by Remington-Rand, for use with the UNIVAC.
- The IBM 726, the 1st magnetic tape device, with 100 character-per-inch density and 75 inches-per-second speed.
- The standard color-TV system was introduced in the USA.

April: A news item relating to the development of ELECTRIC WALDEN technology: The 1st IBM 701 Defense Calculator shipped. This was IBM's 1st stored-program computer, a vacuum tube or "1st-generation" device.

1954

Some news items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Gene Amdahl developed the first operating system, used on IBM 704.
- An oxide masking technique enabled the fabrication of planar transistors.
- Gerald L. Pearson, Daryl M. Chapin, and Calvin S. Fuller devised the “solar battery,” a device converting the sun’s radiation directly to electricity.
- A computerized information service was being developed at China Lake by Harley Tillet.
- A high-level programming language, the FORTRAN formula translator, was being initiated by John Backus at IBM. Harlan Herrick ran the first successful FORTRAN program.
- Jack Tramiel founded Commodore — as a typewriter repair service.

Regency introduced the world’s 1st transistor radio, small enough to be carried in the hand (three years later the Japanese electronics company Tokyo Tsushin Kogyo, which would be renamed “Sony” to suggest “Sonny boy,” would introduce a 2d transistor radio, one so tiny it could almost fit into a standard shirt pocket).

The Japanese electronics company Fuji Electric (later it would be known as “Fujitsu”) introduced its 1st commercial computer:

February 9, Tuesday: Mario Scelba replaced Amintore Fanfani as Prime Minister of Italy.

Thirteen years after filing for the patent, George R. Stibitz received a US patent for a “complex computer” (Stibitz is now considered a progenitor of the digital computer).

Carl Ruggles was elected to the National Institute of Arts and Letters.

US Senator Joseph R. McCarthy retracted his accusation of February 7th but issued a new accusation, that former Undersecretary of War John McCloy had been the “moving force” behind commissioning Communists.

May: A news item relating to the development of ELECTRIC WALDEN technology: Texas Instruments announced the start of commercial production on silicon transistors.

1955

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The 1st SHARE users group meeting was held.
- Remington-Rand merged with Sperry Gyroscope to form Sperry-Rand.
- Arthur Samuel created a checker-playing program for the IBM 704 computer, that was capable of making random changes in itself and testing its new variants, resulting in an ability to automatically generate better checker-playing programs.

Summer: A news item relating to the development of ELECTRIC WALDEN technology: John McCarthy came up with the concept of "simulation":

> Every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it.

Furthermore, this could be done with a general-purpose machine, with all the variability from simulation to simulation being contained entirely within the general-purpose machine's readily alterable lines of coded instructions,[60] in such manner that no onerous hardware reconfiguration of the device itself would be required.

"Intelligence is a kludge."
— Marvin Minsky

August 7, Sunday: A news item relating to the development of ELECTRIC WALDEN technology: Tokyo Telecommunications Engineering, precursor to Sony, sold its 1st transistor radios in Japan.

Colonel John Arnold, one of 11 US airmen recently released by China, described physical and psychological torture during his 2½ years as a prisoner.

6,000 demonstrators blocked a causeway leading to the island housing the Neutral Nations Supervisory Commission in Inchon Harbor. They unsuccessfully attempted to force their way past US troops guarding the island. US forces used tear gas to prevent a landing by demonstrators from fishing boats. The protesters accused the representatives from Czechoslovakia and Poland of espionage and sabotage. Violence over the next week causes one death and 144 injuries, including several US soldiers.

Three Sonatas for solo clarinet by George Perle were performed for the initial time, in Chicago.

60. I'm carefully avoiding the term "software" here since that term would not yet exist, for another three years or so.

October 2, Sunday: ENIAC, all 30 tons of it, all 19,000 vacuum tubes of it, was declared obsolete by the US Army Ordnance Corps. At 11:45PM it was turned off. It would never again consume 174 kilowatts of electric power while emulating one of today's cheap hand calculators. Sic transit gloria mundi, as they say — and this wasn't even a Monday!

Some other news items relating to the development of ELECTRIC WALDEN technology, likewise occurring during this year, were:

- In Palo Alto CA, Professor William Shockley was founding Shockley Semiconductor.
- The "Flashmatic," the 1st remote to be cordless, used a flashlight beam directed at one of the four corners of the TV to turn it on or off, to mute the sound, and to click through the available four or five channels.

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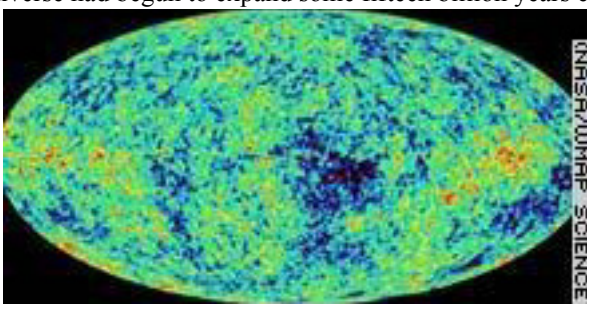
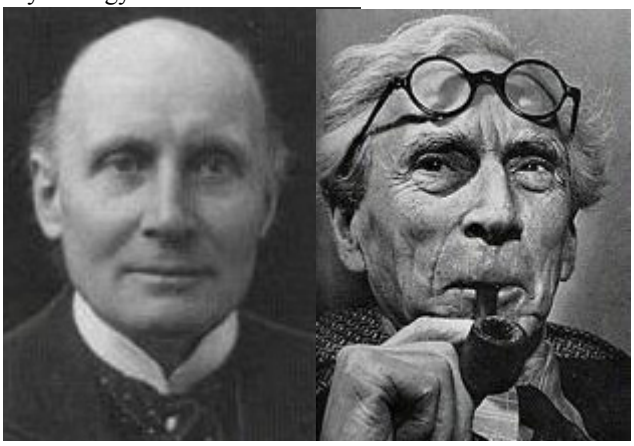
December 15, Thursday: A news item relating to the development of ELECTRIC WALDEN technology: Herbert A. Simon had been trying to develop heuristic, rule-of-thumb strategies for simplifying problem-solving. He was doing this because computer scientists had become acutely aware that sheer number-crunching, which was what they had been able to train their devices to perform very well, involved so many sequential time-consuming steps that some very real computational tasks, such as figuring out the next move in a game of chess for one fine example, simply could not yet have been calculated by a Turing computer capable of performing one step per second, that had been turned on and given that problem to solve and left to crank and crank at the instant at which our universe had begun to expand some fifteen billion years earlier!



On this day Simon found a heuristic that would strategize the proof of theorem #2.15 of Alfred North Whitehead's and Bertrand Russell's *PRINCIPIA MATHEMATICA*, and formed the idea that his heuristic might be programmable. A computer could be taught not merely to number-crunch by the numbers, but instead follow a real shortcut discovery strategy!



After Christmas: A news item relating to the development of ELECTRIC WALDEN technology: When his students returned from their Christmas Break for their first class session, Herbert A. Simon announced:

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Over Christmas, Allan Newell and I invented a thinking machine.
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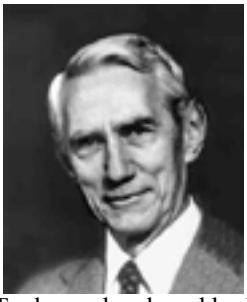
1956

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Claude Shannon, who was visiting the Massachusetts Institute of Technology, was teaching communication sciences and mathematics, and his work on artificial intelligence led in this year to the first computer chess game, played by the MANIAC computer at Los Alamos. Also this year, Shannon demonstrated that a Turing machine might have only two states and still be a universal machine.



- The APT Automatic Programmed Tool was developed by D.T. Ross.
- A. Newell, D. Shaw and F. Simon devised the IPL Information Processing Language.
- Burroughs acquired Electrodata and the Datatron computer, which was renamed the Burroughs 205.
- T.J. Watson, Jr. assumed the presidency of International Business Machines. A federal government antitrust suit was settled by a consent decree under which IBM would sell as well as lease its machines.
- RCA shipped the Bizmac.
- John McCarthy began to speak of artificial intelligence as "AI."
- The "Space Command" device marketed in this year would allow you some remote control over your TV, by means of ultrasound vibrations produced mechanically — you could remotely mute your set's sound, but not remotely adjust its volume.
- MIT began experiments in direct keyboard inputting to a computer. Was this going to be possible?
- SAGE was initiated for the US Air Force.
- The 1st hard disk drive to hit the market offered 5MB of computer storage at $1,000 per MB.[61]

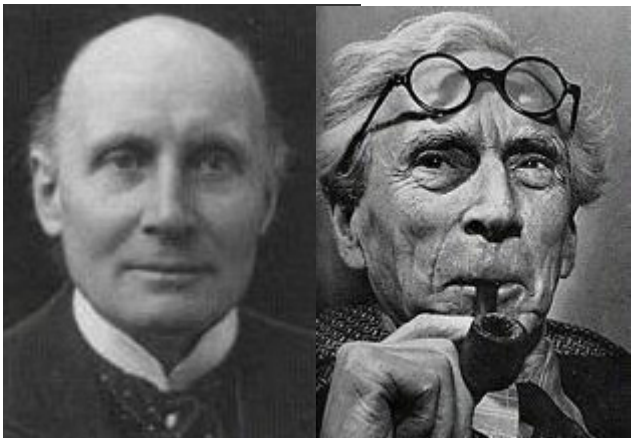
Data Storage

Year	Capacity	Cost per MB
1956	5 MB	$10,000.00
1991	145 MB	$5.23
1997	2.65 GB	$0.10

61. At 1956's prices for storage, the $1,000 desktop computers being offered in 2006 with multi-gigabyte integral hard drives, by mail order, would be costing us just millions and millions of dollars. Each.

Summer: A news item relating to the development of ELECTRIC WALDEN technology: As a result of a lecture by Noam Chomsky, some computer scientists such as George A. Miller began to comprehend that perception, problem-solving, memory retrieval, and other forms of conceptual functioning could be understood as types of computation. Chomsky was claiming that he could demonstrate, and that he could prove mathematically, that the Skinnerian behaviorists were very mistaken — that the limited mode of analysis to which they were so forcefully limiting themselves and everyone else could not possibly ever explain anything about brain function.[62]

August 9, Thursday: A news item in the development of ELECTRIC WALDEN: J. Clifford Shaw's program "Logic Theorist," running on the JOHNNIAC computer at RAND, produced its first complete proof, of theorem #2.01 of Alfred North Whitehead and Bertrand Russell's *PRINCIPIA MATHEMATICA*.



September 11, Tuesday: A news item in the development of ELECTRIC WALDEN: At a conference on information theory Allen Newell presented his PhD thesis project, "The Logic Theory Machine."

Great Britain and France withdrew their request that all non-Egyptian employees of the Suez Canal Company remain at their posts, and authorized anyone who asked to return home before August 15th "to stop working on either September 14 or 15."

As retaliation for sabotage of an Israeli railroad, Israelis killed 5 Egyptian soldiers in the Sinai desert.

Upon the admission of 12 black students to the local high school, National Guardsmen withdrew from Clinton, Tennessee. Three out of four of the white students were attending their classes despite this racial integration.

62. Chomsky also proffered, in this lecture, his insight that the sort of generalized computational engine that Alan Turing had imagined actually could be differentiated into any number of different computational engines of varying degrees of complexity and efficiency. This insight eventually would become one of the basic tenets of computer science. (That portion of Chomsky's lecture would need to simmer for awhile in the minds of the computer scientists, however, before it could come to a rolling boil.)

November 1, Thursday: The Indian states were reorganized, largely by language, with their number being reduced from 27 to 14.

Soviet troops were reported to be entering Hungary. Prime Minister Imre Nagy announced that his government had withdrawn from the Warsaw Pact and was declaring neutrality. The Party publicly supported neutrality and called for the withdrawal of Soviet troops. However, János Kádár and 5 or 6 other Party leaders disappeared and, with Soviet help, reappeared in Uzhgorod, the Ukraine.

Israeli forces captured El Arish and Rafah, cutting off the Gaza Strip. Egypt broke diplomatic relations with Great Britain and France. President Gamal Abdel Nasser ordered all British and French property to be registered, for confiscation. British and French planes continued to bomb targets in the Suez Canal and Delta areas.

A news item in the development of ELECTRIC WALDEN: The Nobel prize for physics went to 3 scientists who had been at Bell Telephone Laboratories, John Bardeen, Walter Brattain, and William "Hush Baby Your Daddy Is A Rich White Man" Shockley, for joint development as of 1947 of the "transistor," a small inexpensive device that could perform the function of a vacuum tube.

1957

Some news items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The Control Data Corporation was formed by William C. Norris and a group of engineers from Sperry-Rand.
- The Digital Equipment Corporation was founded by Ken Olsen.
- The 1st issue of Datamation magazine.
- Honeywell joined with Raytheon to ship the Datamatic 1000.
- The US Patent & Trademark Office made an early experiment with NBS, which would become NIST.
- IBM introduced the IBM 608, the first all-transistor commercial calculator.
- An IBM team led by John Backus designed the 1st successful high-level programming language, FORTRAN, for solving engineering and science problems.
- A group of eight engineers left William Shockley's company to form Fairchild Semiconductor. At this company, John Hoerni developed a technique for putting layers of metals and chemicals onto the planar surface of silicon wafers and then using templates called "photomasks" to etch away portions of these layers. This would enable the mass manufacture of tiny circuits (the "computer chip").

Spring and Summer: A news report from the development of ELECTRIC WALDEN technology: When J.C.R. Licklider first sat down in front of the TX-2 digital computer, he would recollect, it was "like sitting at the

controls of a 707 jet aircraft after having been merely an airline passenger for years." He began to explore the productivity gains that could be achieved by taking a responsive, number-crunching electronic monster, and an innovative, imaginative human being, and tightly coupling together these two very different forms of information processing. If the time delays could be made short enough, could one complement the other? It seemed to Licklider that roughly 85% of his problem-solving thinking was being impeded by rote calculations and processings that could ideally be augmented and speeded by offloading them onto this machine. Our minds, which have been being enslaved by mundane detail, might explode with creativity if we could achieve the proper sort of human/machine symbiosis:

> The hope is that, in not too many years, human brains and computing machines will be coupled together very tightly, and that the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the

information-handling machines we know today.

April: A news item relating to the development of ELECTRIC WALDEN technology: A team led by John Backus created Fortran for the IBM704.

May 27, Monday: A news event in the development of ELECTRIC WALDEN technology: Ken Olsen, Harlan Anderson, and Olsen's brother Stanley made the pitch that got them $70,000 seed capital for the formation of a new computer company. (Because computers had acquired a reputation among stock brokers for unprofitability, in their pitch actually they never used the term "computer.") Soon, on the 2nd floor of Building #12 in a renovated 19th-Century mill in Maynard MA, they would open for business as DEC, the Digital Equipment Corporation.

June 30, Sunday: On this day of worship President Jimmy Carter announced that we would not produce the supersonic B-1 bomber prepared to drop nuclear weapons. On this day of worship he opted instead for our developing cruise missiles tipped with nuclear warheads.

The Southeast Asia Treaty Organization was formally dissolved at a ceremony in Bangkok.

Secretary of Transportation Brock Adams required that all new automobiles be equipped with air bags or passive restraint seatbelts (delaying to begin this, of course, with the 1982 model year — as he could see no particular imperative to try to save any American lives during 1977, 1978, 1979, 1980, or 1981).

A news event in the development of ELECTRIC WALDEN technology: J.C.R. Licklider gave up his tenured position at the Massachusetts Institute of Technology for a job at Bolt, Beranek, and Newman, the idea being to find better ways of coupling humans with their new electronic environment. One thing BBN promised him was that would let him spend $30,000 on a computer, and hire a programmer for it. He would hire Edward Fredkin and the computer would be an LGP-30 (not much, but this would have to do until DEC had been brought into existence and could create its PDP-1).

August: A news event in the development of ELECTRIC WALDEN technology: Ken Olsen, Harlan Anderson, and Olsen's brother Stanley began, on the 2nd floor of Building #12 in a renovated 19th-Century mill in Maynard MA, the firm they would name the Digital Equipment Corporation, that would become world-famous as DEC. At first, to save money and put in sweat equity, Ken would be bringing in his family on weekends and he and his wife and kids would be providing the needed janitorial services.

September: A news item relating to the development of ELECTRIC WALDEN technology: John McCarthy offered the first demonstration of time-sharing, on the IBM704. To do this, at first, it was necessary to add hardware, in the form of an interrupt system, and a Flexowriter.

October: Newly minted PhD Douglas Engelbart accepted his first offer, which had come from the Stanford Research Institute, a spin-off from Stanford University located in Menlo Park CA. There he soon was told he needed to keep his mouth shut about his agenda to use computers to augment the human intellect: “It will prejudice people against you.” Every time he would try to talk to someone, he noted, they “would immediately translate my admittedly strange (for the times) statements of purpose and possibility into their own discipline’s framework.”

October 5, Saturday, early in the morning local time: A news item relating to the development of ELECTRIC WALDEN technology: An R-7 ICBM of the USSR, looking for all the world like a corn silo on steroids attired in a skirt, rose 141 miles to place in earth orbit an aluminum sphere with 4 long antennae, 23 inches in diameter, weighing 184 pounds. It was the *Sputnik Zemli*, which would go around and around the world going “beep-beep-beep” until its batteries died.

When translated from the Russian, what “beep-beep-beep” means is “You’d better start treating us right, and you’d better start treating us right, right away — because this could’ve been our A-bomb dropping right on top of your pointed little heady-head-heads!”

To restore the lead of the USA in science and technology applicable to the military, President Dwight David Eisenhower’s Department of Defense would be creating the ARPA Advanced Research Projects Agency, with just skadzillions of bucks to throw at all known problems (and thus we have the internet).

1958

News items relating to the development of ELECTRIC WALDEN technology:

- At Bell Labs, the “laser” –light amplification by stimulated emission of radiation– eventually this would transform not only the communications industry, but also materials processing, optical scanning, medicine, energy research, and surveying.
- The 1st computer to use the transistor as a switching device, the IBM 7090.
- Texas Instruments demonstrated the 1st integrated circuit microchip. (It has been invented independently and simultaneously by Jack Kilby and by Robert Noyce.)
- John Tukey created the term “software,” by analogy with “hardware.”
- LISP was developed on the IBM 704 at MIT under John McCarthy.
- ALGOL, first named the IAL International Algebraic Language, was presented in Zurich.
- Atlas, the 1st virtual memory machine, developed at the University of Manchester by R.M. Kilburn, was installed in England by Feranti.
- The 1st electronic computers built in Japan by NEC, the NEC-1101 and NEC-1102.
- Frank Rosenblatt built a computer, the Perceptron Mark I, utilizing a CRT Cathode-Ray Tube as an output device.
- At CDC Control Data Corporation, Seymour Cray built the 1st fully transistorized supercomputer, the CDC 1604.

1959

News items relating to the development of ELECTRIC WALDEN technology:

- COBOL was defined by the Conference on Data System Languages (Codasyl), based on Grace Hopper's Flow-Matic.
- The 1st packaged program was sold by Computer Science Corporation.
- International Business Machines, Inc. prepared an information system for the Strategic Air Command.
- International Business Machines, Inc. introduced its IBM 1401 (more than 10,000 would be manufactured).
- International Business Machines, Inc. introduced its 1st transistorized or 2d generation computers, the IBM 1620 and the IBM 1790.
- Jack S. Kilby of Texas Instruments filed a patent for the 1st integrated circuit.
- Robert Noyce of Fairchild Semiconductor developed the monolithic idea for integrated circuits.

From this year until 1962, J.C.R. Licklider would be doing research and management work at Bolt, Beranek, and Newman using the PDP-1 that had been created by the Digital Equipment Corporation. He did “a little study ... on how I would spend my time. It showed that almost all my time was spent on algorithmic things that were no fun, but they were all necessary for the few heuristic things that seemed important. I had this little picture in my mind how we were going to get people and computers really thinking together.”

Movies this year included “North by Northwest,” “Ben Hur,” and “The Diary of Anne Frank.” Stanley Kramer transformed John Paxton’s screenplay of a 1957 Nevil Shute novel into the movie “On the Beach,” in which Gregory Peck, Ava Gardner, Fred Astaire, and Anthony Perkins attempt to stay alive for a few months longer before they take their suicide pills on an earth that, subsequent to a worldpolitik strategic exchange of nuclear

detonations, is becoming far too radioactive to sustain life.

TIMELINE OF ACCIDENTS

From this year until 1977, Douglas Engelbart would be directing the Augmentation Research Center at Stanford Research International. This research laboratory would employ up to 47 people, pioneering various modern interactive working environments. During this period the lab would develop a NLS "oN-Line System" which would integrate many firsts in computer technology, including the mouse, display editing, windows, cross-file editing, idea/outline processing, hypermedia, and groupware (including shared-screen teleconferencing and a computer-supported meeting room). Engelbart would initiate ARPANet's Network Information Center.

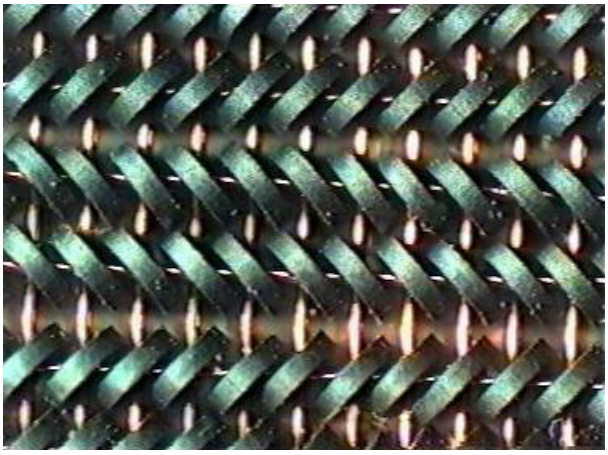
Engelbart was envisioning the sort of environment "where you could sit with a colleague and exchange information. God! Think of how that would let you cut loose in solving problems!" He had begun to refer to his lifelong project as "augmenting the human intellect."

Spring: A news item relating to the development of ELECTRIC WALDEN technology: MIT offered its 1st programming course, in assembly language, Fortran, and Lisp. At about this point one of the students there, known there as something of a "hack" in the terminology currently being employed, developed the first ever word-processing program. (Because the computer on which he had wheedled some time, the university's TX-0, had cost the institution a nice pocket of change, three million dollars, and because the program he had written was causing it to emulate a mere three hundred dollar piece of secretarial equipment, and because he knew a dollar from a donut, the student of course named his program "Expensive Typewriter.")

July: A news item relating to the development of ELECTRIC WALDEN technology: Fairchild Semiconductor filed a patent application for the planar process for manufacturing transistors. The process made commercial production of transistors possible and would lead to Fairchild's introduction, after two years, of the 1st integrated circuit.[63]

63. During this year Texas Instruments also would announce an integrated circuit.

Early Fall: A news item relating to the development of ELECTRIC WALDEN technology: PDP-1 serial number 0 was delivered by the DEC Digital Equipment Corporation to BBN Bolt, Beranek, and Newman for what today we would term its beta-testing. This device was ten feet long, so big in fact that the only place the company had to install it was in the main reception area. For security, every night one of the employees would be taking the machine's core memory unit home with him.



The device cost about twice as much as the LGP-30 it was replacing — but it also happened to be more than one thousand times as fast.

December: A news item relating to the development of ELECTRIC WALDEN technology: The DEC Digital Equipment Corporation sold PDP-1 serial #1 to BBN Bolt, Beranek, and Newman for $150,000.

1960

A news item from the early 1960s relating to the development of ELECTRIC WALDEN technology: The 1st telexed or telegraphed message would not have been the 1st E-mail message, obviously. We'd have hoped to find an initial E-mail message that shares the same historicity and centrality as Morse's "What hath God wrought" and Bell's "Watson, come here — I need you." E-mail's roots can be traced back to conventions established in the TELEX networks using Model 32 Baudot (2-row) Teletypes and in the TWX networks using ASCII (3-row) TTY units. While much of such TELEX and TWX activity was real-time (that is, more of a TALK situation than E-mail), some of the deferred delivery systems developed for both TELEX and TWX closely resembled what we'd come to know as E-mail, and many of the persons building early E-mail systems had been exposed to both of those earlier communications environments. The 1st electronic mail on single machines (mail) would have been invented just as soon as some multi-user system 1st became capable enough to handle it. Although CTSS's may not have been the very earliest such creation, but this was definitely being done on the CTSS time-sharing system at MIT in the very early 1960s. We have a report of it dating to late 1965 but it might well have been operational since CTSS first came up, in like 1961 or 1962. Noel Morris and another person wrote it, implementing a suggestion by Louis Pouzin and Glenda Schroeder in a CTSS Programming Staff Note. They wanted mail so that operators could inform you when your lost file was retrieved. Morris and this other person saw it as far more, and were right. But they made no claim to having been 1st: at the time they were writing MAIL, they were aware of an electronic mail project at BBN called something like MERCURY or PLANET, and of a military message system called AUTODIN. In addition, DTSS might have had some kind of inter-user mail by then.

News items relating to the development of ELECTRIC WALDEN technology:

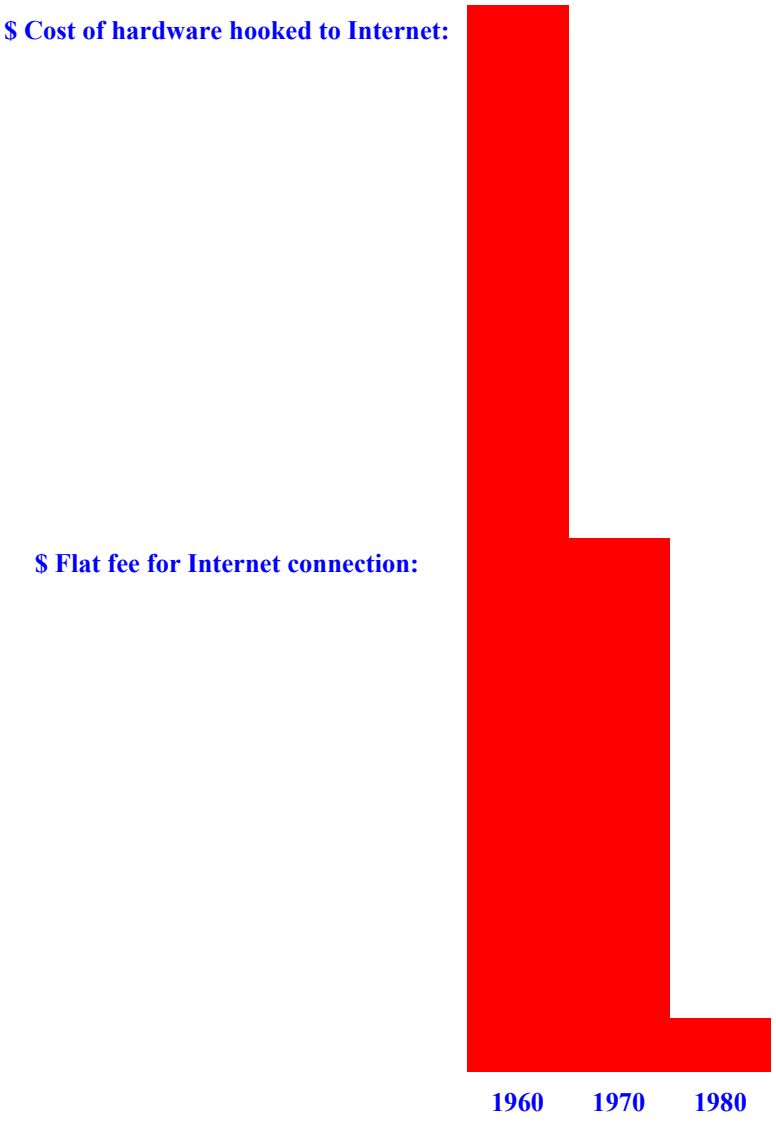
- During the decade of the 1960s, computers would be beginning to be used in the printing industry to drive and control typesetting and photocompositing.
- The COBOL compiler was able to run on the UNIVAC II and on the RCA 501.
- Control Data Corporation delivered its first product, the CDC 1604, a large scientific computer.
- Removable disks first appeared.
- 1st use of transistors in TV sets.
- Protosynthex (SDC).
- IBM developed, in New York, the 1st automatic mass-production facility for transistors.
- Epitaxial film transistors, formed by a new process that greatly improved performance while lowering cost.
- In Chicago, the 1st electronic switching central office became operational.
- AT&T introduced Touch-Tone digital dialing.
- Douglas Engelbart gave a talk about his agenda to use computers to augment the human intellect and was greeted with yawns. All his audience could see of what the guy was pitching to them was that this was yet another proposal for yet another information-retrieval system. Dull and derivative, it wasn't anything to which to pay serious attention to. Such a scheme could not ever amount to anything.
- J.C.R. Licklider prophesied that in the future:

> ... any student from grade school through graduate school who doesn't get two hours a day at the console will be considered intellectually deprived — and will not like it.

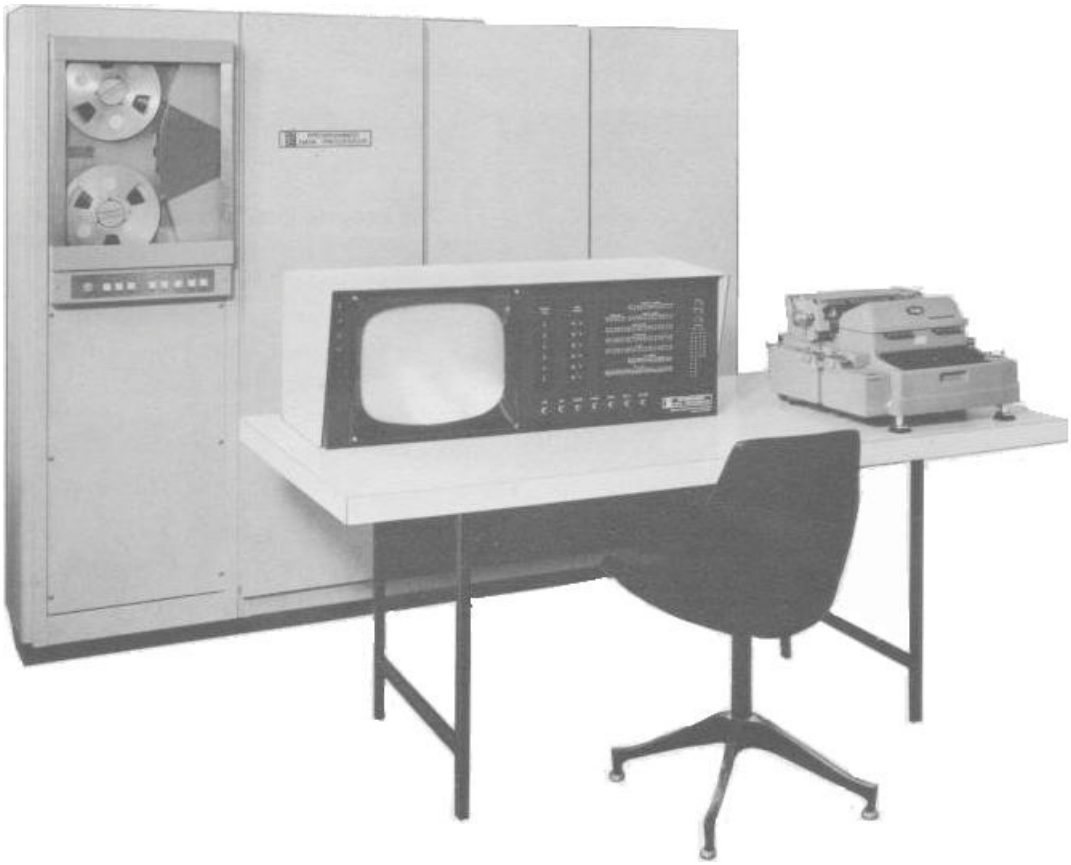
- At this point computer hardware hooked to the Internet cost about one order of magnitude more than, which is to say, about ten times as much as, the flat fee charged for an organization's Internet connection. What this meant, of course, was that you couldn't afford to have very many terminals at each Internet node, and so use of these terminals had of necessity to be shared. By 1970, ten years later, these two cost factors would be approximately equal, and by 1990, thirty years into the development cycle for this new communication technology, computer hardware hooked to the Internet would be costing about one order of magnitude less than the flat fee for an organization's Internet connection, which would mean that at each Internet node (a university campus, say, or a corporate office), you could afford to install practically any number of computer terminals for individuals.[64]

64. With Sun's "Java" terminals coming along, very shortly such comparisons were going to become ridiculous as various expensive computational functions would come to be provided essentially for free by the remote server across the Internet and as personal terminals, therefore, would become able to become more and more rudimentary. (We are now looking at like $100 per base-level home terminal.)

Cost Comparison between Computer Hardware and Internet Hookup Fees, Decade by Decade



- Early in this year, Bolt Beranek and Newman installed serial #1 of the Digital Equipment Corporation's PDP-1, developed at DEC by Benjamin Curley, and had gotten busy with on-line interactive programming. This 1st "small computer," below, set BBN back US$120,000:



- The first telexed or telegraphed message would not have been the first E-mail message, obviously. We'd have hoped to find an initial E-mail message that shares the same historicity and centrality as Morse's "What hath God wrought" and Bell's "Watson, come here — I need you." E-mail's roots can be traced back to conventions established in the TELEX networks using Model 32 Baudot (2-row) Teletypes and in the TWX networks using ASCII (3-row) TTY units during the 1960s. While much of such TELEX and TWX activity was real-time (that is, more of a TALK situation than E-mail), some of the deferred delivery systems developed for both TELEX and TWX closely resembled what we'd come to know as E-mail, and many of the persons building early E-mail systems had been exposed to both of those earlier communications environments. The first electronic mail on single machines (mail) would have been invented just as soon as some multi-user system first became capable enough to handle it. Although CTSS's may not have been the very earliest such creation, but this was definitely being done on the CTSS time-sharing system at MIT in the very early 1960s. We have a report of it dating to late 1965 but it might well have been operational since CTSS first came up, in like 1961 or 1962. Noel Morris and another person wrote it, implementing a suggestion by Louis Pouzin and Glenda Schroeder in a CTSS Programming Staff Note. They wanted mail so that operators could inform you when your lost file was retrieved. Morris and this other person saw it as far more, and were right. But they made no claim to having

been first: at the time they were writing MAIL, they were aware of an electronic mail project at BBN called something like MERCURY or PLANET, and of a military message system called AUTODIN. In addition, DTSS might have had some kind of inter-user mail by then.

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

January 13, Wednesday: In the White House in Washington DC, discussions began about taking covert action to overthrow Cuban dictator Fidel Castro. This was to be "Operation Zapata" created by National Security Council order #5412.

The Soviet Ministry of Internal Affairs (which is to say, the infamous "MVD") was abolished, to be replaced by separate agencies in the 15 republics.

A news item relating to the development of ELECTRIC WALDEN technology: J.C.R. Licklider completed the manuscript that would become MAN-COMPUTER SYMBIOSIS. The electronic computer he characterized as "a colleague whose competence supplements your own."

1961

The marvelous IBM Selectric was introduced. It had interchangeable balls featuring different fonts, even fonts in different languages, and in a few years would account for 70% of the electric typewriter market. The shape of the type element had been chosen as a sphere, rather than the cylinder used in the Pratt device of 1866, not only for space efficiency but also because the line of print force would always be directed through the tilt axis. Each individual type element was selected by choosing an angle around two mutually perpendicular axes known as “rotate” and “tilt.” There were 22 positions of rotation and 4 possible tilts. To cause the ball to rotate and tilt appropriately to obtain the desired character, there was a selection system of cams, pulleys, and metal ribbons (initially, this would turn out to lack the rigidity necessary for the cycle rate desired). This early design would give way to the whiftletree, a differential arrangement of pivoted bars similar to the whiftletree to which the traces of a horse-drawn wagon harness are fastened. The device’s whiffletree would provide fixed units of displacement that could be added or subtracted to obtain the desired rotate and tilt motion. Since the characters were arranged on the print element in two hemispheres (upper-case and lower-case) of 44 characters each and each hemisphere was arranged in 4 rows of 11 characters each, IBM needed to develop a coding scheme that would access each character on the typeball. From a home position in each hemisphere, rotation of up to five positions in either direction and tilt of up to three positions was required. Tilt values of 1 and 2 in all combinations provided access to the four rows of characters. Rotation values of 1, 2, and 2 in selected combinations provided positive rotation from one to five positions from home. A fourth rotation value of -5, in combination with the three positive values, yielded negative rotation from one to five positions from home. Thus, in addition to an eleven-unit motion for upper-case shift, the logic of the apparatus required six decisions for each character selection. When a key was depressed, the keyboard triggered the appropriate string of six decisions, setting up its corresponding coded interposer. The seven-bit character selection code (six bits for rotate and tilt control and one for shift control) was a significant improvement over earlier designs which had required a unique electrical signal for each character selected. This interposer, in turn, was driven by a rotating filter shaft and engaged a predetermined set of selector bails. These bails engaged the latch interposers, which in turn pulled the selector latches of the whiftletree to cause appropriate rotation and tilting. Since power to pull the bails and latches was supplied by the rotating filter shaft rather than by the operator, the designers were free to optimize the touch of the keys.

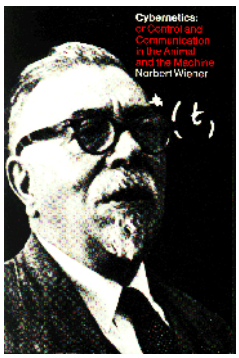
News items relating to the development of ELECTRIC WALDEN technology:

- The formation of the AFIPS American Federation of Information Processing Societies.
- At the Massachusetts Institute of Technology, on IBM 709 and 7090 computers, F. Corbato began to be able to offer time-sharing.
- IBM delivered a Stretch computer to Los Alamos. This transistorized device with 64-bit data paths was the first to use eight-bit bytes (it would remain operational until 1971). It became possible, on this device, to do multiprogramming.
- The 1st stereo radio broadcast.
- R.S. Barton devised the B5000 employing the 1st modern computer architecture (still arguably more advanced than any architecture as yet in vogue).
- Douglas Engelbart pitched the National Institute of Mental Health for funds to create an interdisciplinary “Knowledge Augmentation Laboratory,” and was turned down because, isolated as he was out in Palo Alto, California “far from the centers of computer expertise” such as Harvard

University and the Massachusetts Institute of Technology, they simply didn't believe he could attract anybody out into the boonies, or pull off such a project all on his lonesome.

- Austin Meredith began to be profoundly influenced by the literary remainder of Henry Thoreau.

The cybernetics movement was falling on hard times, partly because its ideas had been so thoroughly embraced, had become so instinctively basic to the new manner in which everyone thought that they seemed now entirely "old hat," and partly, it must be admitted, because the personality of Norbert Wiener was such that he would take offense at even imaginary slights, and partly because he had almost entirely ceased to do original mathematical research, choosing instead to focus on the intractable problem of what it would take to keep us from destroying ourselves. The technical discipline he had founded, which he had realized could just as readily be turned to vicious purposes as to benevolent ones, was being, in effect, abandoned to its hacks and doctrinaires.



Well, that's one account of it. According to the latest biography, Flo Conway and Jim Siegelman's DARK HERO OF THE INFORMATION AGE: IN SEARCH OF NORBERT WIENER, THE FATHER OF CYBERNETICS (Basic Books, 2005), however, Norbert's wife Margaret had a whole lot to do with it. She is said to have feared that his pre-eminence in the field was going to be taken over by one of his protégés, and to have attempted to seize control of the situation by alleging that one of their daughters had been seduced by one of these young men. The biographers allege that in defense of his daughter the father overreacted to this bogus information, and without any explanation cut himself off permanently from all his students.

November: J.C.R. Licklider was commissioned by the Council on Library Resources to explore what computers might be able to do for the library, as of the year 2000. (The result of this would be his LIBRARIES OF THE FUTURE, to be published in 1965.)

A news item relating to the development of ELECTRIC WALDEN technology: There was a demonstration of the CTSS Compatible Time Sharing System, on four terminals. MIT began to use "time-sharing" computers which would enable several users to access the same machine simultaneously. Initially, this would be a cost-sharing and availability technology, but it was also a necessary step toward a brave new world in which different members of a project, sitting at different terminals, could collaborate on their common project, accessing the same databases and employing the same software tools.

"If you wish to make an apple pie from scratch, you must first invent the universe."
— *Carl Sagan*

1962

News items relating to the development of ELECTRIC WALDEN technology:

- Charles Van Doren opinioned that the design of the traditional encyclopedia was obsolete because, growing merely by accretion rather than by design, it inherently looked backward rather than forward. “Because the world is radically new, the ideal encyclopedia should be radical, too. It should stop being safe — in politics, in philosophy, in science.”
- Paul Baran’s RAND article “On Distributed Communications Networks.”
- Packet-switching network with no single outage point.
- Launch of the 1st orbiting international communications satellite, Bell Lab’s Telstar.
- The foil electret microphone improved hands-free conversations.
- Up to this point, computer users conveyed instructions to their computers by the use of punchcards. In this year, however, the Teletype Corporation began shipping the Model-33 keyboard which would become the input mechanism on our early microcomputers.
- Ken Iverson of Harvard University and IBM developed APL (A Programming Language).
- Two of our 1st general-purpose simulation languages were proposed, SIMSCRIPT by the Rand Corporation and GPSS by International Business Machines, Inc.
- International Business Machines, Inc. marketed the IBM 1311, which utilized removable disks.
- IBM’s US-based annual revenues from computer products reached $1,000,000,000, for the first time surpassing its other revenue.
- In Dallas, Texas, H. Ross Perot, a former IBM salesman who had become suddenly wealthy through an incautious clause in his employment contract, founded EDS Electronic Data Systems.

April: A news item relating to the development of ELECTRIC WALDEN technology: Spacewar! was completed on the PDP-1.

May: A news item relating to the development of ELECTRIC WALDEN technology: Spacewar! was shown to the public at the MIT Open House.

June: News items relating to the development of ELECTRIC WALDEN technology:

- Up to this point, computer users conveyed instructions to their computers by the use of punchcards. In this month, however, the Teletype Corporation began shipping the Model-33 keyboard which would become the input mechanism on our early microcomputers.
- Sketchpad, by Ivan Sutherland, was the 1st real example of interactive graphics, windows (it had one window), icons, (almost)-object-oriented models, GUI, etc.
- Commodore Business Machines sold shares to the public for the 1st time.

October: A news item relating to the development of ELECTRIC WALDEN technology: Douglas Engelbart completed "Augmenting the Human Intellect: A Conceptual Framework." This contained the 1st written description of today's word-processing environment:

> Suppose you had a new writing machine – think of it as a high-speed electric typewriter with some special features.... For instance, trial drafts could rapidly be composed from rearranging excerpts of old drafts, together with new words or passages which you stop to type in. Your first draft could represent a free outpouring of thoughts in any order, with the inspection of foregoing thoughts continuously stimulating new considerations and ideas to be entered. If the tangle of thoughts represented by the draft became too complex, you would compile a reordered draft quickly.

Suddenly Douglas remembered Vannevar Bush's Memex article, that he had perused way back in 1945 while stationed in the Philippines — and so he added an entire section to his paper, in tribute to the inspiration which he must unconsciously have imbibed from that article.

October 22, Monday: On this day, in India, Prime Minister Nehru was addressing his nation, preparing them for a potential war with China.

Benjamin Britten was receiving the Freedom of the Borough of Aldeburgh.

Chamber Symphony for ten players by Ralph Shapey was performed for the first time, in McMillin Auditorium at Columbia University, conducted by the composer.

Trio for flute, cello and piano by Otto Luening was performed for the first time, in New York (the piano part was played by Charles Wuorinen).

12 Noon: The US Strategic Air Command initiated a massive alert of its B-52 nuclear bomber force.
B-52 flights began around the clock, with a new bomber taking off each time another landed.
For the first time in SAC history, all aircraft were loaded with nuclear weapons.

2:14PM: President John Fitzgerald Kennedy ordered that US Military forces worldwide go to DEFCON-3 – an increased alert posture– as of 7PM, the time of his speech to the nation.

7PM: President John Fitzgerald Kennedy addressed the nation by television, for 17 minutes.

He informed the nation of the presence of Soviet offensive ballistic missiles in Cuba. he states that as one of his "initial steps," a "strict quarantine on all offensive military equipment" is being put into effect. During the president's speech, 22 interceptor aircraft went airborne in the event the Cuban government reacted militarily. Kennedy warned the Soviet government that the United States will "regard any nuclear missile launched from Cuba against any nation in the Western Hemisphere as an attack by the Soviet Union on the United States, requiring a full retaliatory response against the Soviet Union." U.S. military forces worldwide, with the exception of the United States Air Forces in Europe (USAFE), went to DEFCON 3. ICBM missile crews were alerted and Polaris nuclear submarines in port were dispatched to stations at sea.

CUBAN MISSILE CRISIS

7:30PM: Secretary of State Dean Rusk, speaking to a meeting of all foreign ambassadors in Washington, informed that group, "I would not be candid and I would not be fair with you if I did not say that we are in as grave a crisis as mankind has been in."

A news item relating to the development of ELECTRIC WALDEN technology: The computer command and control system for the nuclear missiles of the time was an untested shambles. For instance, at Malstrom Air Force Base, near Great Fall, Montana, our defenders had been rushing to get a batch of new solid-fueled Minuteman 1 missiles up and operationally ready, just in case the President decided to fire them in the direction of the USSR. Each of the missiles carried a 1.3-megaton nuclear warhead. Now, ideally, there are all sorts of fail-safe devices and fail-safe procedures to safeguard such missiles from Colonel-Jack-Ripper types, a few of which do happen to exist in the USAF.[65] These fail-safe devices and fail-safe procedures, such as dual control panels neither of which will operate unless there is agreement from the other, are designed to prevent one crazy mofo from being able to start a nuclear war on his own hook. The rule is, only if that one crazy mofo is the President himself can such a thing be allowed to happen. At Malstrom there were no such fail-safe devices and there were no such fail-safe procedures, because, after all, the new missile capabilities were still in the process of installation and testing. Recognizing this danger, the military management of the silos though they had secured the firing panel for launching a pack of ten nuclear-warheaded missiles in a guarded vault an hour's drive away from the silos. That would of course have rendered the situation relatively safe, or comparatively safe. But they had not actually accomplished what they were supposing they had accomplished. Actually, that firing panel they thought they had placed under the most intense security had been stashed right out there at the silo complex itself, and was still under the control of the potential mofos. Afterward, during an inquiry, one of our defenders, not himself a mofo, would testify that –had he had some reason to want to do so at the time– he could have launched the missiles and started a global nuclear war all by his lonesome.

Here's another illustration of how much of an untested shambles our computer command and control system for the nuclear-tipped missiles was at the time. Our warning system detected a "missile" rising from Cuba, and specifically predicted that the target of this missile was Tampa, Florida. No missile of any description had actually been fired. This had been merely an operator error with a test tape! (And if we had reacted as we had planned to react, there would have been a very brief World War III. Fortunately, we all had our heads up our collective asses, or we had our hands trapped under our butts or something, and we simply sat and watched and went la-de-da well wha-da-ya-know as this spurious missile was, supposedly, rising toward the nuclear annihilation of Tampa.)

65. During this month a Cold-War novel FAIL-SAFE by Eugene Burdick and Harvey Wheeler was being serialized in the Saturday Evening Post (in 1964 Sidney Lumet would make this nuclear nightmare into a movie starring Henry Fonda, Dan O'Herlihy, and Walter Matthau, and in 2000 it would be recycled as a live TV play on CBS).

Had enough? Here's yet another illustration of how much of an untested shambles our computer command and control system for the nuclear-tipped missiles was at the time. The nice folks out at Volk Field in darker Wisconsin thought they had detected a ground intruder on their turf, and so they scrambled a flight of F106 fighters armed with nuclear weapons. Meanwhile, up in the stratosphere, B52s loaded with atomic bombs were circling slowly, circling slowly, conserving fuel, on full alert, ready to head over the pole toward their assigned particular targets inside the USSR. An officer had to actually drive out onto the airstrip and deflect the fighter planes from takeoff by blinking his headlights off and on, to get the alerted pilots to stand down — because the ground intruder they had detected was not a Commie, not a spy, not a saboteur, but an ordinary garden-variety American **black bear**.[66]

66. One wonders what combination of headlight blinks it requires to spell out "Hey, you guys, it's just a **damn bear**!"

1963

News items relating to the development of ELECTRIC WALDEN technology:

- The CDC Control Data Corporation assimilated the computer division of the Bendix Corporation.
- The GMC General Motors Corporation developed a conversational graphics console, the DAC-1, which would lead toward CAD Computer-Aided Design.
- The Lincoln Laboratories at the MIT Massachusetts Institute of Technology developed a conversational graphics console, the Sketchpad, which used the first light-pen, developed by Ivan Sutherland, and would lead toward CAD Computer-Aided Design.
- Wes Clark's LINC, which was the 1st actual personal computer at the Lincoln Laboratories.
- The DEC Digital Equipment Corporation shipped its 1st PDP-5 minicomputer.
- J.C.R. Licklider initiated ARPA projects to create a "Man-Computer Symbiosis."
- RAND implemented JOSS, the 1st really adequate end-user programming system.
- John R. Pierce received the National Medal of Science for contributions to communications theory, electron optics, traveling wave tubes, and satellite communications.
- C. Kumar and N. Patel developed the carbon dioxide laser which we now use to make surgical incisions, and as a cutting tool in industry.
- Harvey R. Ball devised the smiley face.

April: A news item relating to the development of ELECTRIC WALDEN technology: Charles Tandy acquired, for freebies, the Radio Shack Corporation and its nine retail outlets.

April 25, Thursday: J.C.R. Licklider dashed off a 7-page proposal that to transcend geography, "if such a network as I envisage nebulously could be brought into operation," what he and his co-workers ought to be doing was linking all their various time-sharing computers together (this hastily prepared document was, you see, the first to describe the Internet).

Summer: A news item relating to the development of ELECTRIC WALDEN technology: Project MAC for a Multiple Access Computer began at the MIT Massachusetts Institute of Technology.

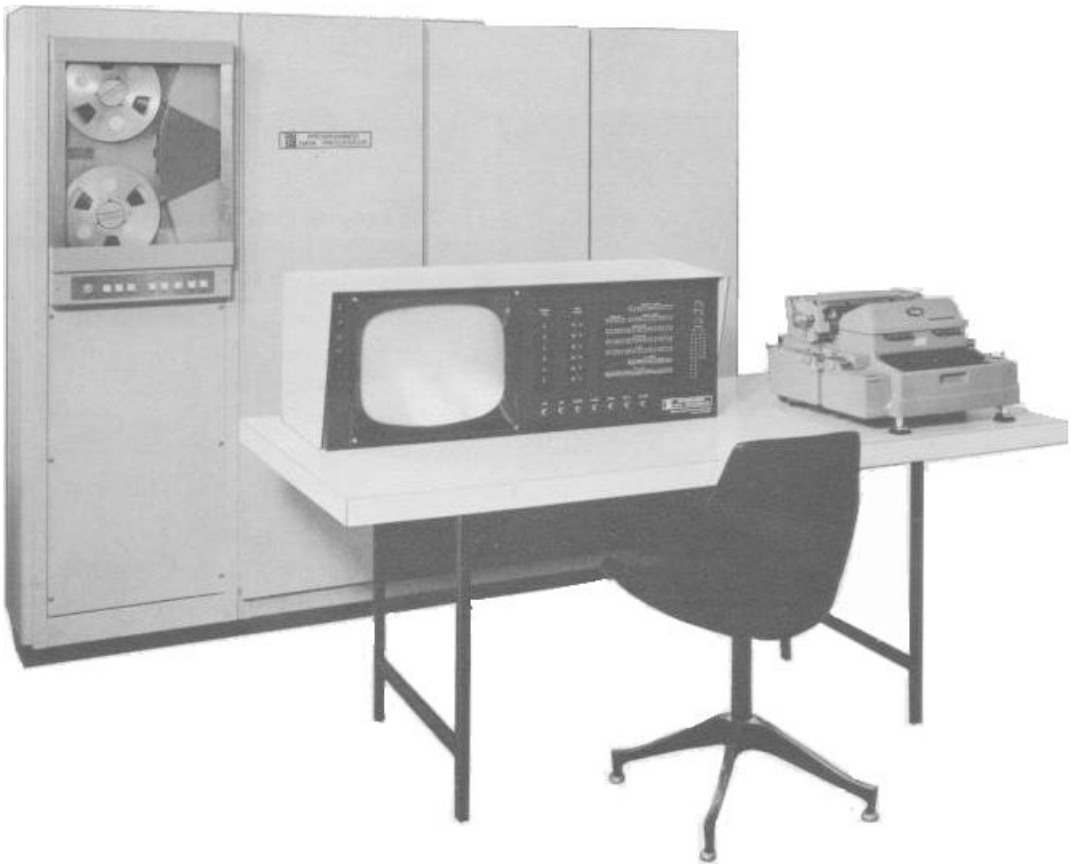
1964

News items relating to the development of ELECTRIC WALDEN technology:

- At the SRI Stanford Research Institute, Douglas C. Engelbart and William K. English invented the mouse.

- Control Data Corporation introduced Seymour Cray's CDC 6000, with 60-bit words and parallel processing.
- The IBM Selectric typewriter began to use an ink ribbon based on single-pass film rather than on multiple-pass fabric — an outgrowth of carbon paper technology.
- At Dartmouth College, John Kemeny and Thomas Kurtz offered a BASIC Beginners All-purpose Symbolic Instruction Language.
- The 1st time-sharing BASIC program.
- NCR introduced the 315/100.
- At RAND, Paul Baran proposed the development a computer-based communication system that could survive a world nuclear war. ("Hello? Is there anybody else? Please talk to me. Hello?")
- The 1st on-line service, MEDLARS (National Library of Medicine), predecessor of today's MEDLINE (MEDlars onLINE) available on a host of information providers such as DIALOG, DataStar, and STN International (MEDLINE is the database that information providers purchase, while MEDLARS remains available through the National Library of Medicine).
- The 1st transcontinental PicturePhone call took place, allowing New York and California to look at one another.
- TouchTone began to replace the rotary telephone dial.
- Honeywell, on the attack against IBM's installed base of 1,400 systems, introduced the H-200.
- Texas Instruments patented the integrated circuit.
- IBM announced the System/360, the first family of commercial mainframes compatible with one another. This was the 1st computer to use integrated circuits.
  Their keyboard introduced specialized keys such as **Esc**, **Alt**, **Ctrl**, **Pause**, **Break**, and **SysRq**.
- In describing its new software application package, IBM began to speak of "word processing."
- At RAND Corporation, M.R. Davis, T.D. Ellis, Sibley, et.al. devised the first graphic tablet.
  While a number of the features which we now associate with interactive use of personal computers such as the mouse, hypertext, and two-dimensional editing, for which we assign credit to Engelbart, would be being developed first in a timesharing environment by his group at the Stanford Research Institute in the late 1960s and early 1970s, this group's use of the screen two-dimensionally (as opposed to the previous line-by-line limitation) did not involve either graphics or menus. Nor

would Engelbart's group pioneer in two-dimensional editing, for a display-oriented timesharing system called Zeus would have already been developed at Stanford University by John McCarthy in the 1964-1966 period based on a DEC PDP-1 computer with eight or so Philco CRT displays attached, using a 2-D text editor called TVEDIT. (For sure Engelbart's group knew of this work, for the groups were only a couple of miles apart and did visit one another occasionally.)



1965

News items relating to the development of ELECTRIC WALDEN technology:

- J.C.R. Licklider's LIBRARIES OF THE FUTURE.
- The IBM International Business Machines Corporation shipped its 1st System/360, its first integrated circuit-based, or third generation, computer.
- The DEC Digital Equipment Corporation shipped its 1st PDP-8, a "minicomputer."
- At the University of Pennsylvania, the 1st computer science PhD was granted, to Richard L. Wexelblat.
- The ARPA Advanced Research Projects Administration sponsored study of the idea of a "cooperative network of time-sharing computers."
- Introduction of the CTSS Compatible Time-Sharing System operating system allowed several users simultaneously to use, or share, a single computer.
- Computer TX-2, at the Lincoln Laboratory of the MIT Massachusetts Institute of Technology, and computer Q-32, at the SDC System Development Corporation of Santa Monica, California, were linked to one another directly, without packet switches.
- NASA RECON was developed.
- At the SDC System Development Corporation of Santa Monica, California, ORBIT was developed.
- Papert, Feurzeig, Bobrow, et al first implemented LOGO.
- The CDC Control Data Corporation founded the Control Data Institute, to provide computer-related education. It would be during the late 1960s that the PLATO "learning system" would be being developed at the University of Illinois and marketed by CDC for "computer-aided instruction." The system would be based entirely on the idea of communication of established fact without the possibility of interpretation or selection, and without the possibility of argument or backtalk to the trainer, and thus would be by design entirely useless or counterproductive for any serious research purpose. Originally commissioned by the US Armed Forces for the training of soldiers, the system involved such sophisticated and unforgiving tracking of student attitudes that, when Congress would begin to become aware of its implications, it would promptly and very properly be defunded as dangerously "Big Brotherish."[67]
- In a paper delivered at a national conference of the Association for Computing Machinery, Theodore Nelson went public with his concept of "hypertext." This would become a buzzword, despite the fact that the only thing that made this crutch necessary was the outworn storage metaphor known as "filesystem" according to which chunks of computer storage were being analogized with individual physical sheets of paper filed away inside physical manila folders inside the physical metal drawers of an office filing cabinet.[68]

67. This sorry backward repressive system has in fact been one of the most serious inspirations for our "Stack of the Artist of Kouroo" research contexture — a negative inspiration, something against which we have needed to plot and to counter-design in every particular.

68. The Kouroo Contexture is based not on Ted Nelson's click-buttons offering stupid blind hypertext leaps but instead on click-buttons offering hypercontext switching. In hypertext, you click on a button and "go to" somewhere else (in programming, the "go to" is one of the first things you learn to avoid). In hypercontext it is very different: you click on a button in order to alter the database view you are taking of the data in question, by replacing the context in which the data had been appearing with a specified other, different context for that same data.

1966

News items relating to the development of ELECTRIC WALDEN technology:

- Honeywell acquires Computer Control Company, a minicomputer manufacturer.
- Scientific Data Systems (SDS) introduces Sigma 7.
- Texas Instruments offers the first solid-state hand-held calculator.
- During this year magnetic bubble devices were being pioneered. The invention offered a new and unique approach to data storage.
- The first commercial modem, a box in which a phone handset could be placed to allow a computer to say "beep beep" to another computer over long distances, was known as the "magnetic/acoustic coupler," and would be manufactured for Tymshare, Inc. by Climet Instruments after being designed by Communications Contact, Inc., which had produced the first 40 or so devices. Tymshare (long since consumed by McDonnell Douglas) had begun as Tymshare Associates in 1965, by Tom O'Rourke and Dave Schmidt at 745 Distel Drive, Los Altos CA, as one of the very earliest commercial timesharing services. Terry Wilson worked out the circuitry while Paul worked out the packaging, and with Bob Leeman's help, the first approximately 10 couplers were produced. The urethane foam poured into them turned a really odd purple, as well as stinking mightily. Whenever the salesperson gave a demo, the prospect would ask: "If I had two of those, could I get two Teletype machines to talk to each other over regular phone lines?" The answer was yes. Tymshare was therefore actually in the coupler business before it was in the computer service business big time. After selling off that first batch, they asked for an improved version that would handle 300 baud.

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

May: A news item relating to the development of ELECTRIC WALDEN technology: Steven Gray founded the Amateur Computer Society, and began publishing the ACS Newsletter (some consider this to amount to the birthdate of personal computing).

Summer: A news item relating to the development of ELECTRIC WALDEN technology: J.C.R. Licklider participated in the EduCom Summer Study on Information Networks, at Boulder, Colorado, planning what would become known as “EduNet.”

1967

News items relating to the development of ELECTRIC WALDEN technology:

- DEC introduces the PDP-10 computer.
- A.H. Bobeck at Bell Laboratories developed bubble memory.
- Burroughs Corporation shipped the B3200.
- The 1st issue of Computerworld was published.
- At the National Physical Laboratory in Middlesex, England, Donald W. Davies developed a data network and presented "packet switching" as an effective way to route data through networks.
- At an ACM Symposium on Operating Principles, a plan was presented for a packet-switching network, and Lawrence G. Roberts presented the 1st design paper on what would become the ARPANET.
- Data Corporation started, for the Ohio Bar Association, a project called O-BAR (later to be renamed LEXIS).
- The 1st book was published, that had been typeset on a computer.
- At Brown University, Andries van Dam's Hypertext Editing System and FRESS. Theodore Nelson coined the term Xanadu to refer to his hypertext publishing project intended to revolutionize data-storage worldwide. "Xanadu, a global hypertext publishing system, is the longest-running vaporware story in the history of the computer industry. It has been in development for more than 30 years.... Xanadu has set a record of futility that will be difficult for other companies to surpass." —Wolf, Gary. "The Curse of Xanadu." Wired, June 1995, page 138.
- Alan Kay & Ed Cheadle invented the FLEX machine, a very early desktop computer, the first to be termed a "personal computer" and the first to have OOP software.

June: A news item relating to the development of ELECTRIC WALDEN technology: The 1st Consumer Electronics Show was held, in New York City.

1968

From this year into 1970, J.C.R. Licklider would be functioning as the Director of MIT's Project MAC (while, concurrently, a Professor of Electrical Engineering there).

News items relating to the development of ELECTRIC WALDEN technology:

- Dendral, the first medical diagnostic medical program, was created by Joshua Lederberg at Stanford University.
- Univac introduced the 9400 computer.
- Integrated Electronics (Intel) Corp. was founded by Gordon Moore and Robert Noyce.
- The PS-network was presented to the Advanced Research Projects Agency.
- MEDLARS was the first service to offer remote online access, from the National Library of Medicine to the State University of New York.
- J.C.R. Licklider and Robert Taylor presented "The Computer as Communication Device."
- Alan Kay's masters' thesis on the FLEX machine, his idea of a "Dynabook" — a notebook computer for children of all ages.
- First appearance of the concept "computer virus," in Gregory Benford's "The Scarred Man." In this sci-fi story, the rogue program in question is called "VIRUS" and the corresponding disinfectant program "VACCINE" with no suggestion that the names were intended as initialisms.
- Douglas Engelbart et.al. gave a smashing demo of NLS to several thousand people in San Francisco, showing the mouse, hypertext, screen regions, interactive cooperative work with video, voice, and shared screen, etc.
- Mostly during this year (but beginning in the previous year and completing in the following year) RAND was showing off their GRAIL, the first complete pen-based system, featuring end-user programming, and (almost completely) modeless editing.
- Alfred Y. Cho headed a Bell Labs team that invented molecular beam epitaxy, used to create new materials one atomic layer at a time. The process enabled semiconductor chips to be made with ultra precision.
- Hewlett-Packard introduced the 1st programmable scientific desktop calculator.
- Robert Noyce and Gordon Moore left Fairchild Semiconductors to found intel Corporation, as a memory chip manufacturer.
- Ed Roberts and Forest Mims founded Micro Instrumentation Telemetry Systems (MITS).

Fall: At the Joint Computer Conference in San Francisco, in the Nourse Auditorium (San Francisco Civic Auditorium), on a high lecture platform, Douglas Engelbart was giving a demo of his ideas and inventions to which some now attribute their devotion to a life of computerism. This presentation by Engelbart, which may very well for all I know have been a repeat performance after an earlier demo or series of demos, was a big deal and involved special projection equipment being set up in the auditorium and was definitely videotaped. The audience was a thousand or more. I believe a copy of that original videotape should still be obtainable from the ACM. Members of the audience were somewhat puzzled, and offended by his presentation. For example, he demonstrated what he called a "mouse," with which a body could move a "cursor" about a television screen displaying text and images. CRT monitors were novel then; hardly anybody knew why one might want to monkey with text in a computer. Worse, these techniques were immorally self-indulgent, wasting expensive cycles on work that could easily be accomplished by a programmer/operator with a decent amount of self-discipline. Whatever enthusiasm for interactive computing was generated at that show must have come chiefly from younger people, not yet acculturated in the stolid old ways of the trade. The reports at the time were more grudging, probably representing the views of the Xerox executives who couldn't see much value in what the folks were producing at Xerox PARC. A few years later, Engelbart's lab at SRI would stand dark and abandoned.

Here's an interesting response I received by Email from Kyle L. Webb <kwebb@astro.phys.unm.edu> of the Department of Physics and Astronomy at the University of New Mexico:

> An interesting aside to the PLATO project
> is that it was commissioned by
> the US Armed Forces for teaching soldiers
> but it involved a sophisticated
> tracking system which when Congress
> learned of its implications, promptly
> threw it out as a dangerous "Big Brother" system!

Plato was used by the US armed forces well into the 1980s, and one of my acquaintances was involved in developing new Plato applications for the US Army Armor school into the early 1990s. Doesn't sound like it was thrown out. Plato was used regularly at quite a number of colleges into the early nineties. Specifically it was still used by Parkland College in Champaign Il, for general educational work when I was taking an organic chemistry class in 92. The University of Illinois continued to use it as well through 1992 for its introductory physics classes, and grade tracking in its higher level physics classes at least though 1992 as well. I don't know what it was replaced with. I was acquainted with Dr. Lorella Jones who was (as far as I know) the last director of the U of Illinois's CERL Plato

system (She unfortunately died of cancer a couple years ago). She was a physics prof, who had developed quite a number of physics related programs on Plato, including some very useful special relativity simulations. In 1992 I was part of an experiment aimed at delivering Plato services through cable television systems. I was living at a Champaign IL apartment complex that had its own cable system, independent from the one that served the town. Having worked for the cable provider, and also having been on Plato for a number of years, I tested a Plato III terminal with a converter box to feed the signal out over the apt's cable system back to the head end. From there it was relayed over microwave and phone line to CERL headquarters in the ERL building on the U of I campus in Urbana. Sadly the performance was poor to say the least, and this was one of the last dying gasps of Plato as far as I saw. Though the Plato system was impressive in many ways, by that time it was getting very long in the tooth. It had very limited connectivity to anything other than Plato (in 92 or so, it finally became able to receive and send mail to the internet). Further the files structure was highly centrally controlled, meaning for example that it took a relatively high level director to allocate not only the divisions of files in a given amount of space, but even to designate what that space was to be used for. On the other hand, we are only recently seeing interactive multi-user games that equal such Plato mainstays as avatar (a dungeon game), empire (team based star trek game), and the like. In 1988 or so, I knew of two companies based in the Champaign Urbana area that were either working on or fielding Plato followons. I don't recall the names of either but one was a PC based system, and the other was closely related to the Novanet followon. As I was leaving that area in 1993, I heard rumors that some former Plato types were looking at revamping the system, and releasing some updated versions to run on modern hardware, with improved software. Whether any of these efforts came to pass, I don't know.

> When Control Data realized that it had
> a multi-million dollar boondoggle on
> its hands, it sold it to the South African Govt!
> The Apartheid regime
> started to install it in the Black school system
> as a method of tracking
> students and their activities
> (both educational and political) and even
> went as far as linking it to Employment Centres
> so that for example, when a
> Black student who was politically active
> finally left school and applied
> for a job through an Employment Centre,
> his/her activities were there in
> the file and any activists of course,
> couldn't get jobs. The Apartheid
> regime installed it in the Orange Free State

> and had plans to use it
> nationwide but I don't think it got that far.
> It had to use the teachers in
> the school system as a source of information
> on the students, effectively
> using the teachers as spies.

Absolutely the opposite of my experience with it. All sorts of people got author signons (privileged access that allowed one to program) to Plato that allowed them to game, use the term-talk chat system, the copious notesfiles (newsgroups equivalents), and form a sort of Champaign-Urbana subculture that survived for years. It was largely untracked, subversive in some ways (I tend to rate that as a plus), but it provided a ready and willing pool of programmers to develop learning applications for schools and college departments at very cheap prices. I don't doubt that the strict controls remaining from the earliest days of Plato could have been used for nefarious purposes, but so can many computer systems. One of the notable features of Plato was an anonymous posting flag provided in the notesfiles. This preceded the current use of remailers for usenet by many years. Though the anon could be broken, it took considerable effort to do so. I know of only one case where this was done on the CERL system, when it was broken by setting up a tracking program to find out the identity of a suicidal, and threatening poster to one of the self help related notesfiles.

December 9, Monday: Thomas Merton died at Suwanganiwas, the Red Cross Centre at Samut Prakan, 30 clicks outside Bangkok, at the age of 53, 27 years after entering the Gethsemani monastery. He had gone to Thailand to attend an interfaith conference between Catholic and non-Christian monks and had concluded his morning talk with "So I will disappear from view and we can all have a coke or something." Back in his cottage, he stepped out of the shower and attempted to adjust a large 220-volt electric fan. When he was found there were severe electric burns on his torso.

A news item relating to the development of ELECTRIC WALDEN technology: The first demonstration of a computer mouse, by its inventor, Douglas Engelbart of Stanford, took place at a computer conference at Stanford University.

Concerto-Rhapsody for piano and orchestra by Aram Khachaturian was performed for the initial time, in Gorky.

Stimmung für sex-tête no.24 for six voices by Karlheinz Stockhausen was performed for initial first time, in Paris.

Das Floss der "Medusa," an oratorio volgare e militare for soprano, baritone, speaker, chorus, boys' chorus, and orchestra by Hans Werner Henze to words of Schnabel, was to be premiered on this evening in Hamburg.

Before the performance a poster of Che Guevara was placed on stage, only to be torn down by the organizer of the concert. In retaliation, leftist students stuck a red flag on the platform. When concert officials attempt to remove the banner, the students vigorously defended it. Meanwhile, some members of the West German Radio Chorus refused to sing under the red flag but the composer would not allow it to be removed. Under these circumstances the chorus exited. Meanwhile police arrived in battle gear and arrested several students and shoved the poet, Ernst Schnabel, through a glass door before arresting him as well. Under these conditions the composer refused to go on and the concert was cancelled.

A concerto for amplified piano, brass, string basses, and percussion was performed for the initial time in Royce Hall at the University of California at Los Angeles, with the composer Roy Harris himself conducting.

1969

News items relating to the development of ELECTRIC WALDEN technology:

- Edson deCastro left DEC to start Data General Corp. and introduced the Nova, the first 16-bit minicomputer.
- First International Joint Conference on Artificial Intelligence was held.
- IBM unbundled hardware and software; introduced a minicomputer line, System/3.
- Lockheed Electronics shipped the MAC-16.
- PASCAL compiler was written by Nicklaus Wirth and installed on the CDC 6400.
- At a time when no standards existed and computers could not, generally, communicate with each other, J.C.R. Licklider and Robert Taylor pitched the director of the Department of Defense's ARPA Advanced Research Project Agency to liberate a million or so in bomb money, to advance an innocent purpose: good communications, research into networking. The result of this would be, of course, ARPANET, the predecessor of our Internet. (See, this thing was a winner from the word go, for even if the million bucks turned out to be wasted, at least they wouldn't have been used to kill anybody! –Good thinking, guys.) The first software for this would be written by three grad students, Vinton Cerf, Steve Crocker, and Jon Postel. Their first node was the Network Measurements Center node on a SDS SIGMA machine running the 7:SEX operating system at UCLA and soon afterward they brought online the NIC node on a SDS940 machine running the Genie operating system at Stanford Research Institute, the Culler-Fried Interactive Mathematics node, an IBM 360/75 running the OS/MVT operating system at the University of California – San Bernardino, and the Graphics node, on a DEC machine running the PDP-10:Tenex operating system at the University of Utah, for a total of four computers. (Perhaps mainframes at a particular site had been networked prior to then, but this was the first connection over any distance.) The 1st successful message over this network was not, like the 1st phone message or the 1st cable message, placed on record, but may well have been merely "ping."
- DIALOG made its appearance, as competition for LEXIS.
- On a Honeywell 516 minicomputer with 12K of memory, Bolt Beranek and Newman, Inc. pioneered Information Message Processors.
- The first "RFC" Request for Comment was Steve Crocker's "Host Software."
- Merit X.25-based networks were established for students, faculty, and alumni at the University of Michigan, Michigan State University, and Wayne State University.
- Kenneth Thompson and Dennis Ritchie of Bell Labs devised a computing environment called the UNIX system (UNIX is a registered trademark, licensed exclusively through x/open company, ltd.) as a simple but elegant time-share software system for minicomputers, to be used for text editing, general computing, switching-system operations, and trouble reporting.
- Replacing traditional cord switchboards, the Traffic Service Position System automated many operator functions.
- Charge-coupled devices foreshadowed breakthroughs in imaging. (Today they are used in video cameras.)
- The 1st commercially viable VCR was sold, by Sony.
- Intel's Marcian Hoff designed an integrated-circuit chip that could receive instructions and perform simple functions on data. The device, known as "4004," became the 1st microprocessor.
- Intel announced a 1KB RAM memory chip — a significantly larger capacity than any previously produced memory chip.

- Golden United Life Insurance Company began an internal computer processing center called “Compu-Serv.” It would later be spun off as CompuServe Incorporated.
- Advanced Micro Devices Incorporated was founded.
- Bill Gates and Paul Allen, calling themselves the “Lakeside Programming Group” signed an agreement with Computer Center Corporation to report bugs in PDP-10 software, in exchange for computer time.
- Xerox opened its famed Palo Alto Research Center (PARC).
- Digital Equipment hired David Ahl as a marketing consultant.

May-October: A news item relating to the development of ELECTRIC WALDEN technology: Nodes began to accumulate on what eventually would become the Internet. Here are the statistics for May and October:

Host nodes on the Internet

DATE	NODES
May 1969	4
October 1969	5
April 1971	23
June 1974	62
March 1977	111
August 1981	213
May 1982	235
August 1983	562
October 1984	1,024
October 1985	1,961
February 1986	2,308
November 1986	5,089
December 1987	28,174
July 1988	33,000
October 1988	56,000
January 1989	80,000
July 1989	130,000
October 1989	159,000
October 1990	313,000
January 1991	376,000
July 1991	535,000
October 1991	617,000
January 1992	727,000
April 1992	890,000
July 1992	992,000
October 1992	1,136,000
January 1993	1,313,000
April 1993	1,486,000
July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

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September: A news item relating to the development of ELECTRIC WALDEN technology: The 1st transfer of an ARPAnet packet over the Internet took place, from BBN to UCLA, and (as Thoreau had feared would be the case!) this historic packet is reported to have contained no message at all.

At this point Stan Mazor came from Fairchild to join Hoff at intel.

October: A news item relating to the development of ELECTRIC WALDEN technology: Engineers from Japan's ETI company met with Intel to inspect work on their calculator project. They accepted the Intel design for an integrated circuit chip set and signed an exclusive contract for the chips.

October 29, Wednesday: A military court in Athens began trials against 43 alleged opponents of the regime.

In the case of Alexander v. Holmes, the United States Supreme Court ordered that school districts end racial discrimination "at once."

In the trial of the "Chicago 8," Judge Julius Hoffman ordered that the defendant Bobby Seale be bound and gagged on account of his persistent outbursts in the courtroom.

Anti-government violence moved from the Central University of Venezuela to other cities throughout the country.

Nature's Concord for trumpet and piano by Charles Wuorinen was performed for the initial time, in the studios of Irish State Radio.

A news item relating to the development of ELECTRIC WALDEN technology: The letters "l," then "o," then "g" were typed into a computer at UCLA by student Charley Kline. The computer had been wired to a computer some 300 miles to the northwest, at the Stanford Research Institute. What was supposed to happen was, the computer at the SRI was to recognize this as an attempt to log in, disregarding entirely the fact that the message was coming from another computer a long distance away, it was to complete the command as "login," and it was to issue the usual login response (what actually happened was, there was a buffer overflow and the system crashed — nevertheless this "l" "o" "g" entry was received and constitutes the 1st message sent and received over ARPANET, predecessor to the Internet).

November 21, Friday: A news item relating to the development of ELECTRIC WALDEN technology: The 1st permanent link between distant computers was effected, with ARPANET between UCLA and Stanford.

Gênesis, a symphonic poem and ballet by Heitor Villa-Lobos was performed for the initial time, in the Teatro Municipal, Rio de Janeiro.

33 1/3, for records, gramophones and audience by John Cage was performed for the initial time, at the University of California, Davis.

December: A news item relating to the development of ELECTRIC WALDEN technology: Stan Mazor worked on i4004 architecture with Hoff and helped to write test code to implement arithmetic and control programs to implement a desktop calculator project. Busicom objected at first that they weren't at all sure that they could produce a calculator, but by this point, Busicom abandoned their custom chips and intel begin the detailed design of the first microcomputer.

1970

News items relating to the development of ELECTRIC WALDEN technology:

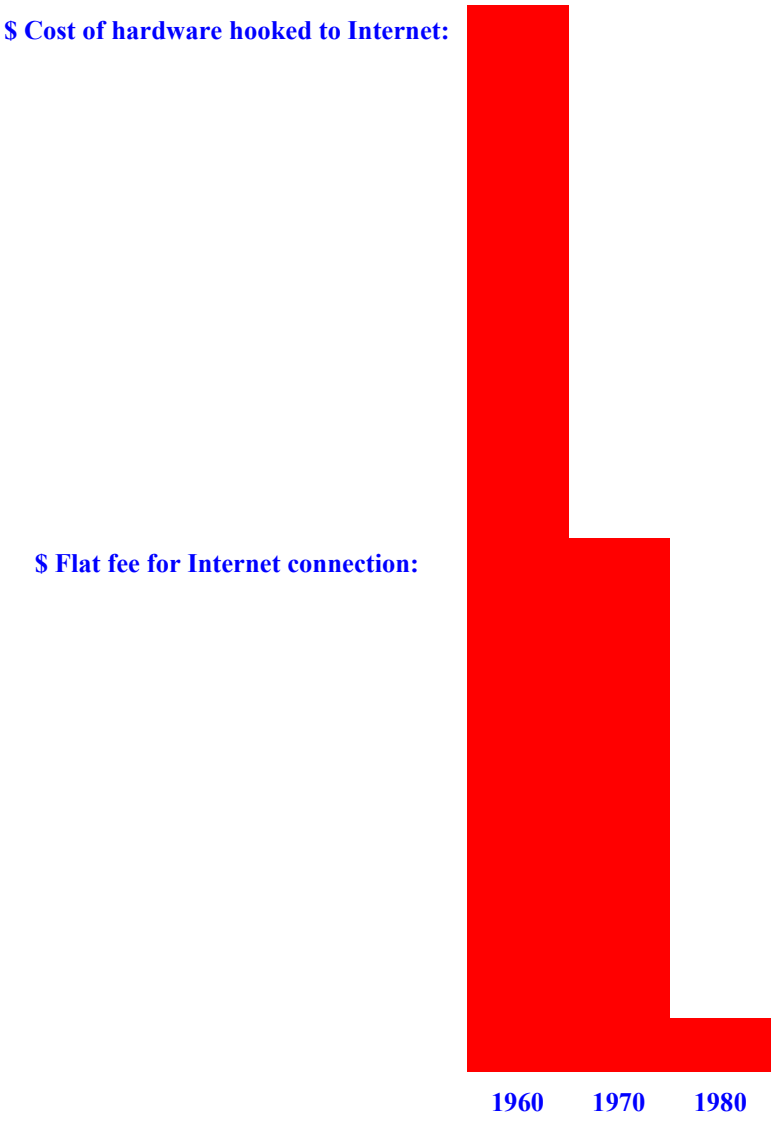
- E.F. Codd of the IBM Research Laboratory south of San Jose, California, in "A Relational Model of Data for Large Shared Data Banks," extended some mathematical principles of the theory of relations into the design of business databases. General Electric would develop "System R," the 1st distributed database, on the basis of this model. At General Electric's Nuclear Energy Division in San Jose, I wrote GE's user requirements for System R.

  During the decade of the 1970s, on the basis of System R, Gary Morgenthaler, Lawrence Rowe, Michael Stonebraker, and Eugine Wong of UC-Berkeley would develop INGRES. ANSI database standards based on this work would be published in 1986, 1989, 1992, and 1999. (If you've used Microsoft's "Access," you've used a relational database. Relationality allows a distribution of responsibility for the maintenance of the data objects in the database, so different people can be responsible for the timeliness and accuracy of the data elements that they know the best, and so that all these various expertises can, in the guts of the computer, intertwingle. Basically, the Kouroo Contexture is intended to make this distribution of data responsibility available for the first time to humanities scholars.)
- Computer Logic Systems shipped the SLS-18.
- A 1st version of the UNIX operating system was running on a DEC PDP-7.
- The DEC Digital Equipment Corporation shipped its first 16-bit minicomputer, the PDP-11/20.
- Data General shipped its SuperNova.
- The 1st ACM computer chess tournament.
- After an airplane crash killed an entire crew of top General Electric computer science executives, Honeywell Information Systems took over GE's computer operations.
- IBM shipped its first System 370, a 4th-generation computer.
- Xerox Data Systems introduced the CF-16A.
- The NCP Network Control Protocol was created.
- The 1st transmission of data into a computer network by means of radio waves.
- During the decade of the 1970s, store-and-forward networks would be utilizing electronic mail technology and extending this capability into the area of conferencing.
- At the University of Hawaii, Norman Abrahamson developed ALOHAnet.
- Ronald W. Schafer, James I. Flanagan and Lawrence R. Rabiner devised techniques to expand the vocabularies of "talking" computers.
- Gilbert Chin's research team created a new type of magnetic alloy now used in most telephone handset speakers.
- Intel created the 1103 chip, the 1st generally available DRAM memory chip.
- Alan Kay proposed a "KiddiKomp."

At this point computer hardware hooked to the Internet had fallen in cost from about one order of magnitude more than, which is to say, about ten times as much as, the flat fee charged for an organization's Internet connection, which had been the situation a decade earlier. What this meant, of course, was that you could a this point afford to have several terminals at each Internet node. By 1990, thirty years into the development cycle for this new communication technology, computer hardware hooked to the Internet would be costing about one order of magnitude less than the flat fee for an organization's Internet connection, which would mean that at each Internet node (a university campus, say, or a corporate office), you could afford to install practically any number of computer terminals for individuals.[69]

69. And now, with "Java" terminals coming along, very shortly such comparisons are going to become ridiculous as various expensive computational functions are provided essentially for free by the remote server across the Internet and as personal terminals, therefore, are able to become more and more rudimentary. (We are looking at like $300 per home terminal.)

Cost Comparison between Computer Hardware and Internet Hookup Fees, Decade by Decade



February: Faggin came to intel from Fairchild and took on responsibility for its chip design project, which was behind schedule. He worked overtime and designed all 4 chips, the ROM, the RAM, the CPU, and the Shift Register). Mazor helped with logic checking (simulation) while Shima helped in chip layout checking. The move from design to production would require about 18 months.

Spring: A news item relating to the development of ELECTRIC WALDEN technology: Work began at Intel on the layout of the circuit for what would be the 4004 microprocessor.
Federico Faggin was directing the work.

December: News items relating to the development of ELECTRIC WALDEN technology:

- Gilbert Hyatt filed a patent application entitled “Single Chip Integrated Circuit Computer Architecture,” the 1st basic patent on the microprocessor.
- Information Sciences contacted Bill Gates and Paul Allen, offering them PDP-10 computer time in exchange for their programming expertise.

“If you wish to make an apple pie from scratch,
you must first invent the universe.”
— *Carl Sagan*

1971

News items relating to the development of ELECTRIC WALDEN technology:

- Computer Automation introduced the Alpha-16.
- The IBM International Business Machines Corporation introduced its 370/135 and 370/195 mainframes.
- The IBM 3720 machine featured a display terminal with a screen-oriented keyboard, and on this keyboard were keys for **Enter**, **Ins**, **Del**, **Home**, **PageUp**, and **EOF** (**End**). There were, in addition, arrow keys.
- IBM introduced the "memory disk," or "floppy disk," an 8-inch floppy plastic disk coated with iron oxide, in order to load the IBM 370 microcode.
- At intel Corporation, a team headed by Marcian E. Hoff announced the first microprocessor, the Intel 4004. The intel Corporation renegotiated its contract with ETI to obtain permission to market this microprocessor openly.
- The intel Corporation introduced its 1101 chip, a 256-bit programmable memory, and its 1701 chip, a 256-byte EROM Erasable Read-Only Memory.
- Kenback Corporation introduced the Kenback-1 computer, for US$750, a computer which used a 1KB MOS memory made by the intel Corporation.
- John Blankenbaker built the 1st personal computer, the Kenbak I.
- The National Radio Institute introduced the 1st computer kit, for US$503.
- NCR introduced the Century 50.
- Sperry-Rand took over the RCA computer product line.
- David Nichols was working on an electronic process, at Iowa State University, that he would be able to patent in 1973. (It is this work which would constitute the foundation claim for fax machine patent royalties in the USA.)
- By this point ARPANET had 15 nodes on 23 hosts: UCLA, SRI, UCSB, University of Utah, Bolt Beranek and Newman, Inc., MIT, RAND, SDC, Harvard, Lincoln Lab, Stanford, UIU(C), CWRU, CMU, NASA/Ames.
- Niklaus Wirth devised the Pascal programming language.
- In this year and the next, at Xerox's PARC, Gary Starkweather was developing the first functional laser printer.
- Wang Laboratories introduced the Wang 1200 word processor system.
- Michael S. Hart <hart@pobox.com>, who would become the executive director of Project Gutenberg, made two predictions:
  1.) Computers will be small enough to hold in your hand and everyone will have them.
  2.) By the end of my lifetime [2020] you will be able to hold every word of the Library of Congress in your hands and there will be a law against it.

April: In his coded diary, Ted Kaczynski explained to himself "I act merely from my desire for revenge.... I believe in nothing.... I don't even believe in the cult of nature worshippers or wilderness worshippers." He acknowledged to himself that he was not some sort of anti-technology Luddite but merely a seeker for "personal revenge."

A news item relating to the development of ELECTRIC WALDEN technology: Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived (if, that is, your cabin had electricity):

Host nodes on the Internet

DATE	NODES
May 1969	4
October 1969	5
April 1971	23
June 1974	62
March 1977	111
August 1981	213
May 1982	235
August 1983	562
October 1984	1,024
October 1985	1,961
February 1986	2,308
November 1986	5,089
December 1987	28,174
July 1988	33,000
October 1988	56,000
January 1989	80,000
July 1989	130,000
October 1989	159,000
October 1990	313,000
January 1991	376,000
July 1991	535,000
October 1991	617,000
January 1992	727,000
April 1992	890,000
July 1992	992,000
October 1992	1,136,000
January 1993	1,313,000
April 1993	1,486,000
July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

Summer: A news item relating to the development of ELECTRIC WALDEN technology: Steve Wozniak and Bill Fernandez build a computer with lights and switches, from parts rejected by local companies. For reasons that are less than obvious, they decided to call this their “Cream Soda” computer.

July 1, Thursday: A news item relating to the development of ELECTRIC WALDEN technology: The an early Email message, at least possibly the 1st:

```
RWW 1-JUL-71 14:58 7364

NIC Open for On-line Business (We Hope)

This message is to demonstrate we are up on the network open
for NIC business. We connected to BBN and are using their
telnet to connect back to ourselves. A historic moment.
```

The above appeared in “The Journal,” a feature of Douglas Engelbart’s ARC NLS system. The message is quoted from the archive of that project, which is now held by Green Library at Stanford University.

Note that “What hath God wrought,” which was the inaugural message on the Baltimore/Washington electric telegraph line on May 24th, 1844, obviously was not been the 1st message that had been sent by electric telegraph, for Samuel F.B. Morse had built an experimental 10-mile line 5 years earlier than the transmission of this famous message, and presumably sent traffic over it that were probably no more consequential than the 1st 1971 Email message as shown above. The first E-mail, actually, depending on how you define it, would have been a message sent when electronic signalling systems were being introduced way back when, or would have been a message sent over the telegraphy in Morse code as of 1837. Usages that we would now consider “Email” may have evolved imperceptibly from file sharing or other practices. The closest analogy we might find for E-mail to the “What hath God wrought” type of famous thingie would be the ARPANET demonstration in 1972, which clearly postdates the introduction of E-mail as is demonstrated above) or would have been a message received by the first ticker-tape machine as of 1870.

November: A news item relating to the development of ELECTRIC WALDEN technology: intel ran its ad for its 4-bit bus, 108-KHz 4004 chip, the MCS-4, in Electronic News with “Announcing a new era ...,” a prophecy. It introduced its chip set as an alternative to designing with random logic chips, for which you would need to provide programming. The idea of putting an entire CPU on one chip was not patentable because it was a too-obvious extension. Intel would patent specific features of the MCS-4. The speed of this device was 60,000 operations per second. It used 2,300 transistors. It could address 640 bytes of memory. Its documentation had been written by Adam Osborne. The idea of 4-bit computer seemed silly to the users of real computers, as the conventional minicomputers of the day were 16-bit. MCS-4 seems like a toy for those not computer literate. The initial price was US$200, a pricey toy indeed!

1972

News items relating to the development of ELECTRIC WALDEN technology:

- Ray Tomlinson of Bolt Beranek and Newman, Inc. originated, on the basis of SNDMSG (a rudimentary existing intra-machine E-mail command) and CPYNET (an experimental file transfer protocol), an E-mail program that could send messages across a distributed network.
- ARPANET went international. Robert E. Maas <rem@btr.com> has testified that "The first time I witnessed ARPANET online was when I got e-mail from Jan Kok in 1972 after he had visited SU-AI and we had met the previous summer. I thought he was back in town, but his message got to me 3000 miles from MIT, the first ARPANET message I ever received." It was UCLA that hosted node #1 of the Internet, then begun as the ARPANET. The actual message switching box for IMP #1 still resides in the Graduate Student Archives, on the 3rd floor of Boelter Hall.[70] At the International Conference on Computer Communications, Bob Kahn offered a demonstration of ARPANET between 40 machines and the TIP Terminal Interface Processor. To set up agreed protocols, an INWG InterNetworking Working Group was chaired initially by Vinton Cerf. ARPANET hosts started using the NCP Network Control Protocol. Telnet specification RFC 318 and File Transfer specification RFC 454 were published. ALOHAnet, which had been developed by Norman Abrahamson at the University of Hawaii beginning in 1970, became part of ARPANET.
- Cray Research was founded.
- Jack Kilby, Jerry Merryman, and Jim VanTassel of Texas Instruments developed the 1st electronic pocket calculator.
- Hewlett-Packard introduced its HP-35, the 1st scientific calculator you could hold in one hand.
- National Semiconductor introduced its IMP-16 microprocessor.
- Wang Laboratories introduced its 2200 series, its 1st small business computers.
- Xerox decided to build a personal computer to be used for research. This would be the "Alto."
- Ben Laws and Alan Kay of Xerox's PARC in Palo Alto, California developed the 1st font editor program.
- Alan Kay and Steve Purcell of Xerox's PARC created the 1st bitmap painting.
- At Xerox's PARC, Alan Kay designed and Dan Ingalls implemented the 1st Smalltalk interpreter.
- The MAXC at Xerox PARC (a fake PDP10) became operational. This was the 1st computer to use IC RAM memory.
- At the Naval Postgraduate School, Gary Kildall created PL/1, the 1st programming language for the intel 4004 microprocessor.
- intel introduced the 8008, an 8 bit microprocessor.
- At Sacramento State University, Bill Pentz and his team built the 1st fully-built-out microcomputer in order to handle a large volume of patient medical records. Their machine was based upon an 8008 microprocessor mounted on a motherboard, donated to them by Tektronix, and cannibalized a mainframe computer for PROMs, 8KB of RAM, an assembly language, a hard drive, a color display, a printer output, a 150bps serial interface for connecting to a mainframe, and a front panel.
- Bill Gates and Paul Allen, who had developed an 8008-based computer hardware/software system for recording automobile traffic flow on a highway, founded a company they called "Traf-O-Data."
- Cal Daniels completed the first demo version of the Xanadu software, hacked in C code, inclusive of a proprietary new data structure that Theodore Nelson termed the "enfilade," useful in data searches but undescribed because proprietary.

70. Local joke: "See how the university keeps equipment around long after it becomes obsolete?"

- The People's Computer Company was founded.
- Prime Computer was founded.
- Synthetic lithium tantalate crystals became useful as filters for transmission equipment.
- The 1st 5.25 inch diskettes for data storage.

July: A news item relating to the development of ELECTRIC WALDEN technology: A researcher at MIT, Lawrence G. Roberts, expanded the utility of the Internet by writing the first email utility program that could list, selectively read, file, forward, and respond to messages. From that point email would take off, as for over a decade the largest network application.

August: A news item relating to the development of ELECTRIC WALDEN technology: Scelbi Computer Consulting Company began design work on what would be the Scelbi-8H processor.

September: A news item relating to the development of ELECTRIC WALDEN technology: Texas Instruments unveiled its 1st line of electronic calculators, the TI-2500, TI-3000, and TI-3500.

October: News items relating to the development of ELECTRIC WALDEN technology:

- The 1st issue of People's Computer Company was released.
- What was probably the 1st public demo of E-mail was provided at the 1st International Conference on Computer Communications at the Mayflower Hotel in Washington DC. This 1st operational E-mail was over ARPANET, but that was an add-on feature since ARPANET was designed for and implemented to support automatic computer-to-computer interactions and file transfers. The 1st system designed specifically for E-mail was probably the Electronic Information Exchange System (EIES) by Murray Turoff at the New Jersey Institute of Technology in the late 70s, but a system in Canada may have been operational before EIES. Turoff had designed DELPHI while at the Office for Emergency Preparedness in the mid-60s. The 1st E-mail message in the sense of electronic messaging between machines (netmail) backed up by retrievable computer files had been sent before this conference by Ray Tomlinson, an engineer at Bolt, Beranek, and Newman, to another computer in his office. His comment on this is "If I'd known it was going to be *the* message I would have typed something wittier, but it probably said 'qwertyuiop' or 'this is a test.'" It was Tomlinson who chose the @ sign, as a character that didn't occur in names, to enable the program to readily distinguish between the name and the address. As Tomlinson tells it, he looked down at his Model 33 Teletype keyboard and "the @ seemed an obvious choice because I didn't know anyone with an @ in their name, and the character had the added meaning of being 'at' the institution."

November: News items relating to the development of ELECTRIC WALDEN technology:

- Intel released its 108-KHz 8008 chip, the 1st 8-bit microprocessor. It accessed 16KB of memory. The processor was originally developed for Computer Terminal Corporation (later called DataPoint). It used 3500 transistors.
- Atari was founded by Nolan Bushnell and shipped Pong, the 1st commercial video game.

1973

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Bob Kahn 1st posed the Internet problem, and initiated an internetting research program at ARPA.
- Bob Metcalfe's Harvard PhD dissertation outlined an idea for an Ethernet connectivity system.
- Norway and Britain were the 1st two countries outside the US to connect to the ARPANET. The connections were to the University College of London and the Royal Radar Establishment of Norway. We don't need to ask why the University College of London, for of course there has always been a whole lot of integration between British science and American. But why the Royal Radar Establishment of Norway in particular? The answer is, they needed to connect their Nordic Seismic Array (a bunch of seismometers with a cover story that they were intended to monitor for earthquake activity, but the real function of which was to monitor Russian nuclear tests). Their connection to the ARPANET would, of course, monitor and funnel back data from this Cold War instrument array. Shhhh.
- In New York City, the 1st National Computer Conference was held.
- Alain Comerauer of the University of Marseilles-Luminy in France developed the PROLOG language.
- IBM introduced the Correcting Selectric typewriter, with its Correctable Film Ribbon with Lift-off Tape, based on a new type of synthetic polymer ink. The operator of the typewriter, recognizing that a mistaken character had been struck, would press a correction key that correcting key that caused a backspace to occur and the correction ribbon to move into place. Then the operator would again press the key for the mistaken character. The adhesive of the Lift-off Tape would cleanly remove the ink impression of that character from the bond paper. Then the operator would be again able to type, this time pressing the key for the correct character.
- IBM settled a lawsuit by Control Data by selling them its Service Bureau Corporation.
- IBM introduced Winchester disk drives (this had been their code name during the development of their Model 3340 direct-access storage device, the recording head of which rode on a layer of air 18 millionths of an inch thin).
- The 1st cinematic reference to computer viruses (in "Westworld," it was a software contagion of some sort that made Yul Brynner, and all those other robots, go berserk).
- Butler Lampson, Charles Simonyi, et al, in this year and the following two years at Xerox PARC, developed an early word-processing program they called "Bravo." This is now called MS WORD.
- At Xerox's PARC Palo Alto Research Center, the ALTO, by Chuck Thacker, a 6-MIP microcoded workstation with a "mouse" input device, bit-mapped screen, IC RAM, etc., ran Smalltalk as its 1st system. Steve Purcell used it to demo 10 frame per second "Disney style" 2.5D animation. The Ethernet technique could be used to link Alto computers to each other. The world wasn't ready, and fewer than 2,000 of these beauties would be manufactured.
- The National Medal of Science was awarded to John Tukey, the pioneer in data analysis who had coined the world "bit" for binary digit.
- Gerhard Sessler and James E. West received a patent for their unidirectional microphone that improved hands-free telephone conversations.
- Ultra transparent fiber: A new production approach, the modified chemical vapor deposition technique, fueled the fiber optics revolution in which voice, data and video are carried on hair-thin glass fibers.
- Stephen Wozniak joined Hewlett-Packard.

- The DEC Digital Equipment Corporation introduced the PDP-8A with 1KB memory, for US$875.
- When David Ahl protested the DEC Digital Equipment Corporation's cutbacks of educational products, he got fired. They would soon rehire him.
- Texas Instruments entered the pocket calculator field with the introduction of the Texas Instruments SR-50 Slide Rule Calculator, selling for about US$75.
- Scelbi Computer Consulting Company offered the 1st computer kit in the US using a microprocessor (the intel 8008-based Scelbi-8H), for US$565. The device featured 1KB programmable memory. An additional 15KB could be had for US$2,760.

March: A news item relating to the development of ELECTRIC WALDEN technology: On the back of an envelope in a hotel lobby in San Francisco, Vinton Cerf sketched a gateway architecture.

Spring: A news item relating to the development of ELECTRIC WALDEN technology: In a desperate act to save his failing calculator company, MITS company owner Ed Roberts began building a small computer based on intel's new 8080 chip, with plans to sell it for the unheard-of price of US$500.

May: A news item relating to the development of ELECTRIC WALDEN technology: A personal computer called MICRAL was created by Truong Tromng Hi of *Realisations Etudes Electroniques S.A*. This 1st non-kit computer based on a microprocessor (the intel 8008) would be marketed by R2E in France as the 1st microcomputer. The MICRAL would be advertised in the US, but unsuccessfully.

June: A news item relating to the development of ELECTRIC WALDEN technology: The term "microcomputer" 1st appeared in print, in reference to the French MICRAL.

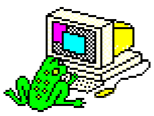
September: A news item relating to the development of ELECTRIC WALDEN technology: Vinton Cerf and Bob Kahn presented basic Internet ideas at INWG at the University of Sussex in Brighton, England.[71]

Late in the year: A news item relating to the development of ELECTRIC WALDEN technology: Gary Kildall wrote a simple operating system for the Intel 8008 in his PL/M language. He based on PL/I and called it CP/M, the Control Program/Monitor or Control Program for Microcomputer. Gary began consulting work for the intel Corporation.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

71. Cerf, who was responsible for the development of the IP protocol, gives credit for coinage of the term "Internet" to Kahn.

1974



News items relating to the development of ELECTRIC WALDEN technology:

- The DEC Digital Equipment Corporation entered the Fortune-500 ranking of the largest industrial companies. This must have gone to their heads, for when one of their engineers, David Ahl, suggested that they produce an inexpensive version of their PDP-8 minicomputer, that they could sell for US$5,000 at a profit, the top management termed such an idea foolish.
- The intel Corporation introduced the 8080, an 8-bit microprocessor that would find use in numerous personal computers.
- Zilog was formed.
- The database description language SEQUEL was pioneered. This eventually would become the SQL Structured Query Language.
- Vinton Cerf and Bob Kahn published "A Protocol for Packet Network Intercommunication," specifying in detail the design of a TCP Transmission Control Program for linking disparate computer networks.
- Bolt Beranek and Newman, Inc. opened Telenet, a commercial version of ARPANET, as the first public packet data service.
- Southwest Technical Products Company introduced the TVT-11 kit for US$180, and an ASCII keyboard kit for US$40.
- Texas Instruments introduced their TMS1000 one-chip microcomputer.
- Brian Kernighan and Dennis Ritchie developed the C programming language.
- The RCA 1802 was able to run at a blazing 6.4 MHz (this is considered one of the 1st RISC reduced instruction-set devices).
- Gary Kildall and John Torode of Microcomputer Applications Associates began to sell CP/M, a disk operating system for intel 8080-based microcomputers.
- Xerox produced the Alto computer.
- At a company called MITS, Ed Robert created a kit which they offered to sell at mail order for US$439, by which one might build at home something which would qualify as a personal computer. As the company was preparing the kit, one of the employees suggested calling it the "Little Brother" as a sly reference to George Orwell's Big Brother figure of the novel 1984, but Lauren Solomon, 12-year-old daughter of Les Solomon, publisher of Popular Electronics, suggested the name "Altair" (on their TV, "Altair" happened to be the name of where Star Trek's *Enterprise* was going that night). Ed sent his only prototype Altair 8800 to New York for review and photography for publishing by Popular Electronics — and Railway Express lost it en route. It would be this little lost computer, and the "Homebrew" clubs it spawned, which eventually would bring forward the plan for Steve Wozniak's Apple II.
- Theodore Nelson's COMPUTER LIB / DREAM MACHINES (also known as DREAM MACHINES / COMPUTER LIB), 11 inches wide and 16 inches tall and 300,000 words in length. Publication of this work would lead to the association between the non-programming dreamer Theodore Nelson and the programming dreamer Roger Gregory, the "Mother of Xanadu."

April: A news item relating to the development of ELECTRIC WALDEN technology: The intel Corporation released its 2-MHz 8080 chip, an 8-bit microprocessor. This device could access 64KB of memory. It used 6,000 transistors.

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

June: News items relating to the development of ELECTRIC WALDEN technology:

- Texas Instruments received a patent for miniature electronic calculators.
- Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

DATE	NODES
May 1969	4
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January 1993	1,313,000
April 1993	1,486,000
July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

July: A news item relating to the development of ELECTRIC WALDEN technology: Radio Electronics magazine published an article on building a Mark-8 microcomputer, designed by Jonathan Titus, using the intel 8008.

August: A news item relating to the development of ELECTRIC WALDEN technology: Motorola introduced its 6800 chip, an early 8-bit microprocessor used in microcomputers and industrial and automotive control devices.

September: News items relating to the development of ELECTRIC WALDEN technology:

- Creative Computing, the 1st magazine for home computerists, was founded.
- Hal Singer started the Micro-8 Newsletter for enthusiasts of the Mark-8 minicomputer.
- Despite being already US$300,000 in debt, Ed Roberts was able to borrow an additional US$65,000 from the bank to completed work on what would become the Altair minicomputer.

November: A news item relating to the development of ELECTRIC WALDEN technology: Hal Chamberlin and others began publishing The Computer Hobbyist magazine.

December: News items relating to the development of ELECTRIC WALDEN technology:

- Scelbi sold its last Scelbi-8H, discontinuing hardware to concentrate on software.
- Popular Electronics published an article by MITS announcing the Altair 8800 computer for US$439 in kit form. It used the intel 8080 processor. The Altair pictured on the cover of the magazine was actually a mock-up, as an actual computer was not available for the photo shoot.
- Les Solomon, publisher of Popular Electronics, took delivery of Altair minicomputer #0001.

1975

Here are some news items relating to the development of ELECTRIC WALDEN technology:

- The Cray-1 supercomputer was introduced.
- Xerox withdrew from the mainframe computer industry.
- Operational management of the Internet was transferred to the DCA (now known as the DISA).
- Raphael Finkel of SAIL released the 1st "Jargon File."
- John Brunner wrote SHOCKWAVE RIDER.
- Wavemate released the Jupiter II computer kit.
- Southwest Technical Products released the M6800 computer kit.
- Microcomputer Associates released the JOLT computer kit.
- IBM's John Cocke began work on project "801," to develop a scalable chip design that could be used in small computers as well as large.
- IMSAI began working on the IMSAI 8080.
- Zilog was founded.
- Sphere Corporation introduced its Sphere I computer kit, featuring a Motorola 6800 CPU, 4KB RAM, ROM monitor, keyboard, and video interface, for US$650.
- Harry Garland and Roger Melen founded Cromemco. They named their company after their dorm at Stanford University, "CroMem," the Crowthers Memorial.
- At this point there were approximately 50,000 computers in the world (a couple of decades later, more than 5,000 new computers would be being manufactured each hour).
- The 1st computer store opened, in Santa Monica, California.
- The Homebrew Computer Club, considered the 1st personal computer users group, was formed.
- MITS of Albuquerque NM introduced its portable personal computer, the Altair, designed by Ed Roberts and Bill Yates. Named after a Star Trek episode, "A Voyage to Altair," it used an 8-bit intel 8080 CPU and had 256 bytes of memory. The I/O consisted of switches and lights. It lacked keyboard, monitor, tape, and disk, but at $397 was a bargain. Within a few years, many companies would be making personal computers based on this 8080 chip. Nearly all relied upon an operating system called CP/M, the Control Program for Microprocessors, produced by Digital Research of California. Bill Gates's and Paul Allen's Traf-O-Data company was given a different name, Micro-Soft. The young Bill Gates wrote a version of BASIC for the Altair PC and sold this to MITS. (During this year, also, Dennis Ritchie was creating the C programming language.) At the 4th meeting of the Homebrew Computer Club at the Peninsula School in Menlo Park, Steve Dompier played the music "Fool on the Hill" and "Daisy" using the Altair and a radio. MITS began work on a Motorola 6800-based Altair.

January: A news item relating to the development of ELECTRIC WALDEN technology: Harry Garland and Roger Melen received Altair #0002 (they had proposed in December to attach their Cyclops camera to the Altair, for use as a security camera).

February: News items relating to the development of ELECTRIC WALDEN technology:

- Paul Allen met with Ed Roberts to demonstrate Traf-O-Data's (Micro-Soft's) newly written BASIC interpreter for the Altair. He had never before touched an Altair. The interpreter worked flawlessly.

- Bill Gates and Paul Allen licensed their newly written BASIC to MITS, their 1st customer. This was the 1st computer language program written for a personal computer.

"If you wish to make an apple pie from scratch, you must first invent the universe."
— *Carl Sagan*

March: News items relating to the development of ELECTRIC WALDEN technology:

- Fred Moore and Gordon French held the 1st meeting of a new microcomputer hobbyist's club in French's garage in Menlo Park, California. 32 people attended, including Bob Albrect, Steve Dompier, Lee Felsenstein, Bob Marsh, Tom Pittman, Marty Spergel, Alan Baum, and Steven Wozniak. Bob Albrect showed off an Altair, and Steve Dompier reported on MITS: they had 4,000 orders for the Altair PC. The Homebrew Computer Club, considered the 1st personal computer users group, was thus formed.
- Ed Roberts hired Paul Allen as director of software at MITS.

April: News items relating to the development of ELECTRIC WALDEN technology:

- The 3rd meeting of the Homebrew Computer Club.
- Bill Gates and Paul Allen founded Micro-Soft (the hyphen would later be omitted).
- MITS delivered the 1st generally-available Altair 8800, sold for US$375 with 1KB memory.
- Bob Marsh and Gary Ingram founded Processor Technology.

May: A news item relating to the development of ELECTRIC WALDEN technology: The Amateur Computer Group of New Jersey was formed.

June: Eric O'Dean and Ivan Henry were swept from rocks at Deep Valley, St. Helena.

News items relating to the development of ELECTRIC WALDEN technology:

- MOS Technology announced the MC6501 at US$20 and the MC6502 at US$25. At this point, the intel 8080 was selling for about US$150.
- Bob Marsh delivered the 1st Processor Technology 4KB memory boards for the Altair PC.
- The Southern California Computer Society was formed.
- The National Computer Conference was held in Anaheim, California.
- Paul Terrell signed a deal with MITS by which he was to receive a 5% commission on every Altair sold in Northern California.

Summer: A news item relating to the development of ELECTRIC WALDEN technology: IMSAI announced the IMSAI 8080 microcomputer.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Bill Gates and Paul Allen signed a licensing agreement with MITS, for their implementation of the BASIC language. Bill Gates and Paul Allen shipped 4K and 8K version of BASIC v2.0.
- Dick Heiser opened Arrow Head Computer Company, subtitled “The Computer Store,” in Los Angeles, selling assembled Altair PCs, boards, peripherals, and magazines.

September: News items relating to the development of ELECTRIC WALDEN technology:

- IBM’s Entry Level Systems unit unveiled “Project Mercury,” the IBM 5100 Portable Computer. This was a briefcase-size minicomputer with BASIC, 16KB RAM, tape storage, and built-in 5-inch screen. They were asking US$9000. The device weighed in at 55 pounds, about in the ballpark of one of those “portable” sewing machine that you could store in a closet.
- The 1st issue of Byte magazine was published.

1976

News items relating to the development of ELECTRIC WALDEN technology:

- The 1st fault-tolerant computer, the T/16, was introduced by Tandem.
- MYCIN, an expert system to diagnose and treat infectious blood diseases, was developed at Stanford University by E. Shortliffe.
- NEC System 800 and 900 general-purpose mainframes were introduced.
- Seymour Cray engineered and delivered Cray 1 with 200,000 freon-cooled ICs and 100 million floating point operations per second (MFLOP) performance.
- Superminicomputers were introduced by Perkin-Elmer and Gould SEL.
- Zilog introduced its Z-80 chip.
- Lee Felsenstein and Bob Marsh delivered the 1st Processor Technology Sol computer to Popular Electronics magazine publisher Les Solomon.
- Fairchild introduced the Channel F, the 1st programmable (via plug-in cartridges) home video game system, at US$170.
- Processor Technology released VDM, a video display module. This worked on the Altair, IMSAI, Sol, Polymorphic computers, and any other with an S-100 bus.
- Gary Kildall founded Intergalactic Digital Research.
- Kentucky Fried Computers was founded.
- Tom Snyder's "Tomorrow" TV show featured the Sol computer, playing a game called "Target."
- US Robotics was founded in Skokie, Illinois.
- MOS Technology Incorporated announced the KIM-1 Microcomputer System, with 1-MHz 6502 CPU, 1KB RAM, 2KB ROM monitor, 23-key keypad, LED readout, cassette and serial interfaces, for US$245.
- MITS unveiled its Altair 680, based on the Motorola 6800 microprocessor.
- Warner Communications bought Atari from Nolan Bushnell for US$26,000,000.
- The Wang WPS word processor was updated, adding a CRT display, large disk storage, and fast letter-quality printer.
- Lore Harp and Carole Ely formed Vector Graphic Incorporated, selling memory boards for S-100 bus systems.
- George Morrow founded MicroStuf.
- The 1st issue of Dr. Dobbs magazine.
- IMSAI began shipping the IMSAI 8080.
- Polymorphic Systems introduced the Poly-88.
- Steve Wozniak proposed that Hewlett-Packard create a personal computer. Steve Jobs proposed that Atari create a personal computer. Their ideas were rejected.
- Stephen Wozniak demonstrated the Apple I at the Homebrew Computer Club.
- The bus of the Altair was named (or renamed) the S-100 bus.
- P.P. Chen developed the entity-relationship semantic model of the relational database.
- Elizabeth II, the Queen of the United Kingdom, sent an E-mail message (a number of less famous Net folks do possess E-mail records ranging through the period 1971 to 1978).
- AT&T Bell Labs developed the UUCP facility (Unix-to-Unix CoPy), a communications protocol that allowed UNIX machines to send files and E-mail messages to one another.
- The PLATO (or "PlayDough") "learning system" was priced at $5,000,000 for software installation plus $6,000 per learning station — only the most serious of our indoctrinators were, of course,

going to be able to afford such prices. Essick and Kolstad would elaborate this University of Illinois/Control Data Corporation software to produce the Lotus suite "Notes." When CDC would belatedly realize what a multi-million-dollar boondoggle it had on its hands, it would sell PLATO to the government of apartheid South Africa, The repressive white regime wanted such a training system for their black schools as a method of tracking students and their activities, both educational and political, and even went as far as linking it to employment centers so that when a black student who was politically active would leave school and apply for a job, his or her proclivities and attitudes would already be there on file to prevent them from gaining employment. By using the teachers in the school system as its source of information on students, it effectively transformed teachers willy-nilly into spies. The regime initially installed this repressive system in the Orange Free State, and their agenda was to implement it nationwide (and then along came Nelson Mandela...).

"I liked the idea that a piece of information is really defined only by what it's related to, and how it's related. There really is little else to meaning. The structure is everything.... The brain has no knowledge until connections are made between neurons. All that we know, all that we are, comes from the way our neurons are connected."

— Tim Berners-Lee, WEAVING THE WEB: THE ORIGINAL DESIGN AND ULTIMATE DESTINY OF THE WORLD WIDE WEB BY ITS INVENTOR (1999)

Early in the year: A news item relating to the development of ELECTRIC WALDEN technology: Hewlett-Packard began Project Capricorn, to build a computer-like calculator.

January: News items relating to the development of ELECTRIC WALDEN technology:

- David Jackson founded Altos Computer Systems.
- Paul Terrell began signing dealership agreements, allowing Byte Shop franchises to open elsewhere in the US.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Bill Gates wrote software routines for BASIC that enabled the Altair to use diskettes for storage.

- David Bunnell published an open letter from Bill Gates to microcomputer hobbyists, complaining about software piracy.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Steve Wozniak and Steve Jobs finished work on a computer circuit board that they would call the Apple I computer.
- The 1st World Altair Computer Convention was held in Albuquerque, New Mexico.
- Paul Terrell incorporated Byte, Inc.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

April: News items relating to the development of ELECTRIC WALDEN technology:

- Bill Gates wrote a 2d open letter to computer hobbyists, condemning software piracy.
- On April Fool's Day, Steve Jobs and Steve Wozniak formed the Apple Computer Company.
- The National Semiconductor SC/MP 8-bit microprocessor appeared, providing early advanced multiprocessing.

April 7, Wednesday: Hua Kuo-feng was confirmed as Prime Minister of the People's Republic of China and was named 1st deputy chairman of the Communist Party.

A news item relating to the development of ELECTRIC WALDEN technology: Robert Swanson and Herbert Boyer founded Genentech in San Francsico. This would be the initial genetic engineering company.

May: News items relating to the development of ELECTRIC WALDEN technology:

- Digital Research copyrighted CP/M, its industry-standard microcomputer operating system which had been created by company founder Gary Kildall.
- The Trenton Computer Festival was held, in New Jersey.

June: A team of divers came to St. Helena to attempt to salvage a 17th-Century Dutch merchantman, the *Witte Leeuw.*

News items relating to the development of ELECTRIC WALDEN technology:

- The Western Digital MCP-1600 3-chip CPU appeared.
- The Texas Instruments TMS 9900, one of the 1st true 16-bit microprocessors, appeared.
- The Midwest Area Computer Club conference was held.
- Processor Technology unveiled the Sol-20 to the public at PC '76 at the Shelbourne Hotel in Atlantic City. It was sold in kit form, using the intel 8080 CPU.

July: News items relating to the development of ELECTRIC WALDEN technology:

- The Apple I computer board was sold in kit form, and delivered to stores by Steve Jobs and Steve Wozniak, at a price of US$666.66.
- Paul Terrell ordered 50 Apple computers from Steve Jobs, for his Byte Shop.
- Zilog released the Z-80, an 8-bit microprocessor the instruction set of which was a superset of the intel 8080.

August: News items relating to the development of ELECTRIC WALDEN technology:

- Paul Terrell received shipment of his order of 50 Apple I computers.
- iCOM advertised their "Frugal Floppy" in BYTE magazine. This was an 8-inch floppy drive, selling for US$1,200.
- In Atlantic City, New Jersey, several computer hobbyist clubs held their 1st convention at the Personal Computing Festival.
- Steve Wozniak began work on the Apple II.

September: A news item relating to the development of ELECTRIC WALDEN technology: "Computer Shack" was incorporated (after objections from Radio Shack this would become "ComputerLand").

September 9, Thursday: A news item relating to the development of ELECTRIC WALDEN technology: JVC introduced the VHS home video system.

Chairman of the Communist Party of the People's Republic of China Mao Tse-tung died in Peking.

16 people were killed in black townships around Cape Town as protests against apartheid in South Africa, begun September 2d, reached a peak.

October: News items relating to the development of ELECTRIC WALDEN technology:

- Commodore International bought MOS Technology.
- Mike Markkula, ex-marketing wizard at Intel, visited Steve Jobs' garage to see the Apple computers.
- Although Steve Wozniak decided to remain at Hewlett-Packard, he was soon convinced that he should permanently join Apple Computer.

November: News items relating to the development of ELECTRIC WALDEN technology:

- The tradename "Microsoft" was registered.
- ComputerLand opened a pilot store in Hayward, California, as a retail outlet and a training facility for franchise owners.
- Paul Allen resigned from MITS.

December: News items relating to the development of ELECTRIC WALDEN technology:

- Bill Gates dropped out of Harvard University (not enough bandwidth).

- Michael Shrayer completed writing Electric Pencil, the 1st popular word-processing program for microcomputers.
- Shugart announced its 5.25 inch “minifloppy” disk drive for US$390.
- Dick Wilcox demonstrated his Alpha Micro, a multi-user CPU board, at a meeting of the Homebrew Computer Club.
- Don French and Steve Leininger were given official blessings to develop a microcomputer for Radio Shack.
- At a Homebrew Computer Club meeting, Steve Wozniak and Randy Wigginton demonstrated their 1st prototype Apple II.

1977

From this year until 1984, Douglas Engelbart would be the Senior Scientist at Tymshare, Inc. of Cupertino CA. This company had bought the commercial rights to NLS, renamed it AUGMENT, and set up the system as a principal line of business in their newly formed Office Automation Division.

Some other news items relating to the development of ELECTRIC WALDEN technology:

- Larry Ellison and Bob Miner cofounded Oracle Corporation, and pioneered a relational DBMS.
- Steve Jobs and Steve Wozniak, terminally youthful, were developing the Apple II.
- Philip W. Anderson shared the Nobel Prize in Physics for developing an improved understanding of the electronic structure of glass and magnetic materials.
- A new alloy named Chromindur reduced the need for scarce, costly cobalt in high-strength magnets for telephone devices.
- Beneath the pavements of Chicago, the initial full-service fiber-optic system.
- AT&T Bell Labs began distribution of their UUCP facility (Unix-to-Unix CoPy) with their UNIX operating system.
- Larry Landweber of the University of Wisconsin, using a locally developed E-mail system and TELENET for access to a server, provided an electronic mail capability to over 100 researchers in computer science over a THEORYNET.
- A Mail specification (RFC 733) was published.
- Tymshare launched its Tymnet.
- The first demonstration of ARPANET/Packet Radio Net/SATNET operation of Internet protocols with gateways supplied by Bolt Beranek and Newman, Inc.
- Kenneth Olsen, the founder and president of the DEC Digital Equipment Corporation, opinioned that “There is no reason for any individual to have a computer in their home.” –Would this have been an early endorsement of the concept of the NC, the “network” computer?
- Vector Graphic Inc. introduced the Vector Graphic I system.
- David Bunnell offered the 1st issue of Personal Computing magazine.
- Compu-Serv changed its name to CompuServe Incorporated.
- Bally completed design of a home computer.
- Dan Bricklin conceived the idea for the VisiCalc spreadsheet program.
- Heath Company introduced the H-8 personal computer kit, based on the Intel 8080.
- IMSAI licensed use of CP/M for its microcomputers for US$25,000.
- Atari introduced the Atari Video Computer System, later renamed the Atari 2600.
- Apple Computer was founded and introduced the Apple II personal computer.

- Apple, Commodore, and Tandy began selling personal computers.
- DEC introduced its first 32-bit superminicomputer, the VAX-11/780.
- Datapoint introduced ARC system, the first local area network.
- The 1st ComputerLand franchise store opened in Morristown, NJ under the name Computer Shack.

January: News items relating to the development of ELECTRIC WALDEN technology:

- The Apple Computer Company was incorporated. Apple employees moved into an office on Steven Creek Boulevard in Cupertino, California.
- A working model of the 1st Radio Shack computer was demonstrated to the company president, Charles Tandy.
- Xerox put David Liddle in charge of developing the Alto computer into a marketable product.

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

February: News items relating to the development of ELECTRIC WALDEN technology:

- The 1st ComputerLand franchise was opened in Morristown, New Jersey, under the name Computer Shack.
- Apple Computer moved from Jobs' garage to an office in Cupertino.
- Bill Gates and Paul Allen signed a partnership agreement to officially create the Microsoft company.

March: A news item relating to the development of ELECTRIC WALDEN technology:

- Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

DATE	NODES
May 1969	4
October 1969	5
April 1971	23
June 1974	62
March 1977	111
August 1981	213
May 1982	235
August 1983	562
October 1984	1,024
October 1985	1,961
February 1986	2,308
November 1986	5,089
December 1987	28,174
July 1988	33,000
October 1988	56,000
January 1989	80,000
July 1989	130,000
October 1989	159,000
October 1990	313,000
January 1991	376,000
July 1991	535,000
October 1991	617,000
January 1992	727,000
April 1992	890,000
July 1992	992,000
October 1992	1,136,000
January 1993	1,313,000
April 1993	1,486,000
July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

April: News items relating to the development of ELECTRIC WALDEN technology:

- The 1st West Coast Computer Faire was held in San Francisco's Brooks Civic Auditorium. Nearly 13,000, including myself, attended the weekend event. At this faire, Commodore Business Machines Inc. unveiled its PET computer at the West Coast Computer Faire featuring a 6502 CPU, 4KB RAM, 14KB ROM, keyboard, display, and tape drive, for US$600. At this faire, Apple Computer introduced its Apple II featuring a 6502 CPU, 4KB RAM, 16KB ROM, keyboard, 8-slot motherboard, game paddles, graphics/text interface to color display, and built-in BASIC, for US$1,300. This was the 1st personal computer with color graphics.
- Apple Computer delivered its 1st Apple II system.

May: The initial Spoleto Festival USA was held, with Charleston designated as permanent American home for this "Festival of Two Worlds."

News items relating to the development of ELECTRIC WALDEN technology:

- By 10 months after introduction, 175 Apple I kits had sold.
- Pertec bought MITS and the Altair line for US$6,000,000 in stock.

June: News items relating to the development of ELECTRIC WALDEN technology:

- Camp Retupmoc, the 1st week-long computer camp, was held in Terre Haute, Indiana.
- Apple II computers were shipped to Europe by independent distributor Eurapple.

July: St. Helena's fishing limit was extended to 200 miles.

A news item relating to the development of ELECTRIC WALDEN technology: Microsoft shipped "Microsoft FORTRAN" for CP/M-based computers.

August: Governor Geoffrey Colin Guy set up a St. Helena Shipping Company to own the initial RMS *St. Helena*, that had been a coastal passenger and cargo vessel motoring back and forth between Vancouver and Alaska. Curnow Shipping Ltd. was chosen to manage this service.

A news item relating to the development of ELECTRIC WALDEN technology: Radio Shack (a division of Tandy Corp.) announced the TRS-80 microcomputer, with Z80 CPU, 4KB RAM, 4KB ROM, keyboard, black-and-white video display, and tape cassette for US$600.

"If you wish to make an apple pie from scratch, you must first invent the universe."
— *Carl Sagan*

Fall: A news item relating to the development of ELECTRIC WALDEN technology: Microsoft Corporation granted to Apple Computer a license for Microsoft's BASIC.

September: A news item relating to the development of ELECTRIC WALDEN technology: One month after launching the TRS-80, despite sales projections of only 3,000 per year, sales had reached five figures: 10,000 units.

A geologic map of earthquake faults in Eastern Alameda County, California had indicated that the Verona fault passed beneath the GE test reactor (GETR) at which I had been a "jumper." During this month surface trenching near the reactor made the Verona fault apparent to the eye.

Q: What is the correct distance to live from the nearest atomic reactor?

A: 91,400,000-94,510,000 miles, which works out to be 499 light-seconds, or 1 AU (Astronomical Unit).

October: A news item relating to the development of ELECTRIC WALDEN technology: Radio Shack opened its 1st all-computer store, in Fort Worth, Texas.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer released Applesoft, a version of BASIC with floating-point capabilities. It was licensed from Microsoft.
- Paul Terrell sold his chain of 74 Byte Shops, valued at US$4 million.

December: News items relating to the development of ELECTRIC WALDEN technology:

- At an executive board meeting at Apple Computer, president Mike Markkula listed the floppy disk drive as the company's top goal.
- Microsoft won a legal battle with Pertec over ownership of the BASIC that Gates and Allen had written and had licensed to MITS.

1978

News items relating to the development of ELECTRIC WALDEN technology:

- SPRINT business service was inaugurated.
- Texas Instruments introduced the Speak-and-Spell educational toy featuring digital speech synthesis.
- Texas Instruments introduced the TMS-4164, a single 5V 64KB programmable memory chip, at US$125.
- Total computers in use in the U.S. exceeded a half million units.
- The first COMDEX trade show was held.
- The Oyz 5.24-inch floppy disk, a reduced-size version of the 8-inch ferromagnetic disks then in use on mainframes, was introduced with the 1st mass-storage personal computer. At first this disk, which now stores 1.2MB formatted, would store only 100KB.
- APF Electronics introduced the MP-1000 video game unit.
- Magnavox released the Odyssey2 cartridge-based console game system.
- Taito developed the Space Invaders game in Japan and released the game to arcade centers.
- Cinematronics released Space Wars to arcades.
- Bally began shipping its Bally Professional Arcade game.
- The intel Corporation unveiled its 8085 CPU chip.
- Tandy opened its 1st dedicated computer center.
- Xerox donated 50 Alto computers to Stanford, Carnegie-Mellon, and MIT.
- Exidy Systems introduced the Sorcerer Microcomputer.
- Apple Computer began research and development on what would become the Lisa.
- Seymour Rubenstein formed MicroPro International.
- Scott Adams founded Adventure International.
- In England, Christopher Curry and Hermann Hauser founded Acorn Computer Ltd.
- Bob Frankston and Dan Bricklin founded Software Arts.
- Ward Christensen's MODEM software allowed PCs to interact over public phonelines.
- The 1st digitally encoded videodisks.

January: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer demonstrated its 1st working prototype Apple II disk drive at the Consumer Electronics Show, in Las Vegas.
- Ward Christianson and Randy Seuss began building the Computerized Bulletin Board System, in Chicago.

February: Ted Kaczynski asked his father Theodore Richard "Turk" Kaczynski to find him a job at his place of employment, Foam Cutting Engineers in Addison, Illinois.

A news item relating to the development of ELECTRIC WALDEN technology: The 1st major microcomputer bulletin board, run by Ward Christianson and Randy Seuss, went on-line, in Chicago.

March: A news item relating to the development of ELECTRIC WALDEN technology:

- The Second West Coast Computer Faire was held, in San Jose, California.

May: Ted Kaczynski arrived in Chicago.

A news item relating to the development of ELECTRIC WALDEN technology: Intel began production of the 8086 microprocessor.

May 3, Wednesday: The first unsolicited junk e-mail message, hawking a company's wares, was received back in these days when the Internet was known as "Arpanet." By this point Arpanet had been operational for about nine years and although you probably hadn't heard about it, lots of techies at universities and government bodies were already frequently exchanging e-mail messages. What had happened in this case was that a marketing executive of Digital Equipment Corporation –a functionary who was even unusually obtuse for a marketing executive– had decided that this would be a neato way to get out the word to all West Coast Arpanet users about an open day on which DEC was going to show off its new line of equipment. Not only was this message carelessly composed but also it was in clear violation of the established policy for noncommercial use of Arpanet, which at this point was functioning as a research aid.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

June: News items relating to the development of ELECTRIC WALDEN technology:

- Intel released its 8086 microprocessor. It used 16-bit registers, a 16-bit data bus, and 29,000 transistors. Price was US$360. It could access 1 MB of memory.
- Microsoft shipped Microsoft COBOL.
- Apple Computer introduced the Disk II, a 5.25 inch floppy disk drive linked to the Apple II by cable. Price: US$495, including controller card.
- 57,240 people showed up for a National Computer Conference in Anaheim, California.
- Pertec ceased production of the Altair.

Summer: A news item relating to the development of ELECTRIC WALDEN technology: Apple Computer hired Chuck Peddle, designer of the 6502 microprocessor and of Commodore's PET.

August: News items relating to the development of ELECTRIC WALDEN technology:

- MicroPro introduced WordMaster.
- Digital Equipment opened a retail store in a shopping mall, for selling small computer systems priced below US$10,000.
- Paul Terrell demonstrated the Z80-based Exidy Sorcerer at the Personal Computing Show in Philadelphia.

Fall: A news item relating to the development of ELECTRIC WALDEN technology: Microsoft began developing BASIC for the Intel 8086 processor.

October: News items relating to the development of ELECTRIC WALDEN technology:

- The 1st Personal Computer Expo was held, in New York City.
- The 1st issue of SoftSide was published, for TRS-80 enthusiasts.

December: News items relating to the development of ELECTRIC WALDEN technology:

- Epson announced the MX-80 dot matrix printer, which established a new standard in high performance with low price for printers.
- Atari announced the Atari 400 and 800 personal computers, using the 6502 microprocessor. The Atari 800 was code-named “Colleen.”
- Microsoft’s sales for the year reach US$1 million.

Late in the year: A news item relating to the development of ELECTRIC WALDEN technology: Apple Computer began work on an enhanced Apple II with custom chips, code-named Annie.

End of the year: A news item relating to the development of ELECTRIC WALDEN technology: Chuck Peddle quit Apple Computer to return to Commodore.

1979

News items relating to the development of ELECTRIC WALDEN technology:

- Ada language was developed by a team at CII-Honeywell Bull (France) directed by Jean Ichbiah.
- The Source and CompuServe Information Services went on-line.
- VisiCalc, the first electronic spreadsheet software, was shown at the West Coast Computer Faire.
- Wordstar, one of the best-selling word processing programs for PCs, was released by Micropro (now called Wordstar International).
- At a meeting at the University of Wisconsin involving DARPA, NSF, and computer scientists from many universities, Larry Landweber organized a Computer Science Department research computer network.
- Ericsson introduced its 1st cellular phone. Cellular phones were 1st introduced in Japan.
- Usenet was created: Tom Truscott, Jim Ellis, and Steve Bellovin used UUCP to establish a USENET between Duke University in Durham, North Carolina and the University of North Carolina in nearby Chapel Hill.
- Richard Bartle and Roy Trubshaw of the University of Essex established the first MUD, of course named MUD1.
- The ARPA established the Internet Configuration Control Board.
- A Packet Radio Network experiment began with DARPA funding, most of its communications taking place between mobile vans.
- There was an ARPANET connection via the SRI.
- Prestel, the first videotex information system, was introduced by British Telecom.
- Between 1979 and 1981, Austin Meredith was enacting his hermit-apprenticeship in a cabin in the Sierra Nevada.

- Roland Barthes defined “the Text,” in “From Work to Text,” as “that social space that leaves no language safe or untouched, that allows no enunciative subject to hold the position of judge, teacher, analyst, confessor, or decoder.” We were ready to fall out of the literary garden into a new and discontinuous space of writing. (Refer to Barthes’s TEXTUAL STRATEGIES, Harari translation.)
- Seagate Technologies (hard disk maker) was founded, in Scotts Valley, California.
- A standard single-sided single-density soft-sectored floppy such as the “Nixdorf 8850-Floppy-Disk” had 128 bytes per sector and 26 sectors per track and 76 tracks, for a total storage capacity of 242.994 bytes of information maximum on each 8-inch-diameter floppy. There were also hard-sectored 8-inch floppies, which had their sector boundaries marked by a hole in the disk for an optical sensor to detect, but that design would lose out to this “soft-sectored” floppy design, especially when it would be converted to a double-sided double-density format that could store more than 242,994 bytes of information.
- The National Computer Conference was held in New York.
- Tim Patterson of Seattle Computer Products demonstrated his 8086 card with Microsoft at the LifeBoat Associates booth at the National Computer Conference.
- Apple Computer began work on “Sara,” the code name for what would be the Apple III.

- Apple Computer released the word processing program AppleWriter 1.0.
- Michael Shane founded Leading Edge Products.
- Vector Graphic Inc. introduced the Vector Graphic System B system.
- Schlumberger Ltd. sold Heath Company to Zenith Radio Corp. for US$64.5 million.
- Niklaus Wirth invented the Modula-1 programming language.
- NEC released its NEC PC 8001 microcomputer in Japan, the 1st for that country.
- Atari founder Nolan Bushnell leaves the company, to manage Pizza Time Theatre.
- IMSAI declared bankruptcy. Its assets were purchased by Fischer-Freitas.
- Bob Metcalfe founded 3Com Corporation.
- IBM introduced the IBM 3800 laser printer, capable of printing 20,000 lines per minute.
- D.C. Hayes introduced the 110/300 baud Micromodem II for the Apple II, for US$380.
- CompuServe launched its online service.

January: A news item relating to the development of ELECTRIC WALDEN technology: MicroSoft moved its offices from Albuquerque, New Mexico to Bellevue, Washington.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Intel introduced the 8088 microprocessor. It was created as a stepping stone to the 8086, as it operates on 16 bits internally, but supports an 8-bit data bus, to use existing 8-bit device-controlling chips.
- Apple Computer released DOS 3.2.

March: A news item relating to the development of ELECTRIC WALDEN technology: Zilog shipped samples of the 16-bit Z-8000 processor.

Spring: News items relating to the development of ELECTRIC WALDEN technology:

- Atari developed the Asteroids computer game.
- Microsoft completed work on BASIC for the Intel 8086 processor.

April: Governor Geoffrey Colin Guy met with the St. Helena Preservation Action Committee to discuss ways of establishing a heritage trust (the Broadway House museum would the following year).

News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft 8080 BASIC won the ICP Million Dollar Award, the initial microprocessor product to do so.
- Taito 1st showed the Space Invaders game, in Japan.

May: News items relating to the development of ELECTRIC WALDEN technology:

- Software Arts demonstrated VisiCalc at the 4th West Coast Computer Faire. Dan Bricklin and Bob Frankston wrote it during 1978-79, under the company name Software Arts, under contract to Personal Software.
- Seattle Computer Products fashioned the 1st prototype of its 8086 microprocessor card for the S-100 bus.

- Microsoft tried out its 8086 BASIC on Seattle Computer Products' 8086 processor card for the 1st time.
- Processor Technology closed.
- Tandy/Radio Shack announced the TRS-80 Model II.

June: News items relating to the development of ELECTRIC WALDEN technology:

- The Source telecommunications service goes on-line.
- Apple Computer introduced the Apple II Plus, with 48KB memory, for US$1195.
- Apple Computer introduced its 1st printer, the Apple Silentype, for US$600. It was a Trendcom Model 200, released under the Apple name.
- Texas Instruments introduced the TI-99/4 personal computer, for an initial price of US$1500. It used the TI 9940 16-bit microprocessor.
- MicroPro released the WordStar word processor, written by Rob Barnaby.
- Microsoft announced Microsoft BASIC 8086 at the National Computer Conference.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer released DOS 3.2.1.
- CompuServe began a service to computer hobbyists called MicroNET, offering bulletin boards, databases, and games.

August: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft released its Assembler language for 8080/Z80 microprocessors.
- Wayne Ratliff developed the Vulcan database program (Ashton-Tate would market it as dBASE II).

September: News items relating to the development of ELECTRIC WALDEN technology:

- Motorola's 68000 16-bit microprocessor appears.
- IMSAI closes.
- Apple Computer sold 35,000 Apple II computers for the fiscal year.

Fall: News items relating to the development of ELECTRIC WALDEN technology:

- Atari produces the 1st coin-operated Asteroids game machine.
- Microsoft began developing an 8086 version of FORTRAN.

October: News items relating to the development of ELECTRIC WALDEN technology:

- 2.5 years after the introduction of the Apple II, 50,000 units had been sold.
- Personal Software released VisiCalc for the Apple II.
- Atari began shipping the Atari 400 and Atari 800 personal computers. The 400 comes with 8KB, selling for US$550. The 800 sold for US$1000.
- Radio Shack began shipping the TRS-80 Model II to users.
- Mattel announced a keyboard unit for the Intellivision. Estimated retail price: US$700.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Texas Instruments began shipping the TI 99/4.
- ComputerLand grows to include 100 franchises.

December: News items relating to the development of ELECTRIC WALDEN technology:

- The 1st Comdex show was held in Las Vegas.
- A group of Apple Computer engineers was given a demo of Xerox Palo Alto Research Center's Alto computer system, in exchange for Xerox buying 100,000 Apple Computer shares for US$1 million.
- Sears began selling Atari home computers.

End of the year: A news item relating to the development of ELECTRIC WALDEN technology: Mattel Electronics released the Intellivision video game system.

1980

A news item relating to the development of ELECTRIC WALDEN technology: Tim Berners-Lee, who wasn't at all good at making random connections, or at remembering details, was spending six months at C.E.R.N., the laboratory for particle physics near Geneva, and so he wrote himself a little program he could utilize as a substitute for a better memory, a calendar program he named Enquire by which one might keep track of quite random associations. This would be the 1st cut at the Wide World Web, confined to a single machine. Tim's program was centered around a document within which he could click on words which would open other documents containing background and context for those words. A neat idea. An idea whose time had come.

Tim's original NeXT box, which hosted the very first website, would eventually be put on display in the foyer of the main admin building in CERN, in a glass case!

"I liked the idea that a piece of information is really defined only by what it's related to, and how it's related. There really is little else to meaning. The structure is everything.... The brain has no knowledge until connections are made between neurons. All that we know, all that we are, comes from the way our neurons are connected."

– Tim Berners-Lee, WEAVING THE WEB: THE ORIGINAL DESIGN AND ULTIMATE DESTINY OF THE WORLD WIDE WEB BY ITS INVENTOR (1999)

Several more news items relating to the development of ELECTRIC WALDEN technology:

- Control Data Corporation introduced the Cyber 205 supercomputer.
- First issue of InfoWorld was published.
- Microsoft licensed the UNIX operating system from Bell Laboratories and introduced its XENIX adaptation.
- Total computers in use in the US exceeded 1,000,000 units.
- IBM decided to go into personal computers as a sideline. It gave one of its managers, Philip Estridge, a big bag of money and sent him off to Boca Raton FL, 2000 km away from the control and oversight of Corporate Headquarters in Westchester County NY, with orders not come back until he had a personal computer to show. Estridge soon decided that the only way he could

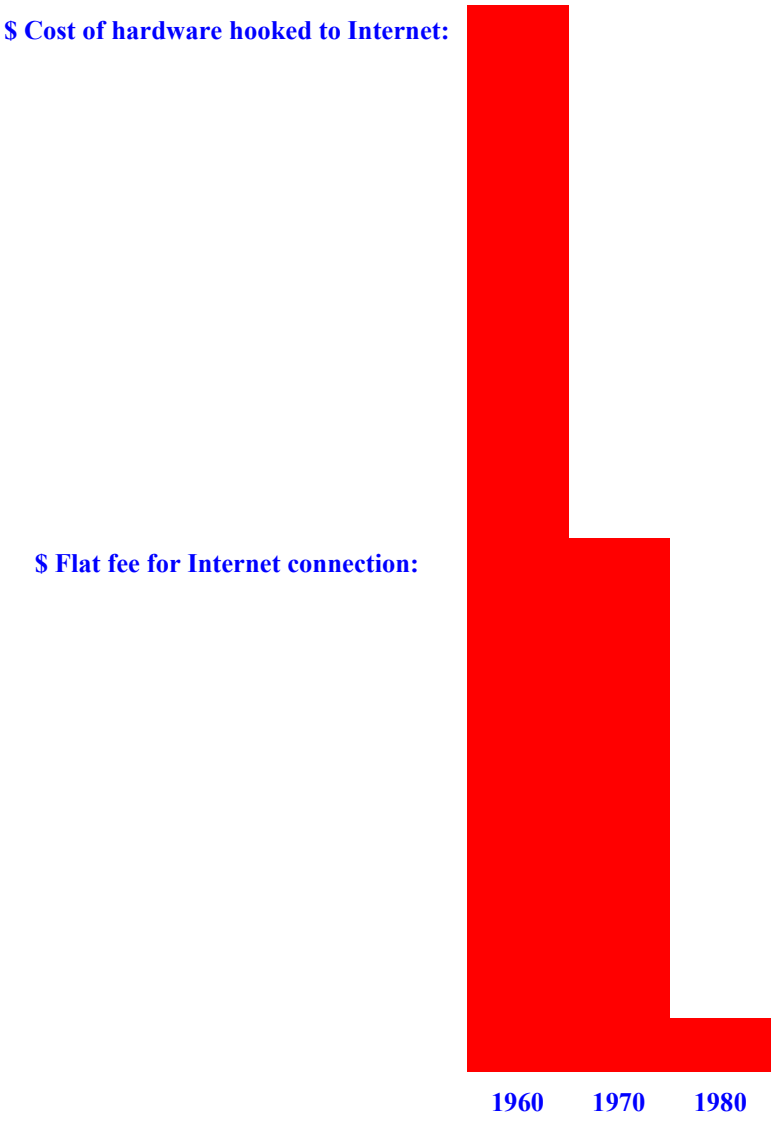
produce a personal computer quickly was to assemble one out of off the shelf components, hogging the case for these parts out of the usual IBM pig iron evidently so that the machine would be hard to steal. By this time, Intel had produced two successors to the 8080, the 16-bit 8086, and a version of the 8086 with an 8-bit bus, the 8088. Estridge chose the 8088 for cost reasons because the selling price of the new IBM machine was perceived to be a major issue. Just as IBM had no desire to get into the chip business, it had no desire to get into writing operating systems for chips. They knew that Bill Gates's BASIC interpreter had become popular among microcomputer users, so they went to Gates, who had formed a company he called Microsoft, to license BASIC for use on the IBM PC. While they were there somebody also asked Gates whether he happened to have an operating system lying around that they might consider as a candidate for the soul of their new machine. At that time, Microsoft was engaged in selling UNIX under license from AT&T Bell Labs, but UNIX, which originated in the minicomputer world, needed 100K just for the operating system alone, and also required a hard disk. The IBM device had a total of 64K and no hard disk, so Gates suggested they use Digital Research's CP/M-86 operating system. IBM talked to Digital Research about this, but CP/M-86 was way behind schedule and Gary Kildall was uninterested so IBM went back to Microsoft and asked them to hack an operating system similar to CP/M. Gates knew of a nearby company, Seattle Computer Products, that had created just such a hack, called 86-DOS, while they had been testing the memory boards they were manufacturing. Gates, a superb negotiator if not that much of a programmer, promptly bought up this 86-DOS.

- Exidy Systems introduced the COMPUTER SYSTEM 80.
- Microsoft began work on its 1st microcomputer application, a spreadsheet program initially called Electronic Paper.
- Hewlett-Packard released the HP-85.
- Sinclair Research shipped the ZX80 in North America, for US$200.
- IBM assembles the members of "Project Chess," whose purpose was to create a microcomputer.
- Apple Computer began project "Diana," which would become the Apple IIe.
- Ken and Roberta Williams start On-Line Systems, developing software for the Apple II.
- Digital Research released CP/M-86 for Intel 8086- and 8088-based systems.
- Intel announced the iAPX-432 32-bit microprocessor. Intel later built the 80286 as a step between the 8086 and the 432.
- The term RISC (reduced instruction set computer) was coined by Professor David Patterson of the University of California – Berkeley.
- Bally sold its Consumer Products Division to Astrovision.
- CompuServe merged with H&R Block, and renames MicroNET to CompuServe Information Service.
- Alan Ashton and Bruce Bastian founded Satellite Software International.
- Apollo introduced a line of workstations using the Motorola 68000.
- Sony Electronics introduced the 3.5 inch floppy disk and drive, double-sided, double-density, holding up to 875KB unformatted.
- Panasonic and Quasar unveiled hand-held computers, made by Matsushita. The unit used a 1-MHz 6502 CPU, and weighed just 14 ounces (397 grams).
- CD-Audio Philips and Sony agreed upon a standard for an optical disk-based digital "CD-Audio" format (the disk storage was planned so it would be capacious enough to allow the recording of Beethoven's 9th Symphony).

By this point, thirty years into the development cycle for our new communication technology, computer hardware hooked to the Internet was costing about one order of magnitude less than the flat fee for an organization's Internet connection, which meant that at each Internet node (a university campus, say, or a corporate office), you could afford to install practically any number of computer terminals for individuals.[72]

72. And now we are looking at like $300 per usual home terminal, with rudimentary access in a remote village, using a hand crank or a bicycle to generate power, at roughly $100.

Cost Comparison between Computer Hardware and Internet Hookup Fees, Decade by Decade



January: News items relating to the development of ELECTRIC WALDEN technology:

- Mike Harvey began the Nibble magazine for Apple Computer products.
- Universal Data Systems announced the 103LP 300 bps modem, connecting directly into the phone line, requiring no additional power. Price: US$195.
- Morrow Designs advertises the 26 MB DISCUS M26 hard drive system for US$5000.
- The 1st issue of S-Eighty was published, for TRS-80 enthusiasts.
- The 1st issue of Computer Shopper was published.
- Hewlett-Packard completed work on the Capricorn project, producing the HP-85. With a 32-character wide CRT display, small built-in printer, cassette tape recorder, and keyboard, it sold for US$3250.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft began development on an 8086 version of AT&T's UNIX operating system.
- Sinclair Research announced the ZX80 computer in the North American market. It used a 3.25-MHz NEC Technologies 780-1 8-bit microprocessor, and comes with 1KB RAM and 4KB ROM.
- Mattel began shipping the game component of the Intellivision.

March: It was decided that the spire on St. James Church on St. Helena was unsafe and needed to be demolished.

News items relating to the development of ELECTRIC WALDEN technology:

- Atari ad: "Atari promises to be the most popular Personal Computer System of the 1980s!"
- Microsoft Corp. announced its 1st hardware product, the Z-80 SoftCard for the Apple II. This card gave the Apple II CP/M capability, contributing greatly to Apple Computer's success. The card included CP/M and Microsoft's Disk BASIC, all for US$349. The announcement was made at the West Coast Computer Faire in San Francisco. Tim Patterson of Seattle Computer Products had built several prototypes before Microsoft's Don Burdis took over the project. In its 1st year of release, 25,000 units were sold.
- Satellite Software International shipped WordPerfect 1.0 for Data General minicomputers.
- At the West Coast Computer Faire, Adam Osborne approaches Les Felsenstein with the idea of starting a computer company.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

April: News items relating to the development of ELECTRIC WALDEN technology:

- Tim Patterson began writing an operating system for use with Seattle Computer Products' 8086-based computer.

- Data General announced the Eclipse MV/8000. Code name during development was Gallifrey Eagle.
- Seattle Computer Products decides to make their own disk operating system (DOS), due to delays by Digital Research in releasing a CP/M-86 operating system.

May: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the Apple III at the National Computer Conference, in Anaheim, California. The Apple III used a 2-MHz 6502A microprocessor, and included a 5.25-inch floppy drive. Price ranges from US$4,500 to US$8,000.
- Universal Data Systems announced the 202LP 1200 bps modem, connecting directly into the phone line, requiring no additional power.

June: News items relating to the development of ELECTRIC WALDEN technology:

- Seagate Technologies announced the 1st “Winchester” 5.25-inch hard drive. Shugart began selling these hard drives.
- Steve Ballmer joined Microsoft.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Radio Shack introduced the TRS-80 Model III. It used the Zilog Z80 CPU, and was priced from US$700 to US$2,500.
- Radio Shack introduced the TRS-80 Color Computer. It used the Motorola 6809E CPU, comes with 4KB RAM, and sold for US$400.
- Radio Shack introduced the TRS-80 Pocket Computer. It features a 24 character display, with 1.9KB of programmable memory. Price was US$230.
- Radio Shack introduced the Daisy Wheel Printer II for US$1,960.
- The last issue of S-Eighty was published.
- IBM representatives meet with Microsoft’s Bill Gates and Steve Ballmer to talk about Microsoft products, and home computers.
- IBM asks Bill Gates to write the operating system for their upcoming PC.

August: News items relating to the development of ELECTRIC WALDEN technology:

- IBM meets with Microsoft again, and showed plans for Project Chess, a personal computer. The code name for the computer was “Acorn.” Bill Gates argues that IBM should use the 16-bit 8086, rather than the 8-bit 8080 processor.
- QDOS 0.10 (Quick and Dirty Operating System) was shipped by Seattle Computer Products. Even though it had been created in only two man-months, the DOS worked surprisingly well. A week later, the EDLIN line editor was created. EDLIN was supposed to last only six months, before being replaced.
- Hal Lashlee and George Tate form Software Plus. The company later changes its name to Ashton-Tate.
- Microsoft announced the Microsoft XENIX OS, a portable and commercial version of the UNIX operating system for the Intel 8086, Zilog Z8000, Motorola M68000, and Digital Equipment PDP-11.
- Apple Computer released DOS 3.3.

September: News items relating to the development of ELECTRIC WALDEN technology:

CTL-ALT-DEL was created by Dave Bradley <drdave@us.ibm.com>, one of 12 IBM engineers who moved from System/23 DataMaster development to a project called Acorn. Dave was at this point writing the assembly language code that became the ROM BIOS of the IBM PC, and he included in that keyboard decoding logic that contained the original CTL-ALT-DEL sequence because during development it had become obvious that IBM needed a way to warm reboot the system when a program hung. Their apparatus lacked a reset button, and even had it had one, reset would have sent the processor through a lengthy Power On Self Test — so Dave added this special key sequence to reset the hardware but bypass the long test. (He had already programmed something similar on his previous project.) He chose three widely spaced keys so that it would be unlikely that a user would accidentally hit them together, and also he used shift keys so that it wouldn't take much code to do it (he used 8168 bytes of the 8192 available to him). –Thus the "three-finger salute" with which we are all now so familiar!

The "Dirty Dozen" was formed, the 12 engineers assembled to design and build the IBM PC, in Boca Raton, Florida. The PC project's code name was Acorn. The IBM people met with Microsoft again, to formalize plans to work together in creating this new microcomputer. Microsoft proposed that it provide the operating system for IBM's hardware offering. "Look, you are a serious company with serious hardware concerns, so let us free you up to do your important hardware work by taking this bothersome 'software' problem off you hands." — "Oh, OK." (This is the true reason why Bill Gates is the richest man on earth.)

During their fiscal year, Apple Computer sold over 78,000 Apple II computers. The 1st issue of Softalk magazine for Apple Computer products appeared.

Tim Patterson showed Microsoft his 86-DOS, written for the 8086 chip.

Software Publishing shipped the pfs:File database program.

Fall: A news item relating to the development of ELECTRIC WALDEN technology: Apple Computer shipped the 1st Apple III units in limited quantity.

October: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft's Paul Allen contacts Seattle Computer Products' Tim Patterson, asking for the rights to sell SCP's DOS to an unnamed client (IBM). Microsoft pays less than US$100,000 for the right.
- Bill Gates, Paul Allen, and Steve Ballmer meet with IBM in Boca Raton, Florida, to deliver a report to IBM. They propose that Microsoft be put in charge of the entire software development process for IBM's new microcomputer, including converting Seattle Computer Products' SCP-DOS to run on the computer.
- Sol Libes quote in Byte magazine's ByteLines: "The 32-bit machine would be 'overkill' for a personal computer."

November: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft and IBM sign a contract for Microsoft to develop certain software products for IBM's microcomputer.

- Atari sponsors the 1st National (US) Space Invaders Competition, in New York. Bill Heineman of Whittier, California scores 165,200 to win an Asteroids Table Top Video Game.

December: News items relating to the development of ELECTRIC WALDEN technology:

- The archetypal fantasy adventure game, Zork, was brought from a mainframe at MIT into the world of microcomputers by Infocom, a company founded for that purpose.
- IBM delivered the 1st PC prototype to Microsoft so they could begin developing BASIC and the machine's operating system.
- Apple Computer became a publicly held company, selling 4.6 million shares at US$22 per share. More than 40 Apple employees and investors become instant millionaires.
- Seattle Computer Products renamed QDOS to 86-DOS, releasing it as version 0.3. Microsoft then bought non-exclusive rights to market 86-DOS.

1981

News items relating to the development of ELECTRIC WALDEN technology:

- Commodore introduced the VIC-20 home computer, which would sell over 1,000,000 units.
- Bally licensed Commodore to manufacture its arcade games into cartridges for the VIC-20.
- Osborne Computer introduced the Osborne 1, the 1st truly portable computer.
- Toshiba demonstrated its T200 and T250 systems.
- IBM entered the personal computer market, creating a de facto standard.
- IBM presented its first commercially available relational database management system, SQL/DS. During the early years of this decade, also, "Oracle" would be being developed using SQL as its language.
- IBM introduced its desktop micro, using software from Bill Gates's Microsoft. At COMDEX, twenty add-on peripherals for the IBM PC were displayed by Tecmar, the 1st such third-party developer.
- Establishment of the BITNET as a cooperative network at the City University of New York, with the first connection to Yale (this initialism originated as "Because It's There NETwork" rather than "Because It's Time NETwork" and the name was in reference to the free NJE protocols provided with the IBM systems). This new system provided not only file transfers but also electronic mail and listserv servers to distribute information.
- CSNET, the Computer Science Network, was built by a collaboration of computer scientists and the University of Delaware, Purdue University, the University of Wisconsin, RAND Corporation, and Bolt Beranek and Newman, Inc., through seed money granted by NSF to provide networking services (specially E-mail) to university scientists with no access to ARPANET (this would later be redesignated the Computer and Science Network).
- Minitel (Teletel) was deployed across France by France Telecom.
- Vernor Vinge wrote TRUE NAMES.
- Theodore Nelson's LITERARY MACHINES; THE REPORT ON, AND OF, PROJECT XANADU CONCERNING WORLD PROCESSING, ELECTRONIC PUBLISHING, HYPERTEXT, THINKERTOYS, TOMORROW'S INTELLECTUAL REVOLUTION, AND CERTAIN OTHER TOPICS INCLUDING KNOWLEDGE, EDUCATION AND FREEDOM. (That's not the book, it's the title.)
- Astrovision released the Bally Computer System.
- Vector Graphic Inc. unveiled the 1st personal computer with a built-in hard drive, for US$7,950.
- Rockwell International ceased production of bubble-memory products for the microcomputer market.
- W.H. Sim founded Creative Technology in Singapore.
- James Clark founded Silicon Graphics.
- Hayes Microcomputer Products advertised the Smartmodem 300 which would become the industry standard. Their Dale Heatherington developed the +++ escape sequence for modems.
- APF introduced the Imagination Machine II at the 1981 Winter Consumer Electronics Show. This featured a 6800 CPU, 27KB RAM, two 5.25 inch disk drives, built-in cassette drive, 53-key keyboard, and 32x16 character display capability, for US$1,600.
- Tandy Corporation sued Personal Microcomputers Inc. for copyright infringement on the design of the TRS-80.
- Texas Instruments announced that it was getting out of the magnetic bubble memory market.

- Apple Computer prohibited mail-order sales of Apple computers because this offered no customer education or services.

January: News items relating to the development of ELECTRIC WALDEN technology:

- Radio Shack ceased production of the TRS-80 Model I, and recalls units from the US market, due to failure to meet new FCC radio-frequency interference regulations.
- Osborne Computer Corporation was incorporated.
- The International Winter Consumer Electronics Show was held in Las Vegas, Nevada.
- Casio demonstrated the FX-9000P, with a 5 inch CRT, keyboard, keypad, removable memory modules, and 256x128 graphics.
- Commodore announced the VIC-20, with full-size 61-key plus four function key keyboard, 5KB RAM expandable to 32KB, 6502A CPU, 22 character by 23 line text display, and color graphics, for US$300. During its life, production peaks at 9,000 units per day.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Steve Wozniak's private plane crashed, leaving him with a temporary loss of short-term memory, lasting for over a month.
- Intel introduced the iAPX432 at the International Solid State Circuits Conference.
- MS-DOS ran for the 1st time on IBM's prototype microcomputer.
- Intel began shipping evaluation sets of the iAPX432 microprocessor. Performance was claimed as 2 MIPS.
- Curt and Kathy Preston opened the Byte Shop in Milwaukee, Wisconsin.
- Mattel test-marketed the keyboard component of the Intellivision in Fresno, California.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Sinclair unveiled the ZX81, based on the Z80A microprocessor, for under US$200.
- Mike Markkula took over as president and chief executive officer at Apple Computer. Steve Jobs remained as "chairman of the board" (which is what?).

April: News items relating to the development of ELECTRIC WALDEN technology:

- Bill Gates hired the author of the 86-DOS hack Microsoft had bought, Tim Patterson, to fix it up a little. They renamed his work product MS-DOS, standing for Microsoft's Dumb Operating System. In the eyes of IBM and many others, the primary utility of this MS-DOS was that it was backward-compatible — it could run most of the software then running on the 8080 under CP/M. Nobody realized that within 10 years, this tiny system that was getting picked up almost by accident was going to be existing in more than 50 million paid-for copies. IBM had been supposing that mostly its little computer would be used for playing games at home, which is why they chose a 4.77 MHz clock rate to make the thing compatible with the colourburst frequency on US color TVs — so people wouldn't need monitors.
- The 6th West Coast Computer Faire was held, in San Francisco, California. Adam Osborne, of Osborne Computer Corporation, introduced the Osborne 1 Personal Business Computer at this Faire. It featured a Z80A CPU, 5-inch display, 64KB RAM, keyboard, keypad, modem, and two 5.25-inch 100KB disk drives for US$1,795. Weight: 24 pounds. It also included US$1,500 worth of software, including CP/M, BASIC, WordStar, and SuperCalc. Osborne anticipated selling 10,000 in total but sold 10,000 in a single month.

May: News items relating to the development of ELECTRIC WALDEN technology:

- 73,000 showed up for a National Computer Conference in Chicago, at which Xerox unveiled its Star 8010. Many features that had been developed on the Alto were incorporated, but at a starting price of US$16,000-17,000 the offering was not destined for commercial success.
- Atari discontinued its 8KB Atari 400.

June: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft reorganized as Microsoft, Incorporated with Bill Gates as President and Chairman and Paul Allen as Executive Vice President.
- Microsoft persuaded IBM to introduce its microcomputer with a minimum of 64KB RAM (IBM having planned to include merely 16KB).

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

July: Some news items relating to the development of ELECTRIC WALDEN technology:

- Xerox announced the Xerox 820. During its development, it was code-named The Worm. It used the Z80 CPU, CP/M, and BASIC. The price with a dual disk drive and display was US$3,000.
- Microsoft bought all rights to DOS from Seattle Computer Products, and the name MS-DOS was adopted.
- IBM introduced its 1st desktop computer, the Datamaster. It used a 16-bit 8086, and was a dedicated data processing machine.
- The 1st IBM PCs roll off the assembly lines.
- Mike Scott resigned from Apple Computer.

August: News items relating to the development of ELECTRIC WALDEN technology:

- Vector Graphic made its 1st public stock offering of US$13,000,000.
- IBM announced the CGA graphics card for the PC, giving 640x200 resolution with 16 colors. A fully loaded version of the "IBM 5150 PC Personal Computer" with color graphics cost US$6,000. Tandy president John Roach was asked about IBM's entry into the microcomputer field and responded "I don't think it's that significant." Apple Computer ran a full-page ad in the Wall Street Journal to say "Welcome IBM. Seriously."
- When we speak of early DOS we generally mean either the MS DOS of Microsoft or the PC DOS of IBM. The difference between these two flavors was primarily due to the proprietary hardware and bus employed by IBM at that time. Microsoft had been smart enough to buy this program from the creators of the CP/M-86 operating system and IBM had been dumb enough to license that program from them rather than go to the trouble of creating something both proprietary and better. When IBM announced the 16K RAM PC built in Boca Raton FL by Philip Estridge, called the "IBM 5150 PC Personal Computer," the machine came with a single-sided 5 1/4" floppy disk drive which could store 160K of information. The company had focused on hardware to the exclusion of

software, and so simultaneously it announced this 1.0 release of DOS. The version of the DOS operating system released along with the IBM PC consisted of three programs: ibmbio.com, the disk and character I/O system; ibmdos.com, the disk and file manager: and command.com, the command processor, a primitive shell. Unlike UNIX, which has always been self-contained, DOS made use of a hardware ROM called the BIOS (Basic Input Output System). The BIOS contains device drivers for standard devices so MS-DOS could simply call them to do I/O. Whereas UNIX contained drivers for terminal I/O, disk I/O etc., MS-DOS used BIOS procedures to do this work. Since BIOS was located near the top of the 8088's 1Mb address space in a ROM, it did not occupy any RAM, surely a plus on a machine with only 64KB of it. It occupied 12KB of the machine's 64KB of memory and was more or less compatible with CP/M. Although DOS Version 1.0 was compatible with CP/M, it could keep track of more information such as size about each file, had a superior disk allocation algorithm, was faster, and had the ability to handle primitive shell scripts (called batch files). DOS 1.0, like CP/M, supported only a single directory. When you logged in and typed dir to list the contents of the working directory, you saw all the files on the system. By way of contrast, even the 1st version of UNIX had a full hierarchical file system. The source consisted of 4000 lines of assembly code. The only disk it supported was the 160KB single-sided 5¼ inch diskette. The 160KB 5¼ inch diskette was something of a technological breakthrough, since most other microcomputers at the time were using 8-inch diskettes. In fact, the 5¼ inch diskettes were often called "mini-diskettes," to contrast them with the "normal" 8-inch diskettes. This machine had a 4.77-MHz Intel 8088 CPU, 64KB RAM, 40KB ROM, for US$3,000.

- Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

DATE	NODES
May 1969	4
October 1969	5
April 1971	23
June 1974	62
March 1977	111
August 1981	213
May 1982	235
August 1983	562
October 1984	1,024
October 1985	1,961
February 1986	2,308
November 1986	5,089
December 1987	28,174
July 1988	33,000
October 1988	56,000
January 1989	80,000
July 1989	130,000
October 1989	159,000
October 1990	313,000
January 1991	376,000
July 1991	535,000
October 1991	617,000
January 1992	727,000
April 1992	890,000
July 1992	992,000
October 1992	1,136,000
January 1993	1,313,000
April 1993	1,486,000
July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

Late Fall: A news item relating to the development of ELECTRIC WALDEN technology:

- Apple Computer officially reintroduces the Apple III, with improved software and a hard disk.

September: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft began work on a graphical user interface for its MS-DOS, initially called Interface Manager because it would effectively conceal the interface between programs and devices such as printers and video cards.
- Osborne Computer Company had its 1st US$1 million sales month.
- Apple Computer introduced its 1st hard drive, the 5MB ProFile, for US$3500.
- IBM began shipping the IBM PC ahead of schedule (something unheard of in the microcomputer industry).
- The 4th Personal Computer World Show was held, in London.
- Sinclair Research and W.H. Smith signed an agreement for W.H. Smith to sell the ZX-81 in its retail stores in England, for a trial 1-year period.
- Acorn Computer Ltd. introduced its BBC Microcomputer System. This featured a 6502A CPU, up to 48 KB RAM, a 73-key keyboard, and 16-color graphics.

October: A news item relating to the development of ELECTRIC WALDEN technology: The ZX81 was introduced to the American market, for US$150.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Ashton-Tate shipped dBASE II, the early industry-standard database program.
- Microsoft, Incorporated became Microsoft Corporation.

1982

News items relating to the development of ELECTRIC WALDEN technology:

- AT&T agreed to give up 22 Bell System companies in settling a 13-year-old lawsuit brought by the Justice Department.
- Compaq Computer was incorporated.
- Sun Microsystems was founded.
- Microsoft licensed MS-DOS to 50 microcomputer manufacturers in the first 16 months of its availability.
- Time Magazine named the computer its Man of the Year.
- IBM's DB2, based on the SQL Structured Query Language.
- The U.S. federal government dropped the antitrust lawsuit it had begun against IBM in 1969.
- DCA and ARPA established the Transmission Control Protocol (TCP) and Internet Protocol (IP), as the protocol suite, commonly known as TCP/IP, for ARPANET. This led to one of the first definitions of an "internet" as a connected set of networks, specifically those using TCP/IP, and "Internet" (capitalized) as connected TCP/IP internets from corporation to corporation. (It would be only much later, in late 1995 in fact, when Brent Schlender would, to avoid confusion, coin the catchy term "intranet" to designate the sort of intra-corporation secure channel of data exchange that had originally been designated in 1982 by this term "internet.")
- The Department of Defense declared the TCP/IP suite to be its standard and initiated a separate secure Defense Data Network (what would today be considered an intranet behind a firewall).
- The European UNIX Network (EUnet) was created by EUUG to provide E-mail and USENET services. The originary connections between the Netherlands, Denmark, Sweden, and the United Kingdom were made.
- The External Gateway Protocol (RFC 827) specification was instituted for gateways between networks.
- Milton Bradley bought General Consumer Electronics.
- Mattel introduced the Intellivision II.
- An insurance company contracts with programmer Wilton Jones to create a PC word processing program that mimics Wang word processing. That program became MultiMate.
- Astrovision renames the Bally Computer System as the Astrocade.
- Vector Graphic introduced the Vector 4 system, leaving them with US$3,000,000 in stock of the Vector 3 system.
- Franklin Computer Corp. unveiled the Franklin Ace 1000, the 1st legal (at the time) Apple II clone. It used a 1.022 MHz 6502 CPU, and comes with 64KB RAM.
- Andrew Fluegelman began distributing his PC-Talk communications software, the 1st copyrighted program distributed as shareware.
- General Videotex Corporation began the Delphi on-line service.
- Robert Lissner began work on Apple Pie, which would be marketed by Apple Computer as AppleWorks for the Apple II.
- Businessland opens.
- Jack Tramiel resigned from Commodore Business Machines, but later takes his position back.
- At the West Coast Computer Faire, Davong Systems introduced its 5MB Winchester Disk Drive for the IBM PC, for US$2,000.
- Mouse Systems introduced the 1st commercial mouse for the IBM PC.

- John Warnock founded Adobe Systems.
- In the 1st 8 months since its introduction, 11,000 Osborne 1 computers shipped.
- Personal Software changes its name to VisiCorp.
- Kaypro, which had been founded in 1952 as Non-Linear Systems, the 1st manufacturer of digital voltmeters, jumped on the personal computer bandwagon and rose quickly to become a darling of the industry with sales hitting $120 million.
- Apple Computer announced the Lisa computer.

January: News items relating to the development of ELECTRIC WALDEN technology:

- The US Justice Department threw out the antitrust lawsuit filed against IBM 13 years earlier.
- The 1982 Winter Consumer Electronics Show was held in Las Vegas, Nevada.
- Commodore introduced the Commodore Ultimax, for US$150.
- Kazuhiko Nishi, Mocrosoft's representative in Japan, showed Bill Gates a drawing of a prototype for a portable computer, using a new liquid crystal display developed by Hitachi. Gates and Nishi began designing the details of the computer, which Kyocera Corporation in Japan had agreed to manufacture.
- Commodore announced the Commodore 64 (6510, 64KB RAM, 20KB ROM with Microsoft BASIC, custom sound, color graphics, for US$600) for US$595. During 1983, the price drops to US$200. It became the best selling computer of all time, with estimated sales of 17-22 million units. It was the 1st personal computer with an integrated sound synthesizer chip.
- Commodore introduced the 16K SuperVIC.
- Commodore introduced the VIC Modem, a 300 baud cartridge modem for US$110.
- Texas Instruments introduced a peripheral expansion unit for the TI-99/4, for US$250.
- Astrovision introduced the ZGrass-32 personal computer add-on to the Astro Professional Arcade, for US$600. It used a Z-80 CPU.
- Toshiba America previews its 1st personal computer, the Model T-100. It used a Z-80A, a flat panel LCD display, and supports up to 32KB RAM and 32KB ROM in cartridges.
- In the 1st 10 months of sale, 250,000 Sinclair ZX81 microcomputers had been delivered.
- Sharp introduced the Sharp PC-1500 Hand Held Personal Computer. It comes with 16KB ROM, and 3.5KB RAM. Price for computer was US$300. Price for tiny color graphics printer that attaches to the side, US$250.
- Atari began shipping all Atari 800 units with GTIA graphics chips, allowing three more graphics modes than previously.
- Radio Shack introduced the TRS-80 Model 16. It used a 16-bit Motorola MC68000.
- Radio Shack introduced the PC-2 Pocket Computer for US$280. It had a 26-character display, with upper and lower case characters. It was expandable to 16KB.
- Davong Systems Incorporated was formed.

February: News items relating to the development of ELECTRIC WALDEN technology:

- IBM split its Personal Computer development team into three groups: one to work on the PC XT, one to develop the PCjr, and one to start work on the PC AT.
- Compaq Computer Corporation was founded by Rod Canion, Jim Harris, and Bill Murto, all former senior managers of Texas Instruments.
- Intel introduced the 80286 microprocessor. It used a 16-bit data bus, 134,000 transistors, and offers protected mode operation. Initial price was US$360. It could access 16 MB of memory.

- Sun Microsystems was founded.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

March: A news item relating to the development of ELECTRIC WALDEN technology: Microsoft released FORTRAN for MS-DOS.

Spring: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft released GW-BASIC, with advanced graphics capabilities.
- Microsoft released Microsoft COBOL for MS-DOS.
- IBM released Digital Research's CP/M-86 for the IBM PC.
- Microsoft shipped its Multiplan spreadsheet program to IBM for testing and marketing for the IBM PC.

April: News items relating to the development of ELECTRIC WALDEN technology:

- Mitch Kapor founded Lotus Development Corporation.
- Xedex Corporation built the Baby Blue card (a Z80 coprocessor card) to increase software availability for the IBM PC.
- Microsoft established a subsidiary company in England.
- Eight months after the introduction of the IBM PC, 50,000 units had been sold.
- Kazuhiko Nishi showed a prototype portable computer to Tandy/Radio Shack. Tandy agreed to market the computer.
- IBM 1st offered CP/M-86 for the IBM PC.

May: News items relating to the development of ELECTRIC WALDEN technology:

- Future Computing Inc. quote: “CP/M 2.2 is extremely important, and the Z80 chip will live forever because of it.”
- Vector Graphic hired Frederick Snow as new president and CEO.
- Microsoft released MS-DOS 1.1 to IBM, for the IBM PC. It supported 320KB double-sided floppy disk drives. Microsoft also released MS-DOS 1.25, similar to 1.1 but for IBM-compatible computers.
- Timex Computer Corp. and Sinclair Research Ltd. announced an agreement for Timex to market a 2KB version of the ZX-81 as the Timex/Sinclair 1000.
- Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

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October 1990	313,000
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October 1992	1,136,000
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July 1993	1,776,000

Host nodes on the Internet

DATE	NODES
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

June: News items relating to the development of ELECTRIC WALDEN technology:

- The National Computer Conference was held in Houston, Texas.
- Epson showed a working prototype computer called the “Rising Star.” It was later introduced as the QX-10.
- Coleco announced the ColecoVision video game system.
- Sony Electronics demonstrated its 3.5 inch microfloppy disk system.
- The 1st IBM PC clone, the MPC, was released by Columbia Data Products.
- Epson America, Inc. announced the HX-20, a notebook-sized computer. It weighs only 3 pounds, and was reported to run on internal batteries for up to 50 hours. It included 16KB RAM, 32KB ROM, a full-size keyboard, built-in printer, and 20x4 character LCD screen.
- Cromemco Inc. announced the C-10 personal computer. It used a 4-MHz Z-80A, 64KB RAM, and 80x25 screen, for US$1,000.
- Wang Laboratories Ltd. introduced the Wang Professional Computer, for US$2,700.
- Commodore Business Machines Inc. introduced the Commodore Max Machine. It had 16-color 40x25 screen capability, for US$180.
- Commodore Business Machines Inc. introduced the BX256 16-bit multiprocessor professional microcomputer. It included 256KB RAM, an Intel 8088 for CP/M-86, 80-column screen, and built-in dual disk drives, for US$3,000.
- Commodore Business Machines Inc. introduced the B128 microcomputer. It features 128KB RAM, and a 80-column screen, for US$1,700.
- Commodore Business Machines Inc. introduced the P128 microcomputer. It features 128KB RAM, TV connector, 40x25 16-color display, and 320x200 graphics, for US$1,000.
- Lobo Drives International introduced the MAX-80 personal computer. It features a 5-MHz Z-80, 64KB RAM, serial/parallel ports, and keyboard, for US$800.
- Altos Computer Systems announced the ACS8600.
- Toshiba America introduced its Toshiba T100 personal computer.
- Digital Equipment announced the dual-processor Rainbow 100. It incorporates both Zilog Z-80 and Intel 8088 microprocessors, allowing it to run CP/M as well as CP/M-86 or MS-DOS.

Summer: A news item relating to the development of ELECTRIC WALDEN technology: Microsoft received its 1st Macintosh prototype from Apple, for use in developing software for the machine.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Bill Gates hires James Towne, a manager from Tektronix, as 1st president of Microsoft.

- Boston's Computer Museum, devoted to documenting and displaying the evolution of computer technology, was incorporated.
- Intel announced the 80186 microprocessor.
- Timex Computer Corp. began selling the Timex Sinclair 1000 through over 1000 Timex retail outlets.
- Apple Computer released the Apple Dot Matrix Printer, for US$700. It was a modified C.Itoh printer.

August: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft released Multiplan for the Apple II and the Osborne I.
- Hercules announced the Hercules Graphics Card (HGC or HGA), with monochrome graphics at 720x348 resolution.

September: A news item relating to the development of ELECTRIC WALDEN technology: On-Line Systems changes its name to Sierra On-Line.

October: News items relating to the development of ELECTRIC WALDEN technology:

- DOS 1.0 was not only exceedingly limited, it had not been debugged. DOS 1.1 was the bug fix release. Also, by this time double sided floppy diskette drives allowing 320KB of disk space on a single drive were available and needed to be supported.
- Version 1.1 supported 320KB diskettes. Like many of the early versions, it was apparently released to support for yet another disk format, in this case the double-sided 320KB diskette. Version 1.1 also fixed some bugs, but otherwise was similar to Version 1.0. By convention, releases such as 1.1, in which the number to the left of the decimal point is the same as the previous version represent relatively minor changes from the previous release. By contrast, Version 2.0 was largely a new system.
- Limitations of the PCs hardware was a big influence on MS-DOS. Although the 8088 has a 1 MB address space, IBM decided to allocate the first 640KB of this to RAM and the rest to ROMs, video boards, etc. As a consequence, MS-DOS was set up to support programs whose maximum size was 640KB. At first this was not a problem, since the machine had only 64KB of RAM in it, but when later models came out with up to 16 MB, the inability to run programs larger than 640KB became something of an embarrassment.
- Another important feature of the IBM PC is the fact that it has no hardware protection at all. Programs were free to bypass the operating system and access the hardware directly.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Compaq Computer introduced the Compaq Portable PC: 4.77MHz 8088, 128KB RAM, 9-inch monochrome monitor, one 320KB 5.25-inch disk drive, price US$3,000.
- Satellite Software International introduced the WordPerfect word processing program.
- Lotus Development announced the Lotus 1-2-3 spreadsheet program at Comdex in Las Vegas.
- VisiCorp announced the VisiOn graphical user interface at the Fall 1982 Comdex.

December: News items relating to the development of ELECTRIC WALDEN technology:

- Satellite Software International began shipping WordPerfect 2.0 for DOS, at a price of US$500. Each.

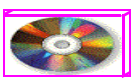
- Apple Computer became the 1st personal computer company to reach US$1,000,000,000 in annual sales.

Late in the year: A news item relating to the development of ELECTRIC WALDEN technology: General Consumer Electronics introduced the Vectrex, the 1st home gaming system with a built-in 9-inch monochrome vector monitor. Price: US$200.

1983

News items relating to the development of ELECTRIC WALDEN technology:

- Compaq shipped its 1st computer in January and sold a total of $111M worth, which amounted to the greatest 1st-year sales in the history of American business.
- Total computers in use in the U.S. exceeded ten million units.
- Seymour Cray introduced his Cray 2 supercomputer with a performance rating of one billion FLOPs (floating point operations per second).
- NEC announced the SX-1 and SX-2 supercomputers.
- A name server was developed at University of Wisconsin, which no longer required that users be aware of their exact path to other systems.
- The CSNET/ARPANET gateway was put in place.
- The ARPANET was split into ARPANET and MILNET, the latter becoming integrated with the Defense Data Network that had been created in 1982.
- Desktop workstations came into being, many with Berkeley UNIX which included IP networking software.
- Need switched from having a single, large timesharing computer connected to Internet per site, to connection of an entire local network.
- An Internet Activities Board (IAB) was established, replacing ICCB.
- The University of California – Berkeley released UNIX 4.2BSD incorporating TCP/IP.
- EARN, the European Academic and Research Network, was established, working in a manner similar to the manner in which BITNET worked with a gateway funded by International Business Machines, Inc.
- Tom Jennings instituted the FidoNet.
- Based on an idea patented in 1965, Won-Tien Tsang patented the cleaved coupled-cavity laser, a semiconductor device which later would be useful for lightwave communications systems because its output can be tuned electronically from one ultrapure single-frequency to another.
- Bjarne Stroustrup created the C++ extension to the C programming language for the UNIX system environment, enabling programmers to improve the quality of code produced by making reusable code easier to write.
- DOS 2.0 was announced when IBM brought out the XT. It more than doubled the commands available and allowed for a hierarchy of files. It provided support for a hard disk drive and for connection to a printer. IBM and Microsoft began co-developing OS/2. Microsoft showed IBM a raw version of Windows. IBM was not interested as they were already developing what would be called TopView.
- Lotus 1-2-3 replaced VisiCalc as the spreadsheet software of choice for microcomputers.
- Nelma Data Corporation introduced the Persona microcomputer. It featured a 4-MHz Z80A, CP/M 2.3, 64KB RAM, dual single-sided 5.25-inch floppy drives, for $3,000.
- Hewlett-Packard began design work on Precision Architecture.
- Commodore introduced the SX-64, the 1st color portable. Weight was 10.5 kg. It incorporated a 5-inch color monitor and one 5.25 inch floppy drive.
- Borland International was founded by Philippe Kahn.
- CD Players Sony introduced the first audio CD player, priced at $1,000 (the first CD title was Billy Joel's "52nd Street")
-



January 1, Saturday: The Holy Prepuce of Jesus Christ and its jeweled casket were stolen by a Catholic priest in Calcata, Italy during the village's annual parade on the Feast of the Circumcision. The precious object hasn't been seen since — which is extremely unfortunate since in this day of forensic tissue specimens we would immediately be able to use it to reconstruct the entire genome of Jesus, in the hope someday that we would be able to clone him like the dinosaurs of Jurassic Park.

A news item relating to the development of ELECTRIC WALDEN technology:

- The scheduled changeover from NCP to TCP/IP protocols.

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Host nodes on the Internet

DATE	NODES
1995 predicted	5,000,000 estimated

January: News items relating to the development of ELECTRIC WALDEN technology:

- The Winter Consumer Electronics Show was held, in Las Vegas, Nevada.
- Texas Instruments introduced the TI 99/2, using the TI-9995 16-bit microprocessor, 4.2KB RAM, 24KB ROM, 16-color graphics.
- Apple Computer unveiled the Lisa computer, with 1MB RAM, 2MB ROM, 5MB hard drive. It was slow, but innovative. Its initial price was US$10,000. The Lisa was based on the Xerox Star System, and cost Apple Computer US$50 million to develop. It was the 1st personal computer with a graphical user interface (GUI). The software for it cost Apple Computer US$100,000,000 to develop.
- Mattel showed the Intellivision III at the Consumer Electronics Show.
- Apple Computer introduced the Apple IIe for US$1,400.
- Apple Computer released the Apple Letter Quality Printer, for US$2,200. It was a modified Qume printer.
- VisiCorp (formerly Personal Software) sues Software Arts over rights to VisiCalc.
- Mattel demonstrated the Aquarius computer at the Winter CES. It had 4 KB RAM, and a Z80A microprocessor. It was expected to sell for US$200.
- Timex introduced the Timex 2000, which was their re-packaged Sinclair Spectrum for the North American market. Price was US$149 for a 16KB model.
- Atari introduced the 1200XL home computer, with 64KB RAM, and 256 color capability. Price: US$900.
- A full-page ad by Media Distributing offers a 44MB hard drive for US$4,400; 22MB for US$3,600; 11MB for US$2,700.
- Commodore's sales of VIC-20s reached 1,000,000.
- Time magazine selected the microcomputer as its "Man" of the Year.
- Lotus Development shipped Lotus 1-2-3 Release 1.0 for MS-DOS.
- Ziff-Davis began publishing A+ magazine for Apple Computer products.
- Essick and Kolstad announced at the Santa Monica USENIX that they were transforming the prohibitively costly University of Illinois/Control Data Corporation software known as the PLATO "learning system" into Lotus "Notes."

February: News items relating to the development of ELECTRIC WALDEN technology: Microsoft established a subsidiary company in West Germany.

March: News items relating to the development of ELECTRIC WALDEN technology:

- IBM introduced the PC/XT, its 1st personal computer with a hard disk. It came with a new version of MS-DOS, Version 2.0. MS-DOS 2.0 was a major break with the past. Although it still supported the CP/M system calls, Microsoft essentially rewrote it from scratch and incorporated many ideas from their UNIX system in it. At this point, Microsoft was a major UNIX vendor, and clearly

wanted to see MS-DOS and UNIX converge. The MS-DOS file system, for example, was taken largely from UNIX, with minor changes (e.g. the use of \ instead of / as the component separator). Also, since MS-DOS was a single-user system, not a timesharing system, none of the UNIX protection features were included. Nevertheless, the OPEN, READ, WRITE, and CLOSE system calls were now present in essentially the same form as UNIX, using file descriptors (not present in Version 1.0). The shell was also improved, and could handle redirection of standard input and output, and supported pipelines and filters. All in all, it was a far cry from CP/M.

- MS-DOS 2.0 also incorporated support for yet another diskette format, 360K, as well as user-installable device drivers, print spooling, system configuration, memory management, and customized shells.
- In the process of adding all these features from UNIX, MS-DOS had grown to 20,000 lines of assembly language. It also killed off CP/M-86, which had finally appeared, and established MS-DOS as the dominant operating system for the PC. Because the hard disk made it possible to run reasonably large applications, the PC/XT quickly moved the entire focus of the personal computer from home use to business use. Small, medium, and large companies began to acquire PCs.
- At this point MS-DOS was being maintained by only four people at Microsoft. With the emergence of a large world-wide demand for the PC/XT for business applications, Microsoft hired more programmers and produced Version 2.05, which supported the time, date, currency, and decimal symbols for many countries. It even supported 16-bit Japanese Kanji (Chinese Characters) to some extent. IBM was not interested. What IBM was interested in was the PC jr, which came with MS-DOS 2.1 and was a total fiasco. Microsoft then combined 2.05 and 2.1 and sold millions of them under the name MS-DOS 2.11.
- Radio Shack announced its TRS-80 Model 100 laptop computer. Its light weight and built-in software and modem make it popular with journalists and businessmen.
- IBM announced the IBM PC XT. It added a 10 MB hard drive, three more expansion slots, and a serial interface. With 128KB RAM and a 360KB floppy drive, it costs US$5,000.
- MS-DOS 2.0 for PCs was announced. It was written from scratch, supporting 10 MB hard drives, a tree-structured file system, and 360 KB floppy disks.
- Microsoft created a publishing division, Microsoft Press.
- The Eagle 1600, the 1st 8086-based PC, shipped.

April: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft introduced XENIX 3.0.
- Vector Graphic fired Frederick Snow, with Lore Harp taking over again.
- Microsoft introduced Multi-Tool Word for DOS (later renamed Microsoft Word) word processing program at Spring Comdex in Atlanta, Georgia.
- John Sculley was hired at Apple Computer as Chief Operating Officer.
- Lotus Development shipped Lotus 1-2-3 Release 1.A.

May: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft France opened its 1st office, in Paris, France.
- Radio Shack introduced the TRS-80 Model 4, with 4-MHz Zilog Z80A microprocessor, 64KB RAM, two 5.25-inch floppy drives, keyboard, and 12-inch B/W monitor, for US$2,000.
- Microsoft introduced its 1st mouse, “The Microsoft Mouse,” including card and software, for US$200.
- Gavalin introduced a full-function portable computer.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

June: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft quote: "We have a long-term relationship with IBM and have solid plans involving PC-DOS."
- The 1,000,000th Apple II was made.
- Intel quote: "Accessing memory using a segmented architecture holds many advantages over the earlier linear-addressing method."
- Mattel announced the scrapping of plans for the Intellivision III.
- Mattel announced the Entertainment Computer System.
- Coleco announced the Adam, a Z80-based computer with SmartWriter daisy wheel printer, 80KB RAM (64KB user RAM, 16KB video RAM), 3 sound channels, 16 color graphics, 4 MC6801 microprocessors controlling operation of peripherals, and 512KB tape-cartridge device, for US$600.
- Shipments of Apple computers reach 1,000,000.

Summer: A news item relating to the development of ELECTRIC WALDEN technology: Starcom released Dragon's Lair to arcade centers. It was the 1st laser-disc based arcade game.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Apple officially began marketing the Lisa computer.
- AT&T Bell Labs designed C++.
- Steve Wozniak returned to Apple Computer.

August: News items relating to the development of ELECTRIC WALDEN technology:

- Jon Shirley replaces James Towne as president of Microsoft.
- A US federal appeals court judge rules that Franklin Computers did violate Apple Computer copyrights on computer programs and the Apple Computer operating system in ROM.

Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

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1995 predicted	5,000,000 estimated

September: News items relating to the development of ELECTRIC WALDEN technology:

- Osborne Computer Corp. filed for Chapter 11 bankruptcy protection.
- Microsoft France released Multiplan for the Apple II.

October: News items relating to the development of ELECTRIC WALDEN technology:

- Atari began shipping its XL computers.
- Visi Corp released VisiOn, an integrated software environment for PCs, for US$1,765.
- Coleco began shipping the Adam.
- National Semiconductor shipped samples of its 6-MHz 32-bit NS32032 microprocessor.
- IBM introduced PC-DOS 2.1 with the IBM PCjr.
- IBM announced the IBM 3270 PC, an 8088-based system, for US$4,290.
- IBM announced the IBM PC-XT Model 370, with 8088 CPU, 768K RAM, 360K drive, and 10 MB hard drive for US$9,000.
- Quote from Spinnaker Software chairman William Bowman: “We’re just sitting here trying to put our PCjrs in a pile and burn them. And the damn things won’t burn. That’s the only thing IBM did right with it - they made it flameproof.”
- Tandy/Radio Shack announced the “transportable” TRS-80 Model 4P, for US$1800. It features a 4-MHz Zilog Z80A CPU, 64KB RAM, two 5.25-inch floppy drives, and 9-inch B/W screen.
- Compaq Computer introduced the Portable Plus.
- Texas Instruments withdrew from the personal computer market.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft formally announced Microsoft Windows.
- Satellite Software International shipped WordPerfect 3.0 for US$500.
- Satellite Software International shipped Personal WordPerfect for US$200.
- Borland International released Turbo Pascal for CP/M and 8086-based computers.
- IBM announced the IBM PCjr, using Intel’s 8088, for US$700 for the bare configuration.
- Quote from Sierra On-Line founder and president, Ken Williams: “the PCjr was bound to be around for a while.”
- Microsoft again showed Windows to IBM, and again IBM was not interested.
- Microsoft officially released Microsoft Word, for US$375, or US$475 with the Microsoft Mouse.

December: News items relating to the development of ELECTRIC WALDEN technology:

- Atari ceased production of the Atari 5200.
- Apple Computer introduced the redesigned Apple III as the Apple III+, for US$3,000.
- Apple Computer released the Apple ImageWriter for US$695. It was a modified C.Itoh printer.
- Apple unveiled the new Macintosh to the press.
- 20th Century Fox Videogames abandons the videogame business.
- Compaq Computer made its 1st public stock offering, raising US$67 million.
- In an obscure television market somewhere on the Great Plains, solely to make the ad eligible for awards during 1984, Apple Computer ran its “1984” Macintosh ad.

1984

The FBI established a Computer Analysis and Response Team specializing in the retrieval of evidence from the hard drives of the personal computers of detained individuals, including information that had been contained in erased files.

From this point, at which McDonnell Douglas ISG acquired Tymshare, until 1989, Douglas Engelbart would be the corporation's Senior Scientist, at San Jose CA. He would be working closely with their Aerospace Components group on an extension of the work he had been doing at the Stanford Research Institute during 1957-1977, dealing with issues of integrated information-system architectures and associated evolutionary strategies.

News items relating to the development of ELECTRIC WALDEN technology:

- The Tandy 1000 personal computer became, in its 1st year, the #1 selling IBM PC-compatible.
- The DNS Domain Name Server was introduced.
- The number of Internet hosts rose above the round number 1,000.
- The JUNET Japan UNIX Network was established using UUCP.
- The JANET Joint Academic Network (previously SERCnet) was established in the United Kingdom using Coloured Book protocols.
- Moderated newsgroups were introduced on USENET (mod.*).
- William Gibson wrote NEUROMANCER.
- Apple Computer, with a little help from Xerox PARC, released the Macintosh with mouse.
- Apple Computer released ProDOS.
- Apple Computer released AppleWorks, one of the 1st integrated software packages, with modules for word processing, database management, and spreadsheet calculations. It was written by Rupert Lissner.
- Narendra Karmarkar invented a ground-breaking algorithm that improved the capabilities and lowered the cost of linear programming by enabling computers to economically solve incredibly complex problems containing thousands of interacting variables.
- Linn Mollenauer and Roger Stolen created the soliton laser to study the properties of optical fibers.
- Early PCs had run at 4.7 to 6mhz. In this year the new IBM-AT (Advanced Technology) with Intel 80286 processor ran at 8 to 10mhz and had high-density floppy disk drives, and DOS 3.0 supported this hardware.
- IBM merged with Rolm Corporation, which was to become a telecommunications subsidiary.
- The “I’m proud to be Canadian” Hyperion was a DOS PC that was manufactured in Kanata (near Ottawa) in the mid-1980’s. It received considerable government subsidies and, while it was considered well-designed and manufactured and a real threat to the Compaq Portable, the Ottawa, Ontario, Canada firm that designed it, was unable to gather the momentum Compaq did and the rest was history.
- Milton Bradley discontinued manufacturing of the Vectrex.
- Sinclair announced the 16/32-bit QL microcomputer, using the Motorola 68008 microprocessor, 128KB RAM, two built-in tape drives, and multitasking ROM-based operating system. Weight was 3 pounds. Price was expected to be US$500.
- Mattel sold marketing rights for the Aquarius home computer to Radofin Electronics.
- Hewlett-Packard introduced the LaserJet laser printer, featuring 300dpi resolution, for US$3,600.
- Motorola unveiled its 68010 CPU chip.
- Intel introduced the 80186, 80188, and 80286 processors.
- Sirius Software filed for Chapter 11 bankruptcy proceedings.
- Mindset offered the Mindset PC.
- MIPS Computer Systems was founded, and began developing its RISC architecture.
- Commodore introduced the Plus/4, with integrated software in ROM.

January: News items relating to the development of ELECTRIC WALDEN technology:

- Terrence E. Valeski and a group of investors purchased all rights to the Intellivision from Mattel for US$16,500,000.
- Jack Tramiel, founder and president of Commodore, left the company.

- Apple Computer ran its “1984” commercial during the SuperBowl, introducing the Macintosh computer. Apple Computer runs the ad only once, but dozens of news and talk showed replay it, making it one of the most memorable ads in TV history. The ad cost US$1,500,000.
- Apple Computer introduced the Macintosh, for US$2,500. It used the 8-MHz 32-bit Motorola 68000 CPU, built-in 9-inch B/W screen, 512x342 graphics, 400KB 3.5-inch floppy disk drive, mouse, 128KB RAM, and weighing 20 pounds.
- Apple Computer introduced its 300-baud modem for US$300, and 1200-baud modem for US$500.
- Microsoft shipped Microsoft BASIC (MacBASIC) and Microsoft Multiplan for the Macintosh.
- Apple released a new version of the Lisa computer, the Lisa 2. It used all new software, as well as the Macintosh operating system. It comes with 512KB RAM, and one 3.5-inch 400KB floppy drive. The Lisa 2/5 comes with a 5MB hard drive, and the Lisa 2/10 comes with a 10MB hard drive.
- Seiko Instruments U.S.A. Inc. displayed the 1st wristwatch computer, with a 10-character, 4-line LCD.
- Hitachi ad for their 3-inch compact floppy disk drive: “It’s clear that the 3-inch floppy will become the new standard.”
- Commodore announced the Commodore 264 at the Winter Consumer Electronics Show in Las Vegas, Nevada. Code name for the computer was “TED.” The 264 used a 7501 microprocessor, 64KB RAM, 320x200 pixel graphics offering 128 color variations.
- Commodore showed a prototype of the Commodore 364 computer at the Winter Consumer Electronics Show. The 364 was like the Commodore 264, but with a separate numeric keypad and built-in voice synthesizer.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Timex withdrew from the home computer business.
- Microsoft released Multiplan v1.1 for the PC.
- IBM announced the IBM Portable PC, for US$2,900.
- IBM sued Eagle Computer and Corona Data Systems for copyright violation of the IBM PC’s BIOS, and won.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Ashton-Tate announced the integrated software package, Framework.
- Microsoft released MS-DOS 2.1 for the IBM PCjr.
- Microsoft released MS-DOS 2.11. It included enhancements to better allow conversion into different languages and date formats.
- IBM shipped the IBM PCjr. It used the 8088 CPU, included 64KB RAM, a “Freeboard” keyboard, and one 5.25-inch disk drive, no monitor, for US$1,300.
- Microsoft decided to temporary shelve work on a new spreadsheet (Excel) for the PC, and concentrate on a version for the Macintosh.
- 74 days after the introduction of the Macintosh, 50,000 units had been sold.
- Project IIx was cancelled at Apple Computer.

Spring: News items relating to the development of ELECTRIC WALDEN technology:

- Atari officially discontinued the Atari 5200.
- Commodore stopped manufacturing the VIC-20.

April: News items relating to the development of ELECTRIC WALDEN technology:

- Commodore International launched the Commodore PC at the Hanover Fair in Germany.
- Commodore International launched the Commodore Z8000 at the Hanover Fair in Germany.
- Compaq Computer introduced its PCs to Europe.
- Apple Computer unveiled the Apple IIc with an intense publicity extravaganza, at the Moscone Center in San Francisco. Priced at US$1,300, 2,000 dealers place orders for more than 52,000 units on the day of its introduction. The IIc used a 65C02A microprocessor, 128KB RAM, weighs 7.5 pounds, included a 3.5-inch floppy drive, supports 40- or 80-column screens, and allows both QWERTY and Dvorak keyboard layouts.
- Apple Computer retired the Apple III and Apple III+, with only 65,000 units sold in total.
- Microsoft France released Multiplan for the IBM PC.
- Silicon Graphics began shipping its 1st 3-D graphics workstations.
- Apple Computer released the color Apple Scribe printer, using a special waxed ribbon and thermal print head.
- Microsoft released Microsoft Word v1.1 for DOS.
- AT&T and Olivetti formed a strategic relationship to develop and market PCs in the US.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

May: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer named Kay Power as a research fellow of Apple.
- Apple Computer introduced the DuoDisk dual 5.25-inch floppy disk drive unit for the Apple II line.
- Apple Computer released the AppleMouse II with MousePaint and a peripheral card for the Apple IIe or Apple II Plus (or directly in the Apple IIc).
- Quarterdeck Office Systems officially launched DESQ, a text-based windowing environment for running DOS programs.

June: News items relating to the development of ELECTRIC WALDEN technology:

- The Summer Consumer Electronics Show was held, in Chicago.
- Ashton-Tate shipped dBASE III.
- Tom Jennings created the FidoNet BBS network.
- Motorola added the 68020 32-bit processor to its line.
- Amiga demonstrated a new computer, code-named "Lorraine."
- Apple Computer released the Apple Color Plotter, a 4-pen plotter.
- Commodore announced the Commodore 16 at the Consumer Electronics Show. The machine looks like the VIC-20 and Commodore 64, but had 16KB of RAM, and was expected to sell for around US$100, and marketed as "The Learning Machine".
- Commodore announced the renamed Commodore 264 as the Plus/4. It would now feature four built-in programs, not just one. Price should be around US$300.
- Commodore announced the DSP 1101 letter-quality daisywheel printer, designed for the Plus/4.

- Commodore announced the MPS 802 dot matrix printer.
- Commodore announced the MCS 801 color dot matrix printer.
- Commodore announced the MPS 803 dot matrix printer, designed for use with the Commodore 16.
- Okidata introduced the Okimate 10 thermal transfer color dot matrix printer, for US$240.
- Compaq Computer introduced the Compaq Deskpro.
- AT&T introduced the PC 6300, manufactured by Olivetti.

Summer: News items relating to the development of ELECTRIC WALDEN technology:

- Sierra On-Line released the game King's Quest.
- IBM introduced a new keyboard for the IBM PCjr, offering a free upgrade to all who want it.

July: UK coins ceased to be legal tender on the island of St. Helena.

News items relating to the development of ELECTRIC WALDEN technology:

- Jack Tramiel, former President of Commodore International, bought a controlling interest in the Atari home computer and video game divisions from Warner Communications, for US$240 million. Warner retains Atari's coin-operated game division and home communications venture Ataritel.
- Six months after its introduction, 100,000 Macintosh computers had been sold.
- Digital Vision released the Computer Eyes video capture system for the Apple II, selling for US$130 (US$350 with a camera).

August: News items relating to the development of ELECTRIC WALDEN technology:

- Commodore purchases Amiga Corporation.
- IBM announced the PC AT, a 6MHz 80286 computer using PC-DOS 3.0, a 5.25-inch 1.2MB floppy drive, with 256KB RAM, for US$4,000, which didn't include hard drive or monitor/card. With a 20MB hard drive, color card and monitor: US$6,700.
- IBM announced its PC Network local area network.
- IBM introduced PC/IX, based on UNIX System III from AT&T, for the PC AT.
- IBM announced TopView, a DOS multitasking program.
- IBM announced the Enhanced Color Display monitor with 640x350 resolution, priced at US$850.
- IBM announced the Enhanced Graphics Adapter (EGA), supporting up to 640x350 resolution in 16 colors. With 64K, the card costs US$524. For 640x350x16 mode, a US$200 64KB RAM expander was required.
- IBM announced the Professional Graphics Display monitor, for US$1300. The 14-inch monitor would display up to 256 colors (from 4096) simultaneously at 640x480 resolution.
- IBM announced the Professional Graphics Controller card, for US$3,000. The card takes up two adjacent slots of a PC, and included an 8-MHz 8088 chip and 384KB of memory.
- Microsoft released MS-DOS 3.0 for PCs. It added support for 1.2 MB floppy disks, and bigger (than 10 MB) hard disks.
- IBM came out with the PC/AT, its 1st personal computer based on the 286 chip. The PC/AT supported memory up to 16 megabytes (versus 640KB on the PC and PC/XT), had user and kernel modes, a ring-based protection mode similar to what MULTICS had, and the ability to run multiple programs at once. The version of DOS shipped with the PC/AT was 3.0, which supported none of these. Instead, it ran the PC/AT in a mode that simulates an 8088, only faster. Subsequent versions

of MS-DOS made some use of the extended memory (i.e. the memory above 1Mb). Since the PC/AT came with a 1.2Mb disk drive, battery backup clock, and configuration information in CMOS, support for these devices was added. Furthermore, hard disks larger than 10Mb were now supported, and RAM disks, in which a portion of memory was used as a fast disk, were introduced. In addition, the command processor (shell) was removed from the operating system and made into a separate program, so that users could replace it with their own version. By now the code was 40,000 lines and 30 people were working on it.

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

September: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the Macintosh 512K for US$3,200.
- Digital Research announced its GEM icon/desktop user interface for 8086- and DOS-based computers.

Fall: News items relating to the development of ELECTRIC WALDEN technology:

- Software Arts won its lawsuit against VisiCorp over the rights to the VisiCalc program. VisiCorp was ordered to pay US$500,000 to Software Arts.
- Atari introduced the Atari 7800 ProSystem.

October: A news item relating to the development of ELECTRIC WALDEN technology:

- Microsoft released Microsoft Word v1.15 for DOS.
- Microsoft demo'd the final version of its Windows operating system to IBM. "Make this easier on new users? –Show how we need to do that." For the 3rd time IBM just wasn't interested.
- The number of hosts on the Internet passed a thousand. Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

DATE	NODES
May 1969	4
October 1969	5
April 1971	23
June 1974	62

Host nodes on the Internet

DATE	NODES
March 1977	111
August 1981	213
May 1982	235
August 1983	562
October 1984	1,024
October 1985	1,961
February 1986	2,308
November 1986	5,089
December 1987	28,174
July 1988	33,000
October 1988	56,000
January 1989	80,000
July 1989	130,000
October 1989	159,000
October 1990	313,000
January 1991	376,000
July 1991	535,000
October 1991	617,000
January 1992	727,000
April 1992	890,000
July 1992	992,000
October 1992	1,136,000
January 1993	1,313,000
April 1993	1,486,000
July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

November: News items relating to the development of ELECTRIC WALDEN technology:

- Satellite Software International shipped WordPerfect 4.0 for US$500.
- The Tandy 1200 was announced.
- The 2 millionth Apple II computer was sold.
- Apple Computer launched its “Test Drive a Macintosh” promotion. About 200,000 potential customers took a Macintosh home for a freebie 24-hour looksee.
- Jim Manzi was named president and chief operating officer of Lotus Development. That company officially announced Jazz for the Macintosh, an all-in-one program incorporating a spreadsheet, database, graphics, word processing, and communications.

- Microsoft released MS-DOS 3.1. Its DOS 3.0 had offered some network support, but not much. This new release supported networking via LAN Local Area Networks.

December: News items relating to the development of ELECTRIC WALDEN technology:

- At COMDEX, several companies introduce 2400-baud modems, priced at US$800-900.
- Apple sold its 250,000th Macintosh system.
- Tandy introduced its Tandy 1000, for US$1,300.
- About the end of this year, the 3 1/2” diskette drive came along. Initially these things could only store 720k of data. DOS 3.2 took care of supporting these new drives. It supported 3½ inch diskettes and the IBM token ring, but became notoriously full of bugs. Few users switched to it, and many of those who did went back to 3.1 in disgust.

1985

News items relating to the development of ELECTRIC WALDEN technology:

- 1st use of optical fibers to connect computers. ARPANET was renamed the internet.
- THE WELL Whole Earth 'Lectronic Link.
- One hundred years to the day from when the last spike had been driven on the cross-Canada railroad, in a year-long effort to create coast-to-coast connectivity, the last Canadian university was connected to BITNET.
- U.S. Robotics introduced the Courier 2400 modem.
- Acorn's Advanced RISC Machine (ARM), a 32-bit processor for home use.
- Motorola introduced its 68008 CPU chip.
- Mips Technologies introduced the 1st commercially available RISC chip, the R2000.
- Microsoft purchased all rights to DOS from Seattle Computer Products for US$925,000.
- Sun Microsystems began work on its SPARC processor.
- Steve Wozniak returned to Apple Computer.
- Mimic Systems announced the Spartan, a hardware upgrade for the Commodore 64 that would induce it to suppose it was an Apple IIe.
- VisiCorp filed for bankruptcy. Software Arts sold the rights to VisiCalc to Mitch Kapor of Lotus Development for US$800,000.
- Nintendo introduced the US to its Nintendo Entertainment System.
- IBM delivered the new 3090 Sierra systems.
- Aldus introduced PageMaker for the Macintosh, initiating the era of desktop publishing.
- CD-ROM Philips and Sony announced a standard for "CD-ROM" compact disk-read-only memory for computer data.

January: News items relating to the development of ELECTRIC WALDEN technology:

- The Winter Consumer Electronics Show was held in Las Vegas, Nevada.
- Commodore unveiled the Commodore 128 Personal Computer. It functions as three computers in one: a completed Commodore 64, a CP/M mode, and a new 128KB mode.
- Atari introduced the 65XE, for US$120. Variations include the 65XEM with a built-in 8-voice synthesizer, and the 65XEP with built-in monitor and 3.5 inch disk drive.
- Atari introduced the 130XE, with 128KB RAM
- Atari introduced the 130ST: 128KB RAM, 192KB ROM, 512 color graphics, MIDI interface, and mouse for US$400.
- Atari introduced the 520ST: 512KB RAM, 192KB ROM, 512 color graphics, MIDI interface, and mouse for US$600.
- Microsoft released Microsoft Word v1.0 for the Macintosh.
- Microsoft showed Apple's Steve Jobs the Microsoft Excel spreadsheet for the 1st time. Jobs was not impressed, claiming that Lotus Development's Jazz would be more popular.
- Compaq Computer reports 2nd year revenues of US$329,000,000, an industry record.
- Coleco sold off its Adam inventory and leaves the computer business.
- Apple Computer officially renames the Lisa the Macintosh XL.
- Apple Computer released the Apple LaserWriter laser printer.

- Satellite Software International shipped WordPerfect Jr. for US$200. It was designed for use on the IBM PCjr.
- Former Microsoft founder Paul Allen founded Asymetrix.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft released Microsoft Word v2.0 for DOS.
- Apple Computer co-founder Steve Wozniak resigned from Apple to start a company that would develop home video products.
- IBM released TopView, for US$150.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the Apple Enhanced IIe.
- IBM announced that it would cease production and promotion of the IBM PCjr.

April: News items relating to the development of ELECTRIC WALDEN technology:

- IBM abandoned production of the IBM PCjr.
- The Macintosh XL (formerly called Lisa) was dropped from Apple Computer's product line.
- Compaq Computer introduced the Compaq Deskpro 286 and Portable 286.

May: News items relating to the development of ELECTRIC WALDEN technology:

- At Apple Computer in Cupertino, California, John Sculley essentially fired Steve Jobs.
- Microsoft introduced Microsoft Excel for the Macintosh.
- Lotus Development released Jazz for the Macintosh.
- At the Spring Comdex, Microsoft demonstrated an operating system replacing its DOS Dumb Operating System. This it was calling Microsoft Windows. A release date of June was set, and a list price of US$95.

June: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the UniDisk 5.25 single 5.25-inch floppy disk drive, with the ability to daisy-chain additional drives through it.
- Apple Computer reports its 1st quarterly loss.
- Microsoft announced Windows 1.0.
- Microsoft released a revised Microsoft Word v1 for the Macintosh.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Commodore unveiled the new Amiga 1000 in New York. It features a multitasking, windowing operating system, using a Motorola 68000 CPU, with 256KB RAM, and 880KB 3.5-inch disk drive, for US$1,300.
- Micrografx released its 1st Microsoft Windows application, In-A-Vision.
- Wang announced a series of products to turn PCs into local and remote Wang terminals.
- Aldus PageMaker was released for the Apple Macintosh.
- Quarterdeck Office Systems shipped DESQview 1.0.

August: A news item relating to the development of ELECTRIC WALDEN technology: Microsoft and IBM signed a joint-development agreement to work together on future operating systems and environments.

September: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer co-founder Steve Jobs resigned from Apple Computer.
- The one millionth copy of Microsoft Multiplan was sold.
- Computer company Gateway 2000 was formed, in Sioux City, Iowa, USA.
- Lotus Development shipped Lotus 1-2-3 Release 2.0.
- Satellite Software International shipped WordPerfect 4.1 for US$500.
- Microsoft released Microsoft Excel for the Macintosh 512K.
- Apple Computer introduced the UniDisk 3.5, a double-sided 3.5-inch disk drive, capable of storing 800KB per disk.
- Apple Computer released the Apple ImageWriter II printer.
- Steve Jobs and five senior managers of Apple Computer Inc. founded “NeXT.”

“If you wish to make an apple pie from scratch,
you must first invent the universe.”
— *Carl Sagan*

October: News items relating to the development of ELECTRIC WALDEN technology:

- Intel announced the 16-MHz 80386 microprocessor. It used 32-bit registers and a 32-bit data bus, and incorporated 275,000 transistors. Initial price was US$299. It could access 4 gigs of memory.
- Microsoft France released a French version of Multiplan 2.0 for the IBM PC.
- Apple Computer discontinued its 128K Mac.
- IBM announced its token ring network.
- General Electric Information Services began the GEnie on-line service.
- Hayes Microcomputer Products was issued a patent for the “Improved Escape Sequence with Guard Time,” a technique that would put a modem into command mode.
- AT&T Computer Systems introduced the PC 6300 Plus.
- Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

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July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

November: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft shipped Microsoft Windows 1.0, for US$100. It was delivered two years after the initial announcement of the product.
- Tandy announced it would offer Digital Research's GEM graphical user interface for its microcomputers.
- Apple Computer and Microsoft sign an agreement regarding Microsoft's use of Apple's copyrights on the visual display of the Macintosh.
- Lotus Development released Lotus 1-2-3 v2.0.

December: A news item relating to the development of ELECTRIC WALDEN technology: Ashton-Tate delivered dBASE III Plus.

1986

At the end of an economic boom period, many cases of corporate fraud simultaneously come to light: “Fraud scandals follow bumps in the market as night follows day,” teaches Stephen L. Meagher in his course on fraud and punishment at Stanford University. “Once there are pressures put on profits, management fiddles with the books.” Professor John C. Coffee, Jr. of the Columbia Law School comments that “This cycle goes back at least 300 years. It’s just part of capitalism.” Jacob van Klaveren, a German economic historian, has alleged that this cycle of fraud began with Warren Hastings and Robert Clive and the antics of the British East India Company founded in 1600 and the Dutch East India Company founded in 1602. Just at this point, as had already happened in 1920 and in 1963, many frauds were coming to light — and this would surprise us again in 2002 and in 2007.

News items relating to the development of ELECTRIC WALDEN technology:

- Burroughs merged with Sperry to form Unisys Corporation, second only to IBM in computer revenues.
- Compaq made the Fortune 500 list. It introduced its first Intel 80386-based PC.
- On November 3d, Computerworld published its 1,000th issue.
- HP introduced its Spectrum line of RISC reduced instruction set computers.
- Tandy had over 7,300 retail outlets including more than 4,800 company-owned Radio Shack stores in the US.
- The number of computers in the US exceeded 30,000,000.
- Austin Meredith began to conceive of the shared computer textbase as a scholarly research vehicle with which to replace the expensive and self-censoring academic rôle of the “little journal.”

- Stuart Moulthrop of the Department of English of the University of Texas at Austin translated Borghes’s “Garden of Forking Paths” into actual hypertext, using a “Storyspace” software program that had just been created by Jay David Bolter, Michael Joyce, and John B. Smith of Eastgate Systems of Cambridge MA.
- European radio stations began to use the FM carrier wave to transmit data.
- The NSF established five supercomputing centers to democratize high-computing power (JVNC@Princeton, PSC@Pittsburgh, SDSC@UCSD, NCSA@UIUC, Theory Center@Cornell). This would allow for an explosion of connections, especially from universities. The National Science Foundation net (NSFNET) was created as the backbone of the present internet, communicating initially at 56KB per second. The NSF-funded SDSCNET, JVNCNET, SURANET, and NYSERNET became operational.
- The NNTP Network News Transfer Protocol enhanced Usenet news performance over TCP/IP.
- The MX Mail Exchanger records developed by Craig Partridge allowed non-IP network hosts to have domain addresses.
- All USENET names were changed at once (names of moderated newsgroups remained to be changed in 1987).
- The BARRNET Bay Area Regional Research Network was established using high speed links (this would become operational in 1987).

- Digital Research introduced its GEM operating environment for MS-DOS.
- Windows 1.03 provided support for keyboards using foreign languages, high-resolution printers, and high-resolution monitors.
- Software Publishing Corporation introduced Harvard Presentation Graphics for the PC.
- Self Electro-optic Effect Devices (SEEDs), cascadable switches turned on and off by light beams in the manner in which conventional transistors are turned on and off by electrical changes.
- Neural network chips began to mimic the manner in which brain cells purportedly retrieve stored information and solve problems.
- Microsoft purchased Dynamical Systems, Inc., makers of a TopView clone called Mondrian.
- MIPS Technologies began volume shipments of its 1st RISC processor, the R2000 with 110,000 transistors. This 8-MHz 32-bit CPU achieved a speed of 5 MIPS.
- Motorola announced its 68030 microprocessor and began work on its 88000 processor.
- NexGen was founded to design a 5th-generation x86 processor.
- Mitch Kapor, founder of Lotus Development, left the company.
- NEC Home Electronics introduced its NEC JC-1401P3A Multisync monitor.
- IBM began work on what would become the IBM RS/6000 series.
- Gateway 2000 shipped its 1st PC.
- Advanced Logic Research announced the 1st 386-based PC, the Access 386.

January: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft released MS-DOS 3.25.
- Apple Computer introduced the Macintosh Plus, with 1 MB RAM, support for hard drives, a new keyboard with cursor keys and numeric keypad, priced at US$2,600.
- Apple Computer introduced the LaserWriter Plus printer.
- John Sculley became chairman of Apple Computer.
- Compaq Computer reported third year revenues of US$503,900,000, a US business record.
- IBM announced the IBM RT Personal Computer, using RISC-based technology from IBM's "801" project of the mid-70s. It was one of the 1st commercially-available 32-bit RISC-based computers. The base configuration had 1MB RAM, a 1.2MB floppy, and 40 MB hard drive, for US$11,700. With performance of only 2 MIPS, it was doomed from the beginning.
- Microsoft released MS-DOS 3.2. It added support for 3.5-inch 720 KB floppy disk drives.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Compaq Computer introduced the Compaq Portable II.
- Quarterdeck Office Systems shipped DESQview 1.1.
- Quarterdeck Office Systems shipped DESQview 1.2.
- Microsoft moves from Bellevue to Redmond, Washington.
- Microsoft released a French version of Windows 1.02.

February-November: A news item relating to the development of ELECTRIC WALDEN technology: Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

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January 1994	2,217,000
1995 predicted	5,000,000 estimated

March: News items relating to the development of ELECTRIC WALDEN technology:

- The 1st International Conference on CD-ROM was held in Seattle, Washington, hosted by Microsoft.
- IBM began shipping the IBM RT PC.
- Microsoft 1st sold shares to the public, for US$21 per share. The initial public offering raises US$61 million. Bill Gates quickly became the world's youngest billionaire.
- Silicon Graphics decided to switch from the Motorola 68000 line to MIPS Technologies' line of RISC processors.

April: 28 St. Helenians departed to work in the Falkland Islands. This group was the 1st, but many more were to follow.

News items relating to the development of ELECTRIC WALDEN technology:

- IBM announced the IBM PC Convertible, 80C88-based, 256K RAM, with two 720K floppy disks, for US$2,000.
- IBM discontinued the IBM Portable PC.
- Satellite Software International shipped Student WordPerfect for US$75.
- IBM boosted the speed of the IBM PC AT by replacing the CPU with a 8-MHz Intel 80286.
- Jim Manzi was named chief executive officer of Lotus Development Corp.
- Microsoft released Microsoft Word v3.0 for DOS.
- Compaq Computer joined the Fortune 500 list faster than any company in history.
- Compaq Computer shipped its 500,000th personal computer.
- Apple Computer replaced the Macintosh 512K with the Macintosh 512K Enhanced, for US$2,000.
- Satellite Software International changed its name to WordPerfect Corporation.

May: A news item relating to the development of ELECTRIC WALDEN technology: IBM shipped TopView 1.1.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer discontinued the Macintosh XL.
- Jim Manzi was appointed chairman of Lotus Development.

July 16, Wednesday: Kelly D. Brownell, G. Alan Marlatt, Edward Lichtenstein, and G. Terence Wilson's "Understanding and Preventing Relapse" in American Psychologist assembled findings from many studies of addictive behaviors.

Robert S. Wyer's and Thomas K. Srull's "Human Cognition in Its Social Context" in Psychological Review.

Reid Hastie's and Bernadette Park's "The Relationship Between Memory and Judgment Depends on Whether the Judgment Task is Memory-Based or On-Line" in Psychological Review.

A news item relating to the development of ELECTRIC WALDEN technology: The first Freenet (Cleveland) came online under the auspices of the SoPAC Society for Public Access Computing. (Later, in 1989, Freenet program management would be assumed by the NPTN National Public Telecomputing Network.)

August: News items relating to the development of ELECTRIC WALDEN technology:

- Intel shipped the 80386.
- Microsoft announced Works for the Macintosh.
- Information Week reported that Frame Technology had been founded and would be offering a hypertext application package “FrameMaker” for UNIX-based machines such as Sun SPARCstations and Apollo Domains and NeXT magnesium cubes. The magazine related that Charles Corfield had been studying astronomy at Columbia University and had talked his way into a loaner Sun workstation as part of the Catalyst program and had written a 1st, demo version of this application package because he needed something better than was then available for doing his dissertation. This was his first C program and he had showed it on the West Coast, where he had hooked up with music major David Murray, venture capitalist Steve Kirsch (who had a few million bucks hanging around after founding Mouse Systems and cashing out), and Vickie Blakeslee who had been with Kirsch at Mouse Systems, to bring his creation into wider use. David Fuchs, who had been a major implementer of TeX at Stanford, would be the 1st employee hired after the founding, making him the 5th person in the company. (When I would purchase the original NeXT magnesium cube sold in Minnesota, it would be because I could afford it whereas I could not afford an engineering workstation such as Sun or Apollo, and because it could run this FrameMaker application package (there was no third reason). I had to have this particular application package because it was the only one that could at that time do hypertext in multiple windows – which is to say, it was the only hypertext offering then being offered that was anything more than a ridiculous toy.)

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

September: News items relating to the development of ELECTRIC WALDEN technology:

- Compaq Computer introduced the 1st 16-MHz Intel 80386-based PC, the Compaq Deskpro 386.
- Apple Computer introduced the Apple IIGS, with the Apple 3.5 drive, for US$1000. It used the Western Digital Center W65C816 (65816) microprocessor, operating at 1-MHz or 2.8-MHz.
- Apple Computer released AppleWorks 2.0.
- Apple Computer introduced the Apple 3.5 drive for the Mac and the Apple IIGS.
- IBM announced the IBM PC-XT Model 286, with 640KB RAM, 1.2MB floppy drive, 20MB hard drive, serial/parallel ports, and keyboard for US$4,000.
- Quarterdeck Office Systems shipped DESQview 1.3.
- Steve Jobs decided to use the ill-fated erasable optical disk drives for the 1st NeXT machine.

"If you wish to make an apple pie from scratch, you must first invent the universe."

— *Carl Sagan*

October: News items relating to the development of ELECTRIC WALDEN technology:

- WordPerfect shipped WordPerfect 4.2 for US$500.
- Microsoft announced Microsoft Word v3.0 for the Macintosh.
- Ashton-Tate shipped the one millionth copy of dBASE.

November: A news item relating to the development of ELECTRIC WALDEN technology: Lotus Development released a French version of Lotus 1-2-3 v2.0 in France.

December: News items relating to the development of ELECTRIC WALDEN technology:

- PageMaker was released for the PC.
- WordPerfect shipped for the Apple IIgs, for US$180.

1987

News items relating to the development of ELECTRIC WALDEN technology:

- The NSF signed a cooperative agreement to manage the NSFNET backbone with Merit Network, Inc. (IBM and MCI involvement would be through an agreement with Merit). Merit, IBM, and MCI would later found ANS.
- UUNET, which had begun as an experiment by Rick Adams and Mike O'Dell, obtained Usenix funding and began to provide commercial UUCP and Usenet access.
- The 1,000th RFC was issued: "Request For Comments reference guide."
- The number of Internet hosts broke the round number 10,000 and the number of BITNET hosts broke the round number 1,000.
- At this point the 3½-inch "pocket size" floppy disk inside its own protective plastic was introduced. It was for some stupid reason ever so slightly too large for the average shirt pocket of that time, but that problem would soon be corrected by the manufacturers of our new nerdshirts. And, just as shirtpocket capacity improved, so also the storage capacity of this new disk would improve, from 720KB to 1.44MB. DOS 3.3 was released to support 3½-inch floppies with 1.44MB of data. A new international character set along with support for 17 countries was included.
- IBM introduced the successor to the PC line, the PS/2 family. These came with 720KB 3½ inch disks on the smaller versions and 1.44Mb 3½ inch disks on the larger ones. MS-DOS 3.3, which came with the PS/2, supported these new formats. It also had more international support and support for serial lines running at 19,200 bits/sec. Like all previous versions, this one too came with a few more utility programs, although still far fewer than UNIX.
- Along with the PS/2 and MS-DOS 3.3, IBM and Microsoft released (late and incomplete) a completely new operating system called OS/2. In the vision of these companies, OS/2 was going to replace MS-DOS. It never would happen. While it had many obvious advantages over MS-DOS, such as actually using all the memory, running in protected mode, and supporting multiprogramming in an elegant way, users were unseduced. In 1991, Microsoft would announce they were dropping OS/2 altogether, which would so anger IBM, that they would drop Microsoft and contract with Apple Computer to provide their future software.
- Windows 2.0 enhanced the appearance of the user interface and improved computer memory management.
- The SmartCard, no bigger than a credit card, contained microprocessors and memory chips, giving it capabilities similar to those of a very dedicated personal computer.
- Prathima Agrawal was the principal inventor of the Microprogrammable Accelerator for Rapid Simulations, which offered vastly increased speed and power to simulate large digital systems.
- As IBM discontinued its IBM PC line, Commodore launched its 1st PC-compatible machines, the PC10-1 and PC10-2 using a 4.77 MHz Siemens 8088.
- Motorola unveiled its 68030 microprocessor.
- U.S. Robotics introduced the Courier HST 9600 modem.
- SGML.
- Reconstruction, by Lauren Sarno, of Theodore Nelson's 1981 publication titled LITERARY MACHINES; THE REPORT ON, AND OF, PROJECT XANADU CONCERNING WORLD PROCESSING, ELECTRONIC PUBLISHING, HYPERTEXT, THINKERTOYS, TOMORROW'S INTELLECTUAL REVOLUTION, AND CERTAIN OTHER TOPICS INCLUDING KNOWLEDGE, EDUCATION AND FREEDOM (that's not the book, it's the title), for republication by Microsoft Press.

- A computer programmed to run through all possibilities exhaustively tested Fermat's Last Theorem and managed to establish that it was correct for every exponent less than 30,000:

$$z = \sqrt[n]{(x^n + y^n)}$$ is false for every *n* between 2 and 30,000.

- IBM introduces its PS/2 family and ships over 1 million units by year end.
- Cray Research introduces the Cray 2S which is 40% faster than the Cray 2.
- ETA Systems introduces its ETA-10 family of supercomputers.
- Sun Microsystems introduces its first workstation based on a RISC microprocessor.
- Apple introduces the Macintosh II and Macintosh SE and HyperCard.
- IBM introduces its Systems Applications Architecture (SAA).
- DEC introduces Vaxstation 2000 workstation computer, and the MicroVAX 3500 and 3600.
- Aldus introduces PageMaker for the IBM PC and compatible computers.
- Compaq reaches a billion dollar in sales in its fifth year of operation.
- Conner Peripherals beats Compaq's first year sales record: $113M vs $111M.
- Computer Associates acquires UCCEL in the largest ever software acquisition ($780M).
- IBM invests in Steve Chen's Supercomputer Systems, Inc.
- Apple spins off its application software business as a separate company and names it Claris.
- Texas Instruments introduced the first AI microprocessor chip.
- The CD-ROM format was introduced into the PC arena. CD-ROM drives cost $1,000; each read-only disk held 650MB of data.

- John Walker, legendary founder of the Autodesk Corporation and still in charge at that point, offered the Xanadu project an opportunity to develop its long-promised software into a full-fledged commercial offering of a universal library and publishing system, if his corporation would be able to utilize the tools developed by the project for its own sharing, distributing, and editing of documents. The result of a year's negotiations between teams of lawyers would be a studied piece of ambiguity and problem-postponement termed "The Silver Agreement." Theodore Nelson ostensibly was to retain all rights to the construction of any royalty-based publication system despite the fact that the Xanadu Operating Company was largely a sub-entity of Autodesk Corporation and despite the fact that these tools were to be used by Autodesk precisely for royalty-based publication. (It'd take a lawyer to justify this to you, and I'm not a lawyer. Autodesk would later "spin off" and totally disaffilate itself from all this.)

January: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft France released a French version of Multiplan 3.0 for the IBM PC.
- Lotus Development filed a lawsuit against Paperback Software (maker of VP-Planner) and Mosaic Software (maker of The Twin), claiming infringement of copyrights over the look and feel of 1-2-3.
- Microsoft began shipping Microsoft Word v3.0 for the Macintosh.
- Apple Computer introduced the Apple Platinum IIe.

February: A news item relating to the development of ELECTRIC WALDEN technology: Commodore announced the Amiga 500 and 2000.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the open architecture Macintosh II. The basic system sold for US$3,900. A system with 1MB RAM, one 800K floppy drive, and a 40MB hard drive was priced at US$5,500. The system features a plug-and-play architecture for expansion cards.
- Apple Computer introduced the expandable Macintosh SE for US$2,900 for a dual floppy system.
- Apple Computer introduced NuBus as the Mac's standard bus.
- U.S. Robotics unveiled its 9600 bps Courier HST modem, for US$995. BBS sysops could purchase the modem for US$495.
- Kaypro lost $19.4 million on sales of $21.8 million. These sorts of losses would drive the company into Chapter 11 bankruptcy proceedings during March 1990.

April: News items relating to the development of ELECTRIC WALDEN technology:

- IBM introduced the IBM Personal System/2 (PS/2) line, with IBM's 1st 386 PC, and 3.5-inch floppy drives as standard. The PS/2 Model 30 used a 8-MHz 8086, the Model 50 and 60 use the 10-MHz 80286, and the Model 80 used a 20-MHz 80386.
- IBM unveiled its Video Graphics Array (VGA) in its Model 50 and higher of the PS/2 line. VGA offers 256 simultaneous colors at a resolution of 320x200, and 16 colors at 640x480. The colors displayed had six bits of depth for each primary color, giving a palette of 262,144 different colors to select from.
- IBM unveiled its Multicolor Graphics Array (MCGA) on its PS/2 Model 30. The MCGA was limited to 64K of memory, limiting 640x480 resolution to just 2 colors, but still allowing 320x200 in 256 colors.
- IBM introduced its Micro Channel Architecture (MCA) on its Model 50 and higher of the PS/2 line.
- IBM and Microsoft announce Operating System/2 (OS/2).
- IBM announced the 8514/A Display Adapter, a high-resolution graphics card for the MCA PS/2 line. The 8514/A added 1024x768 in 16 colors to the standard VGA, at a cost of US$1,290. With the addition of a US$270 Memory Expansion Kit, 640x480 and 1024x768 resolutions could be had in 256 colors.
- IBM announced the 8514 16-inch monitor, for US$1,550.
- IBM announced DOS 3.3 for PCs, for US$120. It added support for 1.44 MB floppy disks, and multiple 32 MB hard drive partitions.
- Microsoft announced Microsoft Windows 2.0.
- IBM shipped TopView 1.12.

May: News items relating to the development of ELECTRIC WALDEN technology:

- PC MOS 1.0 shipped.
- Quarterdeck Office Systems shipped DESQview 2.0.
- Microsoft released Excel 1.04 for the Macintosh II.

June: News items relating to the development of ELECTRIC WALDEN technology:

- IBM withdrew TopView from the market.
- Atari introduced the Atari XE Game System, with 64KB RAM, supporting 256KB game cartridges.
- Microsoft sold its 500,000th mouse.

July: News items relating to the development of ELECTRIC WALDEN technology:

- WordPerfect created an Amiga/Atari division within the company.
- IBM shipped the 1st 8514/A adapters, PS/2 systems, and VGA cards.
- Microsoft acquires Forethought, maker of the PowerPoint presentation graphics program for the Macintosh.
- WordPerfect shipped WordPerfect for the Amiga for US$400.
- Zilog introduced its Z-280 16-bit version of the Z-80 CPU.
- Sun Microsystems introduced its 1st SPARC-based system, the Sun-4/260, with 10 MIPS performance.
- Sun Microsystems offers licenses for its SPARC microprocessor architecture.
- Apple Computer created the company Claris, to handle some of Apple Computer's software for the Apple II and Macintosh.
- IBM shipped the 1st PS/2 Model 80 systems.
- August: IBM introduced the PS/2 Model 25, with an 8-MHz Intel 8086, combined system unit with monitor, no hard drive, and reduced-size keyboard, starting at US$1,350.
- Microsoft shipped MS-DOS 3.3.
- Apple Computer introduced HyperCard, MultiFinder 5.0, and AppleFax Modem for the Macintosh, at the Macworld Expo.
- Tandy introduced the Tandy 1000 TX, 1000 HX, 1400 LT, and 4000.
- The Association of Shareware Professionals (ASP) was formed.

August: An event in the development of ELECTRIC WALDEN: Release of the HyperCard hypertext program in its original form (1.0), with inadequate native linking abilities, inadequate text-markup functionality, and extremely limited search capabilities, for the Macintosh personal computer with the tiny screen that made it impossible to view more than one window at a time.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

September: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft shipped Microsoft Bookshelf, its initial CD-ROM application.
- Lotus Development announced Lotus 1-2-3 for the Macintosh.

October: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft unveiled the Microsoft Excel spreadsheet for Windows.
- Microsoft shipped Microsoft Works for DOS.
- Microsoft released Microsoft Windows/386, priced at US$195.
- Microsoft shipped Windows 2.0.
- Compaq Computer introduced the 20-MHz Compaq Deskpro 386/20 and Compaq Portable 386.
- WordPerfect shipped WordPerfect for the Atari ST for US$400.

- Ven-Tel unveiled its EC18K-34 modem, which it claims could operate at up to 18,000 bps, with data compression achieving a throughput of 19,200 bps on normal voice phone lines. The cost of the modem was US$1,400.
- Ad Lib Incorporated unveiled its Ad Lib Personal Computer Music System for US$245. The card provides FM synthesis with 11 simultaneous voices.
- Microsoft released Microsoft Word 4.0 for the PC.
- Microsoft released Microsoft Word 3.0 for the Macintosh.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Compaq Computer manufactured its millionth PC.
- IBM reported it had shipped a million PS/2 systems.

December: A news item relating to the development of ELECTRIC WALDEN technology:

- Microsoft shipped the one millionth copy of Windows.
- Microsoft released OS/2 1.0.
- IBM shipped 1st copies of OS/2 Standard Edition 1.0.
- Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived!

Host nodes on the Internet

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1995 predicted	5,000,000 estimated

1988

News items relating to the development of ELECTRIC WALDEN technology:

- Tested in Chicago, a digital cellular technology offered better sound quality, much greater channel capacity, and lower cost compared to the existing analog cellular systems.
- PanAmSat launched the 1st privately owned communications satellite.
- Japan conducted the world's 1st large-scale analog-TV broadcast, from the Seoul Olympics.
- Richard Nottenburg and Young-Kai Chen co-invented, with Morton Panish and A.F.J. Levi, the fastest bipolar transistor at that time using a process called gas source molecular beam epitaxy. This multi-layered bipolar transistor could switch on and off 140 billion times a second, 12 times faster than existing versions used in supercomputers.
- Unique light pulses called Solitons were sent through a record-breaking 4,000-kilometer optical fiber without any electronic regeneration.
- Installation of the first transatlantic fiber-optic cable, linking North America and Europe. The 3,148-mile cable can now handle 40,000 telephone calls simultaneously.
- A new programming language let users manipulate photographic images to create unusual pictures.
- The Optimized Material Simulator (ATOMS), a special-purpose computer, simulated the behavior of materials at the atomic level faster than any other on the market at that time.
- In response to the Morris worm incident, a Computer Emergency Response Team (CERT) was formed by DARPA.
- The Department of Defense chose to adopt OSI and consider its reliance on TCP/IP as an interim use.
- The GOSIP US Government OSI Profile defined the set of protocols to be supported by Government-purchased products.
- The Los Nettos network was created by Caltech, TIS, UCLA, USC, and ISI with no federal funding, being instead entirely supported by its regional members.
- The NSFNET backbone was upgraded to T1 standards (1.544Mbps).
- Susan Estrada founded the CERFnet California Education and Research Federation network.
- Jarkko Oikarinen provided Internet Relay Chat (IRC).
- The first Canadian regionals joined NSFNET: ONet via Cornell University, RISQ via Princeton University, and BCnet via the University of Washington.
- FidoNet was connected to the Net, enabling the exchange of e-mail and news.
- Canada, Denmark, Finland, France, Iceland, Norway, and Sweden connected to the NSFNET.
- Optical disks began to be used as general computer storage devices.
- Windows 2.1 enhanced use of personal computer memory and allowed for user customization.
- You don't hear much about this year's DOS 4.0. When the great rush to OS/2 never happened, IBM surprised the industry by bringing out this new version of MS-DOS, which Microsoft later reverse-engineered for distribution to makers of PC clones. This event was widely perceived to be IBM's realization that MS-DOS wasn't going to disappear after all. Instead of killing off MS-DOS, they were enhancing it. One of the big improvements in this release was the support for disks larger than 32MB, something the absence of which in Version 3.3 was becoming a serious problem. Version 4.0 supported disks up to 2GB. Although programs were still restricted to 640K, up to 16MB of extended memory could be used for RAM disk, to increase the performance of the filesystem. Another first with 4.0 was the DOS shell, a menu-driven shell rather than the previous keyboard

oriented ones. All in all, few people were impressed and like MS-DOS 3.2, this version was not widely used.

- Solbourne Computer Incorporated was the 1st to produce a Sun-compatible SPARC-based computer.
- Compaq Computer and other companies formed the "Gang of Nine" to improve on the AT-bus, rather than accept IBM's approach of abandoning it.
- Toshiba introduced the T1600 16-MHz 286 portable.
- Digital Equipment began development of a 64-bit microprocessor. The chip would debut in 1992 as the 150-MHz Alpha 21064.
- W.H. Sim founded Creative Labs, Inc., in California, as a subsidiary of Creative Technology.
- U.S. Robotics introduced the Courier Dual Standard modem, supporting both v.32 and HST protocols, and the Courier v.32 modem. Prices were US$1,600 and US$1,500 respectively.
- Tandy announced Thor CD, an erasable compact disk system for music, video, or data.
- Hewlett-Packard introduced the HP DeskJet inkjet printer at US$1,000.
- DEC introduced VAXstation 8000.
- Cray Research introduced the Cray Y-MP, a $20M supercomputer.
- IBM introduced a new mainframe computer operating system called MVS/ESA.
- IBM announced its long awaited Silverlake mid-range computers called AS/400.
- Motorola announced the 88000, a RISC microprocessor.
- The first graphics supercomputers were announced by Apollo, Ardent and Stellar. These computers are aimed at 3D graphics applications.
- The first PS/2-compatible computers were announced by Tandy, Dell Computer and others.
- Unisys introduced the 2200/400 family to replace its mid-range 1100 series.
- AT&T announced plan to acquire 20% of Sun Microsystems, and that Sun will help AT&T develop the next version of UNIX.
- In response to the AT&T-Sun cooperation, IBM, DEC, HP, Apollo and several other major computer companies formed the Open Software Foundation to set a UNIX counterstandard.
- Sun Microsystems surpassed the $1,000,000,000 sales mark, and introduced 80386-based workstations.
- IBM and Sears joint videotex venture started operation under the PRODIGY name.
- Sematech picked Austin, TX as its headquarters and the consortium would be headed by Robert Noyce.
- A consortium of PC companies led by Compaq introduced the EISA counter standard to IBM's PS/2 MicroChannel bus.
- IBM introduced the ES/3090 S series mainframe computer.
- IBM won a $3,600,000,000 contract to build the next generation air traffic control system.
- Unisys acquired Convergent Technologies for $350,000,000.
- Computer Associates acquired Applied Data Research for $170M from Ameritech.
- Next unveiled its innovative workstation computer which is the first computer using erasable optical disks as the primary mass storage device. IBM license Next's graphics user interface.
- A nondestructive worm spread via the Internet network and brought several thousand computers to their knees.

January: A news item relating to the development of ELECTRIC WALDEN technology: Spectrum Holobyte introduced Tetris, the 1st entertainment software imported from the Soviet Union.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer shipped A/UX for the Macintosh II, Apple Computer's combination of the Mac interface with UNIX.
- Compaq Computer reports sales for the year reach US$1.2 billion, setting the record as the fastest company to reach that mark.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer sued Microsoft and Hewlett-Packard for copyright infringement on its Macintosh OS regarding Microsoft's Windows 2.03 and Hewlett-Packard's NewWave. Are the "look and feel" of a program proprietary?
- The Open Software Foundation was founded.

April: A new item relating to the development of ELECTRIC WALDEN technology: Motorola unveiled the 88000 processor.

April 6, Wednesday: A new item relating to the development of ELECTRIC WALDEN technology: Autodesk Corporation acquired, for roughly US$1,000,000 down, some 80% of Xanadu Operating Company. A research budget was agreed to that amounted to nearly another US$1,000,000 per year, and results, including a fully implemented transclusion mechanism, were promised within 18 months. Said Autodesk founder John Walker at the press release, "Reality isn't enough anymore." (Well, reality has a way of catching up with us, doesn't it?)

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

May: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft released Microsoft Excel 1.5 for the Macintosh.
- Lotus Development shipped the four millionth copy of Lotus 1-2-3.
- Apple Computer contracts with Quantum Computer Services to create the AppleLink - Personal Edition (later renamed America Online).

June: The keel was laid for a new RMS *St. Helena*.

News items relating to the development of ELECTRIC WALDEN technology:

- IBM announced the PS/2 Model 70, as 16-, 20-, and 25-MHz 80386 systems.
- Microsoft shipped Windows 2.1 as Windows/286 and Windows/386.
- Microsoft released MS-DOS 4.0, including a graphical/mouse interface.
- Intel introduced the 80386SX, like the 80386 but with a 16-bit data bus.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Lotus Development shipped Agenda
- IBM shipped OS/2 Extended Edition 1.0
- IBM shipped DOS 4.0 that added a shell menu interface and support for hard disk partitions greater than 32 MB

Ted Kaczynski wrote to Mental Health Services Inc. in Helena, Montana asking for mental help. Unable to afford the trip from his remote Montana cabin, he needed the sessions to be by correspondence.

> Actually, I'd even PREFER to handle it this way because, in writing, I can express what I have to say much more precisely, clearly, and completely than I can in speaking.

July-October: A news item relating to the development of ELECTRIC WALDEN technology: Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

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1995 predicted	5,000,000 estimated

September: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the Apple IIc Plus for US$1,100.

- IBM introduced the IBM PS/2 Model 30 286, using the AT-bus. It features a 10-MHz 286, 512KB RAM, VGA, and 20MB hard drive.
- Claris released AppleWorks 2.1.
- 61 companies support the formation of the EISA Extended Industry Standard Architecture. Companies included Compaq Computer, AST, Epson, Hewlett-Packard, NEC Technologies, Olivetti, Tandy, Wyse, Zenith, Microsoft.
- Apple Computer introduced the Macintosh IIx computer, using Motorola's 68030 and 68882 processors. It was priced at US$7,770.
- Apple Computer released GS/OS, a 16-bit operating system for the Apple IIGS.
- SPEC was formed, with the aim of producing a benchmark based on a standard set of real-life applications programs.
- Tandy shipped the 1st MCA-bus-based clone PC, the Tandy 5000 MC.
- Compaq Computer introduced its 1st laptop PC with VGA graphics, the Compaq SLT/286. It had a 12-MHz 286, 640KB RAM, 20-40MB hard drive, 3.5-inch disk drive, and built-in 10-inch grayscale LCD VGA screen. Price was up to US$5,800.

October: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer and Quantum Computer Services launched the AppleLink Personal Edition computer network.
- Microsoft and IBM shipped OS/2 1.1 Standard Edition with Presentation Manager.
- Microsoft released OS/2 LAN Manager for networked PCs.
- Steve Jobs unveiled the 1st NeXT computer at the Davis Symphony Hall in San Francisco. For US$6,500 it featured a 25-MHz Motorola 68030 processor and 68882 math coprocessor, 8MB RAM, 17-inch monochrome monitor, 256MB read/write magneto-optical drive, and a NextStep operating system that was truly object-oriented.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Ashton-Tate sued Fox Software and Santa Cruz Operations for infringing copyrights on the Dbase language.
- Microsoft released MS-DOS 4.01.

November 1, Tuesday: A news item relating to the development of ELECTRIC WALDEN technology: an Internet worm impacted ~6,000 of its 60,000 hosts.

1989

For 18 months, Douglas Engelbart would be directing his Bootstrap Project under the umbrella of Stanford University, laying the groundwork for a multi-corporate Bootstrap Initiative for cooperative advanced research in collaborative knowledge development, including:

- establishing the requirements for an open hyperdocument system
- exploratory pilots in which to co-evolve associated work methods with successive OHS prototypes
- developing strategies for in-house deployment and continuous improvement

The Project would develop a three-day management seminar to communicate the underlying strategic framework for this, to corporate executives.

News items relating to the development of ELECTRIC WALDEN technology:

- The number of hosts on the Internet broke the 100,000 round number.
- RIPE (*Reseaux IP Europeens*) was formed by European service providers to ensure the necessary administrative and technical coordination to allow the operation of the pan-European IP Network.
- The first relays began between a commercial electronic mail carrier and the Internet: MCI Mail through the Corporation for the CNRI National Research Initiative, and Compuserve through Ohio State University.
- The CREN Corporation for Research and Education Networking was formed by merge of CSNET into BITNET.
- The IETF Internet Engineering Task Force and the IRTF Internet Research Task Force came into existence under the IAB.
- AARNET, the Australian Academic Research Network, was set up by AVCC and CSIRO and would be introduced into service as of 1990.
- Clifford Stoll wrote CUCKOO'S EGG, telling a real-life tale of a German cracker group which had infiltrated numerous US facilities
- Australia, Germany, Israel, Italy, Japan, Mexico, Netherlands, New Zealand, Puerto Rico, and the United Kingdom connected to the NSFNET.
- High-Definition Digital Television: Bell Labs teams with Zenith Electronics to develop the next generation of television featuring a sharper picture and improved audio.
- Sunita Bijlani helps develop a digital operator services system that can provide assistance, verify credit cards and set up conference calls.

- Jay Wilpon, Bruce Buntschuh and Michael Brown use spoken commands to interact with SAM, a speech-activated manipulator capable of performing specific tasks.
- Quote from a Lotus Development official, while demoing a new DOS version of Lotus 1-2-3: “We don’t see Windows as a long-term graphical interface for the masses.”
- Hewlett-Packard introduced the HP DeskJet Plus inkjet printer. Price: US$1000.
- SPARC International was formed.
- Creative Labs introduced the Sound Blaster, an 8-bit mono PC sound card.
- NEC Technologies introduced the 4.2-pound NEC UltraLite laptop PC.
- Sun Microsystems announced the 12.5 MIPS 20-MHz SPARCstation 1 for a base price of US$9000.
- Intel unveiled the i860 chip.
- The Personal Computer Memory Card International Association (PCMCIA) was formed, to develop a memory card standard for PCs.
- Data General unveiled its Aviion workstation line, based on the Motorola 88000.
- Mission Cyrus introduced the Darius ProPortable, the 1st PS/2-compatible portable microcomputer.
- Atari Computer introduced the Portfolio, a 1-pound DOS-based PC. It used a 4.92-MHz 80C88 processor, 240x64 resolution screen, and runs on three AA batteries. Price: US$400.
- Zenith Data Systems introduced the Zenith MinisPort, a 6-pound laptop computer.
- MicroPro International changed its name to WordStar International.
- Tim Berners-Lee took his Enquire utility public, by proposing that it be used to link all CERN’s documents for all its staff. His boss at least authorized the procurement of a NeXT workstation on which Tim might develop his first web servers. Tim began to develop HTML markup language, HTTP transfer protocol, and the URL individual resource locator for identifying documents. He wrote server software and a graphical user interface of sorts, a browser. He named all this the WWW.
- Solbourne Computer introduced the first Sun 4-compatible computer.
- DEC announced a workstation using Mips Computer’s RISC microprocessor.
- Microsoft bought a 20% stake in Santa Cruz Operation, a major UNIX software developer.
- Intel announced the 80486 microprocessor and the I860 RISC/coprocessor chip. Both chips had over one million transistors.
- Hewlett-Packard acquired Apollo for $476M.
- Sun Microsystems introduced its SPARCstation, a low-end RISC workstation with an entry price of only $9,000.
- Control Data discontinued its ETA supercomputer subsidiary.
- IBM announced the Officevision software using the SAA protocol, which ran on PS/2s, PS/2 LANs, AS/400 and mainframe computers.
- Cray restructured itself into two companies: Cray Research which continued with its current business and Cray Computer Corp. headed by Seymour Cray, which would develop a gallium arsenide-based supercomputer.
- NeXT sold a 16.6% share to Canon for $100,000,000.
- Seagate bought Control Data’s Imprimis disk drive subsidiary for $450,000,000.
- Computer Associates acquired Cullinet for $333,000,000.
- Prime Computer agreed to be bought by a J.H. Whitney-formed company, ending a long and acrimonious takeover battle by MAI Basic.
- Apple introduced its long awaited portable Macintosh.
- The worldwide number of computers in use surpassed 100,000,000 units.
- Poqet announced the first pocket sized MS-DOS compatible computer.

- Grid introduced a laptop computer with a touch sensitive pad that recognizes handwriting—the GridPad.
- The number of computers in the U.S. exceeded 50,000,000 units.
- The battery-powered notebook computer became a full function computer including hard and floppy disk with the arrival of Compaq's LTE and LTE/286.
- Digital Equipment extended the VAX-family into the mainframe arena with the VAX 9000.
- The first EISA-based personal computers arrived.
- The first 80486-based computers were introduced.
- Dun & Bradstreet acquired MSA in a major software acquisition worth $333,000,000.

"I liked the idea that a piece of information is really defined only by what it's related to, and how it's related. There really is little else to meaning. The structure is everything.... The brain has no knowledge until connections are made between neurons. All that we know, all that we are, comes from the way our neurons are connected."

— Tim Berners-Lee, WEAVING THE WEB: THE ORIGINAL DESIGN AND ULTIMATE DESTINY OF THE WORLD WIDE WEB BY ITS INVENTOR (1999)

January-July-October: A news item relating to development of ELECTRIC WALDEN technology:

- Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

DATE	NODES
May 1969	4
October 1969	5
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June 1974	62
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Host nodes on the Internet

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April 1993	1,486,000
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October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

January: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the Macintosh SE/30, with MS-DOS and OS/2 disk compatibility, for US$4,370.
- Digital Equipment introduced its 1st RISC-based workstation, the DECstation 3100, using the 16.7-MHz R2000 MIPS Technologies processor.
- Microsoft released Quick Pascal, designed to compete with Borland International's Turbo Pascal.

February: A news item relating to the development of ELECTRIC WALDEN technology: Santa Cruz Operations announced the Open Desktop user interface for 80386-based UNIX systems.

March: A news item relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced its Macintosh IIcx for US$5,370.
- Microsoft released Microsoft Word v4.0 for the Macintosh.
- A judge ruled that Microsoft Windows 2.03 was not covered in the Apple Computer / Microsoft 1985 agreement. This allowed the issue to proceed to trial, in the suit of Apple Computer against Microsoft that had been filed in March 1988.

March: The World Wide Web began at CERN (European Laboratory for Particle Physics) in Geneva, Switzerland when Tim Berners-Lee proposed a global hypertext project to allow people to work together by combining their knowledge in a "web" of hypertext documents. What Tim initially proposed was a simple scheme that would incorporate various databases of information, already available at CERN but stored on several different servers, into one accessible virtual space, using hypertext to provide a standardized user interface. In the late 1980s, CERN joined the Internet. Tim would go on to write the first WWW server and the first client, a wysiwyg hypertext browser/editor. He would begin this work in October 1990, with the actual program "WorldWideWeb" first being made available within CERN in December, and on the Internet during the summer of 1991.

Tim's original NeXT box, which hosted the very first website, would eventually be put on display in the foyer of the main admin building in CERN, in a glass case.

Spring: A news item relating to the development of ELECTRIC WALDEN technology: Harris Semiconductor introduced the a 25-MHz version of the 80286. Price was US$142 each in quantities of 1000.

April: News items relating to the development of ELECTRIC WALDEN technology:

- The VESA standard emerged, providing a uniform method of accessing SuperVGA chipsets.
- Microsoft shipped SQL Server.

- Intel introduced the 80486 microprocessor at Spring Comdex in Chicago. It integrates the 80386, 80387 math coprocessor, and added a primary cache. It used 1.2 million transistors. Initial price was US$900.
- Intel introduced the 33-MHz version of the 80386 microprocessor and 80387 numeric co-processor.
- Motorola announced the 68040 microprocessor.
- Motorola announced the 50-MHz version of the 68030 microprocessor.

May: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft released Microsoft Excel 2.2 for the Macintosh. It could handle spreadsheets up to 8 MB in size.
- Hewlett-Packard bought workstation maker Apollo Computer for US$476 million.
- Solbourne Computers Incorporated was the 1st to announce a line of SPARC-based Sun-compatible computers.
- Apple Computer announced details of the System 7.0 Macintosh operating system.

June: News items relating to the development of ELECTRIC WALDEN technology:

- IBM introduced the Office Vision system.
- Claris released AppleWorks 3.0.
- Lotus Development released Lotus 1-2-3/3 for the PC, two years after its initial announcement.
- Apricot Computers announced the 1st 486-based PC, in London, England. The VX FT system used the 25-MHz Intel 80486 chip, IBM's MCA bus, and was priced starting at US$18,000.

July: A news item relating to the development of ELECTRIC WALDEN technology: AT&T and Intel signed an agreement to produce 386-based PCs.

August: A news item relating to the development of ELECTRIC WALDEN technology: Britain's Apricot Computers produced the 1st PC based on the 25-MHz Intel 80486 chip.

September: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer announced the Macintosh Portable.
- Apple Computer announced the 25-MHz Macintosh IIci.
- IBM released OS/2 1.2.
- Hewlett-Packard announced a US$3990 UNIX workstation based on the Motorola 68030.
- NeXT shipped the 1st NeXT Computer systems.
- NeXT released NextStep v1.0.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

October: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft released Microsoft Excel for OS/2's Presentation Manager. This was the 1st major application available for PM.
- Compaq Computer introduced its 1st notebook PC, the Compaq LTE.
- SPEC released version 1.0 of its SPEC Benchmark Suite.
- IBM signed a deal with NeXT to license the NextStep operating system.

November: News items relating to the development of ELECTRIC WALDEN technology:

- At the autumn Comdex IBM had strongly endorsed Windows for low end PCs, and at this point Microsoft publicly endorsed OS/2 as the future platform for higher-end PCs. IBM and Microsoft agreed to jointly develop a consistent full range of systems software.
- Compaq Computer introduced its 1st server PC, the Compaq Systempro. This was also the 1st EISA PC.

December: News items relating to the development of ELECTRIC WALDEN technology:

- IBM demonstrated its new line of RISC System/6000 workstations.
- Xerox filed a lawsuit challenging the validity of Apple Computer's copyrights covering the Lisa and Macintosh computers' graphical user interface.

1990

A news item relating to the development of ELECTRIC WALDEN technology: In the decade of the 1990s, object-relational databases would begin to be developed.

News items relating to the development of ELECTRIC WALDEN technology:

- Lotus won its look-and-feel lawsuit against Paperback Software's spreadsheet program.
- The DEC Digital Equipment Corporation introduced a fault-tolerant VAX computer.
- Cray Research unveiled its Y-MP2E, an entry-level supercomputer with a starting price of $2.2M.
- The Motorola Corporation announced a new line of single-chip RISC processors, the 1st of which was be the 88110.
- Motorola introduced the 68040 microprocessor.
- The IBM International Business Machines Corporation introduced its 10-MHz 80286-based IBM PS/1 systems, with built-in VGA and monitor, at between US$1,000 and US$2,000.
- IBM announced its RISC Station RS/6000 family of high performance workstations.
- IBM shipped the PS/1, a computer for consumers and home offices.
- IBM announced System 390 (code name Summit), its mainframe computer for the 1990s.
- Microsoft, IBM, Tandy, AT&T, and others announced their consensus hardware and software spec for a multimedia platform.
- Microsoft introduced Windows 3.0.
- Microsoft's fiscal year revenue ending 6/30/90 exceeded one billion dollars.
- The intel Corporation launched a parallel supercomputer using over 500 860 RISC microprocessors.
- NCR abandoned its proprietary mainframes in favor of systems based on single or multiple intel 486 and successor microprocessors.
- The 2.0 version of Apple's HyperCard removed a number of the irritating inadequacies of the original hypertext program.
- Apple Computer introduced its low-end Macintoshes, the Classic, the LC, and the IISI.
- Apple Computer's AppleLink/Personal Edition was expanded and renamed "America Online."
- The first SPARC-compatible workstations were introduced. Sun Microsystems introduced its SPARCstation 2.
- The ARPANET was phased out.
- Free-space optical switching: A working example of the basic optical hardware required for photonic switching fabrics.
- A Speech-driven robot tool for research in speech recognition and machine intelligence understood and responded to conversational English.
- Mitch Kapor founded the EFF Electronic Frontier Foundation.
- Peter Deutsch, Alan Emtage, and Bill Heelan of McGill University released their "Archie" search software package.
- Peter Scott of the University of Saskatchewan released his Hytelnet.
- World.std.com came online as the 1st commercial provider of Internet dial-up access.
- The ISO Development Environment (ISODE) provided for OSI migration for the Department of Defense, by enabling OSI applications to operate over TCP/IP.

- Argentina, Austria, Belgium, Brazil, Chile, Greece, India, Ireland, South Korea, Spain, and Switzerland connected to NSFNET. 10 regional Canadian networks linked into CA*net, a national backbone directly connected to NSFNET.
- The 650MB data CD-ROM was introduced, as a spin-off of the consumer audio product known as the CD or Compact Disk which had at this point rendered vinyl LPs all but obsolete.
- The CDR CD-Recordable drive was introduced, initially at around $25,000.
- US Robotics introduced the Courier v.32bis modem.
- NewTek's hardware/software package, the Video Toaster, for US$1,600 turned the Amiga into a sophisticated, broadcast-quality video-editing system. This Internet Toaster (controlled via SNMP), made its debut at Interop as the 1st remotely operated machine to be hooked up to the Internet.
- Hewlett-Packard's introduction of the LaserJet IIP broke the US$1,000 street-price barrier.
- Xerox destroyed the distinction between copying and printing with its Docutech 135 "digital" copier merging the technologies for making copies of existing documents and for the printing of original documents. Attached to a computer, this device functioned both as copier and as printer.
- The INMOS T-9000 processor, designed for parallel computing in the Transputer architecture.
- INTV Corporation discontinued production of its Intellivision.
- Austin Meredith got funding to purchase, from the Minnesota Supercomputer Center, a used surplus black-and-white UNIX workstation capable of hypertext, with magneto-optical storage.

- Tim Berners-Lee wrote the specs for the HTML hypertext markup language, plus the HTTP hypertext transfer protocol, plus a precursor of the URL uniform resource locator, and at Christmastime he made his little present to the world of his linking of files over the Internet by means of hypertext, including his notion of "browsing" — the Wide World Web was born!

"I liked the idea that a piece of information is really defined only by what it's related to, and how it's related. There really is little else to meaning. The structure is everything.... The brain has no knowledge until connections are made between neurons. All that we know, all that we are, comes from the way our neurons are connected."

— Tim Berners-Lee, WEAVING THE WEB: THE ORIGINAL DESIGN AND ULTIMATE DESTINY OF THE WORLD WIDE WEB BY ITS INVENTOR (1999)

January: News items relating to development of ELECTRIC WALDEN technology:

- Motorola announced the availability of its 32-bit 25-MHz microprocessor, the 68040.
- The 68040 incorporated 1.2 million transistors, integrated the FPU, and included instruction and data caches.
- Apple Computer discontinued the Macintosh II.
- Sun Microsystems signed an agreement to transfer the SPARC trademark to SPARC International.
- Hayes Microcomputer Products won a US$1,400,000 lawsuit against Everex, Ven-Tel, and Omnitel regarding the validity of Hayes' patent on the +++ escape sequence.

March: A news item relating to the development of ELECTRIC WALDEN technology: Apple Computer introduced the 40-MHz Apple Macintosh IIfx.

April: A news item relating to the development of ELECTRIC WALDEN technology: Microsoft introduced Russian MS-DOS 4.01 for the Soviet market.

May: News items relating to the development of ELECTRIC WALDEN technology:

- The lawsuit of Xerox against Apple Computer regarding use of Xerox's graphical user interface was thrown out of court.
- Toshiba unveiled the 1st SPARC laptop, the SPARC LT.
- Digital Research released DR DOS 5.0.
- The PCMCIA card specification v1.0 was released.
- FrameMaker 2.0 for the Mac (Frame 3 would be the first Windows version, a couple years later).

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

May 22, Tuesday: A news item relating to the development of ELECTRIC WALDEN technology: Microsoft released Windows 3.0, spending $3,000,000 for opening-day marketing, as part of a $10,000,000 promotional campaign.

June: News items relating to the development of ELECTRIC WALDEN technology:

- A US District Court judge rules that Paperback Software's duplicating the menu interface of Lotus 1-2-3 was a violation of copyright (this "look and feel" lawsuit had been filed in 1987).
- Jon Shirley resigned as President of Microsoft. He was replaced by former Boeing executive Michael Hallman.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft's sales revenues hit US$1 billion for the past year, the 1st personal computer software company to do so.
- Lotus Development filed lawsuits against Borland International (maker of Quattro) and Santa Cruz Operations (maker of SCO Professional) claiming copyright infringement of the Lotus 1-2-3 spreadsheet software.
- Acer Incorporated bought Altos Computer Systems for US$94 million.

August: A news item relating to the development of ELECTRIC WALDEN technology: Gilbert Hyatt was granted a basic patent on the microprocessor, 20 years after his 1st application for the patent.

September: News items relating to the development of ELECTRIC WALDEN technology:

- IBM and Microsoft ended cooperative work on operating systems, dividing up work-to-date between them.
- NeXT announced the NeXTstation.
- Apple Computer discontinued the Apple IIc Plus.

October: News items relating to the development of ELECTRIC WALDEN technology: Tim Berners-Lee began writing the first WWW server and the first client, a wysiwyg hypertext browser/editor which would run in the NeXTStep environment, in implementation of the proposal he had made in March 1989 for a global hypertext project to allow people to work together by combining their knowledge in a "web" of hypertext documents. The actual program "WorldWideWeb" would first be made available within CERN in December, and on the Internet at large in the summer of 1991.

Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

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May 1969	4
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July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000

Host nodes on the Internet

DATE	NODES
1995 predicted	5,000,000 estimated

October: News items relating to the development of ELECTRICWALDEN technology:

- Apple Computer discontinued the Mac Plus, Mac SE, Mac SE/30 and Mac IIx.
- Apple Computer unveiled the Macintosh Classic for US$1000, the Macintosh LC, and the Macintosh IIsi.
- IBM introduced the XGA MCA graphics card, as a replacement for VGA. Resolutions of 640x480 and 1024x768 were supported, with up to 65,536 colors in the 640x480 mode. At the same time, IBM joined the VESA group, making the XGA specification publicly available.
- Advanced Micro Devices officially acknowledges that it was working on cloning Intel's 386 CPUs.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Michael Spindler became president of Apple Computer.
- AT&T made a US$6 billion hostile takeover bid for NCR.
- LSI Logic announced the availability of SparcKIT, a SPARC chipset at speeds of 20-MHz and 25-MHz.
- Sun Microsystems unveiled its SPARCstation 2 series, starting at roughly US$20,000.

December: News items relating to the development of ELECTRIC WALDEN technology:

- Ashton-Tate's lawsuit regarding the copyright on the Dbase language was dismissed in court.
- Advanced Micro Designs produces its 1st clone chips of Intel's 386, at speeds of 20, 25, and 33-MHz.
- Tim Berners-Lee's WWW server and its client, a wysiwyg hypertext browser/editor, was at this point first made available within CERN, the European Laboratory for Particle Physics.

1991

News items relating to the development of ELECTRIC WALDEN technology:

Data Storage

Year	Capacity	Cost per MB
1956	5 MB	$10,000.00
1991	145 MB	$5.23
1997	2.65 GB	$0.10

- Microsoft was rolling out DOS 5.0 when the US Federal Trade Commission began to investigate its allegedly monopolistic practices in the software market. Aaron Goldberg of International Data Corporation commented: “I don’t know if anyone has tried to run Windows on a 286 machine, but frankly I’d rather have knitting needles in my eyes.”
- S3 introduced the 911 graphics chip, incorporating GUI acceleration with VGA compatibility.
- Commodore introduced the Amiga 3000UX, with a Motorola MC68030 25-MHz processor, 68882 math coprocessor, UNIX System V Release 4, Open Look, and Ethernet support. Cost was US$5,000 without a monitor.
- MIPS Technologies introduced the 64-bit R4000 RISC processor.
- HP introduced its RISC-based 9000 Series 700 workstations.
- Creative Labs introduced its Sound Blaster Pro Deluxe, the 1st stereo PC sound card.
- Using a “whispering gallery” mode named after the sound effect noted in some European cathedrals, Sam McCall designed the world’s smallest semiconductor Microlaser.
- Scott Hinton led a team that built the 1st photonic switching fabric, bringing light-based switching technology in telecommunications networks closer to reality.
- Notebook PCs were introduced by most PC vendors. The 1st general purpose pen-based notebook computers were introduced, and Go Corporation released its PenPoint operating system for pen-based computers.
- Advanced Micro Devices introduced its AMD 386 microprocessor to compete with the intel Corporation’s 386 chips. The intel Corporation introduced its 486SX, a lower-priced 486 chip.
- Compaq led a group of 21 companies to launch the ACE Advanced Computing Environment, a new standard for high-end PCs and workstations.
- AT&T acquired NCR for $7,400,000,000.
- AT&T/NCR acquired Teradata for $520,000,000.
- IBM has its 1st revenue decline in 45 years (many major computer companies, such as Compaq, DEC, Lotus, and Unisys, were operating at a loss, primarily due to work force reduction costs). IBM reorganized into more autonomous business units, with several divisions becoming wholly owned subsidiaries. Apple and IBM combined for two joint ventures: Kaleida would develop multimedia products while Taligent would develop object-oriented operating software.
- Apple introduced its PowerBook notebook and Quadra Macintosh PCs.
- Apple introduced its System 7.0 operating system for the Macintosh.

- Wang began to resell IBM PS/2, RS/6000 and minicomputers. IBM would invest $100M in Wang.
- There were major changes among PC dealers as ComputerLand acquired Nynex's computer stores, CompuCom acquired Computer Factory, ValCom and Inacomp merged, JWP bought Businessland, and Intelligent Electronics acquired BizMart.
- Borland purchased Ashton-Tate for $440M.
- SunSoft, a Sun Microsystems subsidiary, announced Solaris (a UNIX operating system for SPARC workstations and 386/486 PCs).
- The Bell companies received permission to enter the on-line information services market.
- Wavetracer introduced its Zephyr massively parallel computer system, with up to 8,192 processors.
- After the NSF lifted its restrictions on commercial use of the Net, CIX, the Commercial Internet eXchange Association, Inc. was formed by General Atomics (CERFnet), Performance Systems International, Inc. (PSInet), and UUNET Technologies, Inc. (AlterNet).
- Brewster Kahle's WAIS Wide Area Information Servers were released by Thinking Machines Corporation.
- The "Gopher" search and retrieval software package was released by Paul Lindner and Mark P. McCahill of the University of Minnesota.
- Philip Zimmerman released his PGP Pretty Good Privacy encryption package.
- The US High Performance Computing Act (Gore 1) established the National Research and Education Network (NREN).
- The NSFNET backbone was upgraded to T3 condition (44.736Mbps). In this year NSFNET traffic passed 1 trillion bytes/month and 10 billion packets/month
- The JIPS JANET IP Service started up, signalling the changeover from Coloured Book software to TCP/IP within the UK academic network (IP was initially "tunnelled" within X.25).
- Croatia, Czech Republic, Hong Kong, Hungary, Poland, Portugal, Singapore, South Africa, Taiwan, and Tunisia connected to the NSFNET.
- Austin Meredith got funding to purchase an early hypertext word processor software offering that was capable of multiple windows (*i.e.*, by contrast with HyperCard, not a toy).

- The new generation of programmers hired from Xerox PARC by the Xanadu Operating Company were uncomfortable with the C code full of kludges and history that had been developed over the previous decade, and began again with a prototype written in the SmallTalk language with plans to implement this prototype in C++ code. The problem, as John Walker would explicate it later, is that in the real world working software is never to be developed out of big-think schemes in one fell swoop. These big-think schemes are implementable, by way of contrast, if they are implementable at all, **only** by a process of **iteration** involving **actual use** and **feedback** and **correction** not only to the implementation techniques but also to the plans themselves. In the real world unrestrained rationality only takes one so far and no further.

"Intelligence is a kludge."
— Marvin Minsky

January-July-October: A news item relating to development of ELECTRIC WALDEN technology (something going on which eventually would mean that you could go to a cabin without being terminally deprived):

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January 1994	2,217,000
1995 predicted	5,000,000 estimated

January: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer discontinued the Mac Portable.

- RDI announced the availability of Mac emulation software for SPARC systems.
- A judge rules that Mosaic Software infringed on Lotus Development's copyrights on Lotus 1-2-3.
- Sun Microsystems began shipping the SPARCstation 2.
- Compaq Computer reported its 1st billion dollar quarter.
- Microsoft released Microsoft Excel for Windows 3.0.
- After a year of delays due to technical difficulties, Motorola's 68040 microprocessor became available.

February: A news item relating to the development of ELECTRIC WALDEN technology: MIPS Technologies unveiled the R4000 RISC processor architecture.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer discontinued the Macintosh IIcx.
- IBM spun off its entire printer and typewriter division to a New York investment firm. The company Lexmark was born.
- NeXT announced availability of its Nextstation color computers for US$8000.
- Advanced Micro Devices released their 386DX/40 CPU.
- Microsoft announced the Microsoft BallPoint Mouse, incorporating mouse and trackball technology in a pointing device for laptop computers.

April: News items relating to the development of ELECTRIC WALDEN technology:

- Intel's debut of the i486SX chip, initially at 20-MHz, and its i487SX math coprocessor. (The i486SX had been like the 486, but without the math coprocessor.)
- The December 1990 dismissal of Ashton-Tate's lawsuit was reversed.
- The Advanced Computing Environment (ACE) Initiative was created by a consortium of 21 companies.
- NeXT shipped the NeXTstation and the NeXTstep v2.0 operating system.
- DOS 5.0 was released. The most important thing it offered was memory management. It was the first version that made any serious use of the extended memory of which many 286 and 386 owners had several megabytes. Although it still had the restriction that programs could not exceed 640K, at least it had the ability to locate most of MS-DOS itself in extended memory, so about 600KB of the lower 640KB was now available for user programs. In addition, user written device drivers could also be put into extended memory. MS-DOS 5.0 also had the ability to use the memory between 640KB and 1Mb on 386 machines for device drivers and certain utilities, thus freeing up more of the lower 640K. It also came with some new commands and had the ability to generate macros. It enhanced the DOS Shell utility, to have multiple programs in memory at once, with the user switching between them using the CTRL-ESC keys. Command line editing became possible. Version 5.0 also came with an extensive HELP facility. In addition, many commands and utility programs were upgraded. For example, the dreadful line editor, edlin, was finally replaced by a screen editor. Finally, for the first time MS-DOS 5.0 could be purchased in stores. (Previous versions were only sold to computer vendors who delivered them with their machines.)

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

May: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer released its System 7.0 Macintosh operating system, two years late, for US$100.
- Apple Computer released the Apple Stylewriter, a modified Canon BubbleJet inkjet printer, using new TrueType font technology.
- Apple Computer announced QuickTime software, for integration of dynamic media for Macintosh computers.
- AT&T and NCR signed a merger agreement.
- Microsoft announced Microsoft Visual BASIC for Windows.
- Businessland posted a loss of US$43,000,000 and filed for Chapter 11 bankruptcy protection.

June: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft DOS 5.0 was released. It added a full-screen editor, undelete and unformat utilities, and task swapping. GW-BASIC was replaced with Qbasic, based on Microsoft's QuickBASIC.
- Intel introduced its 50-MHz 486 chip.
- Tandy introduced its low-cost CD-ROM drive for PCs. At US$400, including drive and controller card, it was about half the price of other drives.

Summer: News items relating to the development of ELECTRIC WALDEN technology:

- Ad Lib announced the Ad Lib Gold series of PC sound cards at the Consumer Electronics Show in Chicago.
- Tim Berners-Lee and his co-worker Robert Cailliau were allowed by CERN to make their Web software available on the Internet for free. At this early point there were about 10 WWW clients. Through the next couple of years, as this Web technology became more and more popular, Tim's initial ideas of URLs, HTTP, and HTML would of course be being refined.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Sega of America shipped the Time Traveler holographic video game to arcade centers.
- Apple Computer and IBM sign a technology sharing agreement, to integrate the Mac into IBM's enterprise systems, to allow future RISC-based Macs to use IBM's Power PC chip, to work

together on common multimedia standards, and to cooperatively produce a new object-oriented operating system.
- Borland International bought database competitor Ashton-Tate for US$440 million.
- Microsoft vice president Brad Silverberg quote: DOS would be "with us forever. We've learned how passionate people were about DOS.".
- Sun Microsystems introduced the SPARCstation ELC, and the SPARCstation IPX.
- Microsoft changes the name of OS/2 v3.0 to Windows NT.

August: News items relating to the development of ELECTRIC WALDEN technology:

- Symantec acquires Zortech Inc., maker of C++ compilers for DOS, Windows, OS/2, Macintosh, and UNIX.
- The ban on business was lifted on the Internet.

September: News items relating to the development of ELECTRIC WALDEN technology:

- Digital Research Inc. released DR DOS 6.0, for US$100.
- Apple Computer, IBM, and Motorola agree to develop PowerPC, PowerOpen, and a Taligent operating system.
- The PCMCIA card specification v2.x was released.

October: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer, Motorola, and IBM officially sign an accord on technology sharing. Apple and IBM would jointly develop the PowerOpen Specification, based on IBM's AIX operating system.
- Apple Computer launches the largest product introduction in its history. Products include the Macintosh Classic II (replacing the Macintosh Classic), Macintosh Quadra 700 and 900, and Macintosh PowerBook 100, 140, and 170.
- MIPS Technologies officially introduced the R4000, its 64-bit RISC processor.
- Quote from IBM's Lee Reiswig: "We will be enhancing OS/2 until the late 1990s."
- Insite Technology began shipping its 21 MB 3.5-inch floppy disk drive to system vendors. The drive used "floptical" disks, using optical technology to store data.
- Sun Microsystems began licensing the new chipset used in the SPARCstation 2.

November: News items relating to the development of ELECTRIC WALDEN technology:

- IBM and Intel signed a 10-year joint development agreement to create a series of integrated processors.
- Microsoft announced the Multimedia Edition of Microsoft Works 2.0 for Windows, on CD-ROM.

December: A news item relating to the development of ELECTRIC WALDEN technology: Apple Computer shipped QuickTime 1.0.

1992

Henry Petroski's THE EVOLUTION OF USEFUL THINGS.

News items relating to the development of ELECTRIC WALDEN technology:

- The number of Internet hosts passed the round number of 1,000,000. The ISOC Internet Society was chartered. In response to the sort of question which one might imagine, Peter Deutsch commented that the Internet was six months from completion — and always would be. The IAB was reconstituted as the Internet Architecture Board and became part of the Internet Society. Rick Gates initiated the Internet Hunt.
- Cameroon, Cyprus, Ecuador, Estonia, Kuwait, Latvia, Luxembourg, Malaysia, Slovakia, Slovenia, Thailand, and Venezuela connected to the NSFNET.
- The University of Nevada provided "Veronica," a gopherspace search tool.
- The World Bank came online.
- A programming team at NCSA (National Center for Supercomputing Applications) at the University of Illinois began to focus its attention on the Web.
- Novell purchased Digital Research for US$80 million.
- Creative Labs' Sound Blaster 16, a 16-bit stereo PC sound card with Advanced Signal Processor.
- Commodore's Amiga 600: 4096 colors, stereo sound, full preemptive multitasking operating system (Workbench 2.05), PCMCIA slot, and Motorola 68000 CPU for a base price of $500.
- Hewlett-Packard's LaserJet 4 laser printer.
- Seiji Ogawa and University of Minnesota researchers unveiled imaging techniques for brain activity.
- Bell Labs reported a novel "Fullerene" compound of carbon and potassium that superconducted at a transition temperature 50% higher than any other molecular superconductor.
- Two general-purpose software components provided automatic on-line retry, enabling other software programs to tolerate faults without shutting down processing.
- Bell Labs and a Japanese telecommunications laboratory tested an in-line 9000-kilometer optically amplified fiber-optic system that had zero errors at a transmission rate of 5,000,000,000 bits/second.
- A near field scanning optical microscopy technique developed at Bell Labs enabled a magneto-optic data storage technique producing data densities of 45,000,000,000 bits/square inch.
- A real-time text-to-speech synthesis system, the Voice English/Spanish Translator, recognized one language as it was spoken and less than a second later "spoke" translated sentences.
- Designers unveil a graphic chip set for personal computers and workstations that provided photographic-image quality based on true-color resolution generated by nearly 17 million hues.
- Eric Betzig, Ray Wolfe, Mike Gyorgy and Jay Trautman, with Pat Finn, developed a magneto-optic data storage technique that could squeeze 45 billion bits of data into a square-inch of disk space.
- Silicon Graphics acquired Mips Computer in a $400M stock swap.
- Sun Microsystems launched the SPARCstation 10 family of workstations.
- IBM invested $100M in Groupe Bull. It released OS/2 Version 2.0 and shipped over 1,000,000 units. It made the IBM PC Co. its subsidiary.
- Compaq announced several new lines of PCs and became a price trendsetter. Its low-price strategy was very successful. It entered the Japanese market with aggressively priced PCs — as much as

50% lower than Japanese PC prices. IBM followed Compaq's strategy and introduced aggressively priced PCs.

- Sears and IBM formed a new venture, Advantis, to compete in the value added network service market.
- Wang Laboratories filed for Chapter 11 bankruptcy protection.
- The DEC Digital Equipment Corporation announced its next-generation computer architecture — the RISC-based Alpha. Ken Olsen resigned from DEC after 25 years at the helm.
- The intel Corporation named its next microprocessor Pentium instead of 586.
- Hewlett-Packard shipped the LaserJet 4, a 600X600 dots per inch laser printer.
- Novell was to acquire the UNIX Systems Laboratory, including Univel, from AT&T, for $350M.
- Microsoft introduced Windows for Workgroup. It introduced Windows 3.1 and shipped nearly 10,000,000 units: Windows 3.1 allowed various Microsoft application programs to work together in "suites," had a built-in screensaver, better ways to organize files, improved fonts and printer drivers, and support for audio and video cards. For the first time it became possible to run Windows, or a particular extra-cost version of Windows, over a network, with E-mail support and file sharing. The core of Apple's lawsuit versus Microsoft Windows was dismissed.
- For the Boston Computer Museum's 1992 Computer Bowl, televised by the show "Computer Chronicles," the West Coast team of five industry panjandrums showed up with bottles of "Jolt" cola laden with caffeine because they had given a lackluster performance in the previous year. Five mavens from East Coast computer firms, overdressed and "playing smug," entered with the slightest of nods to the applause of the audience and faced these five Silicon Valley types. Then Microsoft's wonder child, Bill Gates known to his underlings as "The Bill," haltingly and woodenly read off a question about the 1937 article "As You May Think," in the Atlantic Monthly, by presidential weapons adviser Vannevar Bush. Went The Bill:

> *What word do we now use, to describe the historic proposal made in this article?*

But the two teams of industry panjandrums and mavens, hands poised over their buzzer buttons, merely sat and stared at each other. Finally, to break the silence, one of the contestants hazarded a guess –a wrong guess– and my wife, who is not a computer wizard, shouted at his televised image in outraged disbelief. "**Hypertext**, you yokels, what's **wrong** with you?" The moderator, Stuart Cheifet of the "Computer Chronicles" TV show, had to inform these two elite panels of the expected answer.

January-April-July-October: A news item relating to the development of ELECTRIC WALDEN technology: Something was going on which eventually would mean you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

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October 1988	56,000
January 1989	80,000
July 1989	130,000
October 1989	159,000
October 1990	313,000
January 1991	376,000
July 1991	535,000
October 1991	617,000
January 1992	727,000
April 1992	890,000
July 1992	992,000
October 1992	1,136,000
January 1993	1,313,000
April 1993	1,486,000
July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

January: News items relating to the development of ELECTRIC WALDEN technology:

- IBM reported a year-end loss, for the 1st time, of US$564 million, on revenues of US$64.8 billion.
- NeXT announced that a version of the NextStep OS would be made for Intel PCs.

February: A news item relating to the development of ELECTRIC WALDEN technology: The PowerOpen Association was formed, with the goal of producing specifications for an open software/hardware platform that could run all UNIX, DOS/Windows (via emulation), and Macintosh applications.

Beginning of February: On the 10th anniversary of John Walker's phenomenally successful software firm Autodesk the company's management announced that they had had a bad sales quarter — and the value of its stock collapsed from $52 to $40 in one day (from a 1991 high of more than $60 to a record low of $23 1/2 by the middle of February). When Walker's praise for his company's management was less than effusive, the venture capitalists replaced him as CEO with a more function-oriented person, Carol Bartz (money problems and new managers would spell the end of Autodesk's vulnerability to the Xanadu dream).

March: News items relating to the development of ELECTRIC WALDEN technology:

- 1st MBONE audio multicast.
- Apple Computer announced a powerful new Macintosh LC II, replacing the Macintosh LC.
- Microsoft launches its 1st TV advertising campaign, for Windows.
- Microsoft bought Fox Software for 1.36 million shares of Microsoft's common stock.
- Apple Computer and IBM founded Taligent, to work on a platform-independent operating system.
- Intel announced clock doubler technology for its microprocessors, allowing CPU MHz speeds to continue increasing, without requiring faster motherboard components.
- Intel debuts the 486DX2 CPU.

Spring: 1st issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (1.1), on a Sony 256-Megabyte magneto-optical disk, containing:

- approximately 1,000 experimental hypertext link/anchor combinations
- general preparatory materials
- Brief Prospectus

- Elaborate Prospectus
- draft of proposal for financing by the National Endowment for the Humanities
- WALDEN; OR, LIFE IN THE WOODS (1854 published version)

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

April: A news item relating to the development of ELECTRIC WALDEN technology: Microsoft shipped Windows 3.1.

May: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the 33-MHz 68040-based Macintosh Quadra 950 (replacing the Quadra 900).
- Sun Microcomputers' Sunsoft division introduced the Solaris 2.0 operating system for Intel-based PCs.

June: News items relating to the development of ELECTRIC WALDEN technology:

- IBM and Microsoft signed a "divorce" document, allowing source code sharing for current versions of operating systems, but only up to September 1993.
- Microsoft Chairman Bill Gates received a National Medal of Technology for Technical Achievement from President George Bush.
- Kaypro's proceedings were converted to Chapter 7 liquidation to satisfy some $20 million in claims.

Summer: 2d issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (1.2), on a Sony 256-Megabyte magneto-optical disk, revising materials already present and adding the following materials to the Thoreau contexture:

- a cumulative total of 10,000 hypertext link/anchor combinations
- an extensive chronology of events in the 19th century as they pertained to Thoreau materials
- a separate chronology of major accident events occurring in the United States during Thoreau's lifetime, as background for the particular accident events with which he personally dealt such as shipwrecks, train derailings, etc.
- a chronological study of the development of peripheral commuter communities around US metropolises, and how that played out in Thoreau's lifetime in the town of Concord on the periphery of Boston
- a chronology of the various fads of phrenology, mesmerism, and spiritualism which were popular before and during Thoreau's lifetime, to some of which he makes reference, and some of which were of influence in the lives of persons known to Thoreau, such as Walt Whitman
- a number of years of Thoreau's JOURNAL

- an exploration of the Huguenot origins of the Thoreau family in the USA and the Guillet family in Canada and the possible impact of this 17th-Century history of religious persecution upon the 19th-Century Thoreau household in Concord
- CAPE COD, richly linked into a chronology of Massachusetts history
- full text of THE MAINE WOODS, richly linked into the appropriate points in the Thoreau chronology
- all Thoreau's bird observations, by species, with Helen Gere Cruickshank's remarks upon these species, linked into Thoreau's JOURNAL and, for the very first time, into his other writings as well

July: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer discontinued the PowerBook 100.
- Advanced Micro Devices began work on a fifth-generation x86 processor (in the class of Intel's Pentium chip).

August: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the PowerBook 145, replacing the PowerBook 140).
- The number of users of Apple Computer's System 7 reached 4 million.
- The Timeline of Xanadu: Autodesk entered into the throes of an organizational shakeup and dropped the Xanadu project, after expenditures on the order of $5,000,000US. Disvestiture. Rights to continued development of the XOC server were licensed to Memex, Inc. of Palo Alto, California and the trademark "Xanadu" reverted to Theodore Holm Nelson. The developers essentially were given carfare out of town. The project would have its code cannibalized as an effort to salvage what usable innovations had been created to that date by applying them to an insurance-company database. The pipe-dream would have to wait.

Fall: 3d issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (1.3), on a Sony 256-Megabyte magneto-optical disk, upgrading the previous materials and adding the following materials to the Thoreau contexture:

- a cumulative total of 100,000 hypertext link/anchor combinations
- an extensive chronology of events in the 18th century as they pertained to Thoreau materials
- a separate chronology of astronomical and meteorological events occurring during Thoreau's period, as background for the particular events which he personally noticed
- a separate chronology of chronometric developments occurring prior to and during Thoreau's period, as background for the particular mechanisms which he personally employed
- a separate chronology of drug use during Thoreau's period, as background for his shunning of the recreational drug practices of certain of his contemporaries
- a separate chronology of developments in dentistry and anesthesia occurring during Thoreau's period, as background for the dental and anesthesia practices which he experienced
- a separate analysis of sexual practices common during Thoreau's period, as backdrop for his personal chastity and for his homoerotic orientation
- Waldo Emerson's essays and lyceum lectures and sermons
- Waldo Emerson's published books
- Waldo Emerson's unpublished prose
- relevant extracts from Waldo Emerson's journal
- the full text of all articles which had been published in the short-lived Thoreau Research News

September: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer launches the Performa Line, designed for mass merchandisers and superstores.
- IBM created the IBM Personal Computer Company.
- NeXT shipped NextStep v3.0.

October: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer began direct mail order sales.
- Apple Computer introduced the PowerBook 160.
- Apple Computer introduced the PowerBook 180, replacing the PowerBook 170.
- Apple Computer announced the Macintosh Duo Systems, 210 and 230.
- Apple Computer introduced the Macintosh IIvx and IIvi.
- IBM introduced its ThinkPad laptop computer.
- One year after the introduction of Apple Computer's PowerBook, sales of US$1 billion make it the 1st personal computer to break that threshold.
- Microsoft shipped Microsoft Windows for Workgroups 3.1, which integrates networking and workgroup functionality.

November: News items relating to the development of ELECTRIC WALDEN technology:

- First MBONE video multicast.
- Apple Computer announced QuickTime for Windows.
- Microsoft shipped Microsoft Access Database for Windows.
- Digital Equipment unveiled the Alpha 21064 64-bit microprocessor.
- Hewlett-Packard announced an expansion of its HP 9000 series, with the midrange Model 735 workstation for US$37,400, deskside Model 755 for US$59,000, as well as low-end Model 715/33 for US$5,000 and Model 725/50 for US$17,900.
- Sun Microsystems announced the low-end SPARCclassic workstation for US$4300 and high-end SPARCcenter 2000 multi-processor server.

Winter: 4th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (1.4), on a Sony 256-Megabyte magneto-optical disk, elaborating upon the existing materials and adding the following materials to the Thoreau contexture:

- a cumulative total of 200,000 hypertext link/anchor combinations
- an extensive chronology of events in the 17th century as they pertained to Thoreau materials
- a separate chronology of developments in bridge construction during Thoreau's period, as background for particular bridges he crossed and the particular construction sites he observed
- a separate chronology of developments in coach and carriage design occurring prior to and during Thoreau's period, as background for the particular horse-drawn vehicles which he personally experienced, including the possible presence of Thoreau's father, as a child, at a public hanging which had taken place in Concord
- a separate chronology of developments in public lecturing occurring during Thoreau's period, such as the lyceum movement and the activities of the young workingmen's reading rooms, as background for his own experience as a lecturer

- Samuel Taylor Coleridge's poem "The Ancient Mariner," richly linked into its context
- full text of Donald Ross, Jr. and Stephen Adams's REVISING MYTHOLOGIES: THE COMPOSITION OF THOREAU'S MAJOR WORKS, richly linked into its sources

December: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer discontinued the Apple IIgs.
- Novell bought AT&T's UNIX Systems Laboratories, gaining all rights to the UNIX source code, for US$150 million.

1993

News items relating to the development of ELECTRIC WALDEN technology:

- IBM introduced the F series of the AS/400, its 1st workstations based on the PowerPC chip. It announced OS/2 for Windows, which upgraded the Windows environment to OS/2. Its storage division, Adstar, became a subsidiary. It sold its Federal Systems division ($2.2B in yearly revenue) to Loral for $1.6B. The company reported its worst year in history with a loss of $4.97B on revenues of $64.5B, its chairman, John Akers, resigned, and after the most executive search publicity ever, Louis Gerstner would become new Chairman and CEO.
- The InterNIC was created by the NSF to provide specific Internet services: directory and database services (AT&T), registration services (Network Solutions Inc.), and information services (General Atomics/CERFnet).
- The US White House came online (http://www.whitehouse.gov/): President William Jefferson Clinton: president@whitehouse.gov, Vice-President Al Gore: vice-president@whitehouse.gov, First Lady Hilary Rodham Clinton: root@whitehouse.gov.
- Worms of a new kind found their way around the Net — WWW Worms (W4), joined by Spiders, Wanderers, Crawlers, and Snakes.
- Internet Talk Radio began broadcasting.
- The United Nations came online.
- The US National Information Infrastructure Act.
- Bulgaria, Costa Rica, Egypt, Fiji, Ghana, Guam, Indonesia, Kazakhstan, Kenya, Liechtenstein, Peru, Romania, the Russian Federation, Turkey, Ukraine, UAE, and the Virgin Islands connected to the NSFNET.
- Personal Video System: Bell Labs unveiled the Personal Video System Model 70. It enabled people to see one another in the corner of their computer screens while discussing business, sharing software, and revising documents.
- Lucent Technologies EO Personal Communicator 440: Based on the Bell Labs-developed Hobbit microprocessor, this hand-held device combined the features of pen-based personal computers, telephones, and fax machines.
- Kicha Ganapathy headed a team of virtual reality researchers creating three-dimensional “you-are-there” games, travel tours and training simulations.
- Nintendo rereleased the Nintendo Entertainment System with an improved cartridge slot.
- Marc Andreesen and colleagues at the National Center for Supercomputing Applications at the University of Illinois, having had experience with an early Web browser named ViolaWWW, wrote a new Web browser named Mosaic, and Tim Berners-Lee’s creation began to take the Internet by storm; the World Wide Web (“WWW” or “W3”) began to proliferate at a 341,634% annual growth rate of service traffic, while Gopher growth was reduced to a mere 997% rate of annual growth (!) Later, the NCSA implementation team would found the Netscape Company and author the 1st commercial browser, “Navigator.”
- Novell unveiled NetWare 4.0.
- Lotus announced Notes 3.0.
- Motorola started shipping the 1st PowerPC microprocessor.
- Pentium-based systems started shipping.
- The EPA’s Energy Star Initiative was unveiled and most PC vendors supported the program with announcements of energy-efficient PCs.

- General Magic, an Apple spin-off, debuted Telescripts, a communications-intensive operating system for PDAs. Apple shipped its Newton MessagePad — its 1st Personal Digital Assistant. John Sculley left Apple after 10 years at the helm.
- AT&T acquired McCaw Cellular for $12.6B.
- Compaq introduced the Presario, a PC family targeted for the home market.
- Novell transferred the UNIX trademark to X/Open, which took up the task of certifying that an operating system was UNIX compliant.
- Sun Microsystems licensed NextStep and made a $10M investment in NeXT.

"I liked the idea that a piece of information is really defined only by what it's related to, and how it's related. There really is little else to meaning. The structure is everything.... The brain has no knowledge until connections are made between neurons. All that we know, all that we are, comes from the way our neurons are connected."

— Tim Berners-Lee, WEAVING THE WEB: THE ORIGINAL DESIGN AND ULTIMATE DESTINY OF THE WORLD WIDE WEB BY ITS INVENTOR (1999)

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October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

January: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer showed off test versions of its Newton Personal Digital Assistants at the Winter Consumer Electronics Show.
- IBM reported a year-end loss, of US$4.96 billion, on revenues of US$64.5 billion (this was actually the highest single-year loss for any US company in our nation's history).
- Stac Electronics filed a lawsuit against Microsoft over inclusion of file compression in MS-DOS 6.0, because it allegedly infringed on Stac's patents.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer shipped the 10,000,000 Macintosh computer. It made its largest product announcement in its history, and made it in Japan: the Macintosh Color Classic, Macintosh LC III, Macintosh Centris 610 and 650, Macintosh Quadra 800, and PowerBook 165c. It discontinued, however, the Macintosh IIci and the Quadra 700.
- IBM announced nine new systems in its RS/6000 line, priced between US$4,000 and US$25,000.
- NeXT sold its hardware business to Canon in order to concentrate its efforts on its NextStep object-oriented software business (this had a telling effect on my "Stack of the Artist of Kouroo" project, which ran only on this abandoned hardware, and in the difficult transition to the PC environment, many of the accumulated images and about a year of my work was lost).
- The US Federal Trade Commission, after two years of investigating complaints of anticompetitive behavior, decided to take no action against Microsoft. The Antitrust Division of the US Department of Justice, however, began its own investigation of Microsoft.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Intel introduced its 60-MHz Pentium processor at US$878. It used 32-bit registers, had a 64-bit data bus, and incorporated 3,200,000 transistors.
- Microsoft unveiled its Windows NT. DOS 6 provided more memory management for applications such as Microsoft Windows. Additionally, newer utilities were made available for disk de-fragmentation, DoubleSpace file compression, file backup, anti-virus checking. Microsoft proposed the MAW Microsoft at Work initiatives. Compaq Computer, Intel, Microsoft, and Phoenix Technologies defined the Plug and Play specification for PCs.
- Microsoft offered Microsoft Encarta, the 1st multimedia encyclopedia for a computer.
- The 1st Internet Talk Radio program.

March 31, Wednesday: The first spam, in the form of excessive posting, went out when Usenet administrator Richard Depew inadvertently posted the same message to a discussion group, 200 times. (At our present high point, up to 40% of the Internet e-mail messages arriving in people's inbaskets amount to unsolicited spams.)[73]

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

73. This message of course pre-dates the use of the term "spam," which would thanks to a hilarious Monty Python sketch subsequently be applied to junk mail. The word "spam," repeated endlessly in this skit, would find its way into the online text games played by Usenet users, and from there, would be adopted as the name of choice for these offensive repetitive unwanted e-mails.

Spring: 5th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (2.1), on a Sony 256-Megabyte magneto-optical disk, making certain corrections to materials already distributed, plus adding the following new materials to the Thoreau contexture:

- a cumulative total of 300,000 hypertext link/anchor combinations
- an extensive chronology of events in the 16th century as they pertained to Thoreau materials
- a study of the development of fax technology during Thoreau's lifetime, both in Europe and in China
- a chronology of the development of flute mechanisms and the culture of flute playing before and during Thoreau's lifetime
- a chronology of the development of home construction techniques and materials which influenced Thoreau's design and construction of his shanty at Walden Pond
- Laura Dassow Walls on Thoreau's involvement with the contemporary science of Louis Agassiz and on Thoreau's involvement with the travel records of Alexander von Humboldt

April: News items relating to the development of ELECTRIC WALDEN technology:

- Motorola Corp. shipped the 1st PowerPC 601 chips.
- Apple Computer demonstrated a prototype Macintosh running on an 80-MHz PowerPC 601 processor.
- Microsoft reports that there were 25 million licensed users of Microsoft Windows.
- Gateway 2000 shipped its 1,000,000th PC.

May: News items relating to the development of ELECTRIC WALDEN technology:

- IBM released OS/2 v2.1.
- Microsoft formally launches Windows NT 3.1.
- NeXT shipped NextStep v3.1 for Intel PCs.
- MIPS Technologies announced availability of the 150-MHz 64-bit R4400 RISC microprocessor.

June: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer expands its PowerBook line with the PowerBook 180c and 145B.
- Apple Computer's 63-month legal suit against Microsoft and Hewlett-Packard comes to a close, as a US District Court judge throws out Apple Computer's remaining claim.
- John Sculley steps down as CEO of Apple Computer.
- Michael Spindler was appointed as CEO of Apple Computer.

Summer: 6th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (2.2), on a Sony 256-Megabyte magneto-optical disk, primarily concerned with the standardization of existing formats but adding the following materials into the Thoreau contexture:

- a cumulative total of 500,000 hypertext link/anchor combinations
- an extensive chronology of events in the 15th century as they pertained to Thoreau materials
- a chronology of fuel use and of lighting techniques (stoves, gas lamps, etc.) before and during Thoreau's lifetime
- full text of the ANALECTS of Confucius
- full text of the DOCTRINE OF THE MEAN
- full text of the GREAT LEARNING

- full text of John Bunyan's PILGRIM'S PROGRESS (Volume I: Christian's journey)
- full text of referenced books of the King James translation of the BIBLE, connected by hypertext links to the sites in which it is directly quoted or in which its phrases and tropes are exploited
- full text of the ORDINANCES OF MENU
- full text of the VISHNU PURANA
- full text of the QUR'AN, richly linked into various contexts in which it is referred to
- selections from Timothy Dwight's TRAVELS

July: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the Macintosh Quadra 840AV and Macintosh Centris 660AV. These computers integrate telecommunications, video and speed technologies on the desktop for the 1st time.
- The US Federal Trade Commission decides to take no action against Intel, after three years of investigating complaints of forcing exclusive dealing practices.
- IBM introduced its clock-tripled 25/75MHz Blue Lightning 486-based processor.
- Digital Equipment created the Digital Personal Computer Business unit, to focus on PC sales.

August: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer's Newton MessagePad was introduced at Macworld. 50,000 units were sold in the 1st 10 weeks.
- IBM created the Ambra Computer Corporation, a subsidiary of the IBM PC Company, to sell a new low-cost line of PCs.
- Microsoft began shipping Windows NT.
- Microsoft reports 1st US$1 billion sales quarter.
- IBM demos its 1st PowerPC RS/6000 workstation.
- Lotus Development won its copyright infringement lawsuit over Borland International, but the decision was overturned in 1995.
- Compton's New Media Incorporated received a patent on multimedia search and retrieval technology, from the U.S. Patent and Trade Office. The Office reversed the decision a year later, annulling the patent.

September: News items relating to the development of ELECTRIC WALDEN technology:

- Symantec acquired Fifth Generation Systems, maker of backup and security utilities for various operating systems.
- Gateway 2000 introduced the industry's 1st VESA system.
- IBM shipped its 1st PowerPC-based RS/6000 system, the RS/6000 Model 250, using a single PowerPC 601 chip.

Fall: 7th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (2.3), on a Sony 256-Megabyte magneto-optical disk, incorporating user comments and adding the following materials to the Thoreau contexture:

- a cumulative total of 1,000,000 hypertext link/anchor combinations
- an extensive chronology of events in the 14th century as they pertained to Thoreau materials

- a chronologized study of the practice of the execution of prisoners by hanging in England and in the New World up to and in the course of the development of Thoreau's opposition to the death penalty and of the impact of this upon his interesting reaction to the death penalty in particular in the case of John Brown
- chronologized thumbnail biographies of the more than 50 reverends personally known to Thoreau
- full text of Walt Whitman's initial edition of the LEAVES OF GRASS
- full text of Walt Whitman's DEMOCRATIC VISTAS
- full text of Walt Whitman's NOVEMBER BOUGHS
- full text of Walt Whitman's SPECIMEN DAYS
- other materials by Walt Whitman

November: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer quietly discontinued the Apple II product line. In its 17-year history, 5,000,000 had been shipped. Sales of Apple's PowerBook series hit the 1,000,000 mark.
- Microsoft shipped Windows for Workgroups 3.11 and released MS-DOS 6.2.
- Benny S. Lee of Everex Systems, Inc. was sentenced to a year in prison for manufacturing and selling counterfeit MS-DOS software (this was the 1st time a prison sentence had been handed down for software counterfeiting in the USA).

Winter: 8th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (2.4), on a Sony 256-Megabyte magneto-optical disk, adding the following materials to the Thoreau contexture:

- a cumulative total of 2,000,000 hypertext link/anchor combinations
- an extensive chronology of events in the 13th century as they pertained to Thoreau materials
- a study of prime movers before and during Thoreau's lifetime: horsepower, waterwheels, windmills, steam, etc.
- thumbnail biographies of an additional 50 persons known to Thoreau, for a cumulative total of 100 such chronologized biographies
- full text of the BHAGAVAD GITA
- Charles Darwin's THE ORIGIN OF SPECIES
- full text of the ATHARVA VEDA
- full text of the RIG VEDA
- full text of the SAMA VEDA
- full text of the YAJUR VEDA
- Æsop's FABLES
- full text of the MEMOIRS of Benjamin Franklin (termed "autobiography")
- full text of the HITOPADESA
- full text of the SAKUNTALA
- full text of the SANKHYA KARIKA
- full text of the ÆNEID of Virgil
- full text of the ILIAD of Homer

December: News items relating to the development of ELECTRIC WALDEN technology:

- SunSoft Incorporated, a subsidiary of Sun Microsystems, shipped the 1st version of WABI, providing Microsoft Windows application compatibility on Solaris, Intel, and Sparc versions of UNIX.
- IBM posted a year-end loss of US$8,100,000,000 on total sales of US$62,700,000,000.

1994

News items relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- The ARPANET/Internet celebrated its 25th anniversary. Algeria, Armenia, Bermuda, Burkina Faso, China, Colombia, French Polynesia, Jamaica, Lebanon, Lithuania, Macau, Morocco, New Caledonia, Nicaragua, Niger, Panama, Philippines, Senegal, Sri Lanka, Swaziland, Uruguay, and Uzbekistan connected to the NSFNET. NSFNET traffic passed 10 trillion bytes/month.
- The US Senate and House provided information servers, for those who considered what they made available to constitute information. It became possible, and convenient, to order delivery of a Pizza Hut pizza to your residence, over your Internet connection, if you happened to appreciate what this outlet passes off as pizza.
- The first cyberstation, RT-FM, began broadcasting from Interop in Las Vegas.
- The National Institute for Standards and Technology suggested that GOSIP should incorporate TCP/IP and drop its "OSI-only" requirement.
- The Arizona law firm of Canter & Siegel "spammed" the Internet with E-mail advertising their green card lottery services and Net citizens flamed indignantly back at them.
- The limitations of magnetic flux data storing densities were being reached. A 3 1/2-inch disk drive could store up to perhaps 4 gigabytes at densities of 400,000,000 bits per square inch of surface, up from 2,000 bits per square inch 38 years before.
- The office of the Japanese Prime Minister came online (http://www.kantei.go.jp/), and the office of the UK's HM Treasury (http://www.hm-treasury.gov.uk/), and the office of New Zealand's Info Tech Prime Minister (http://www.govt.nz/).
- First Virtual, the first cyberbank, opened its virtual doors for real business.
- Radio stations WXYC at the University of North Carolina, WJHK at the University of Kansas-Lawrence, and KUGS at Western Washington University began rockin' (rebroadcasting) round the clock on the Net.
- The TERENA Trans-European Research and Education Network Association was formed by the merge of RARE and EARN, with representatives from 38 countries as well as CERN and ECMWF. TERERNA's aim was to "promote and participate in the development of a high quality international information and telecommunications infrastructure for the benefit of research and education."

- IBM introduced the ValuePoint line of PC systems.
- Hayes Microcomputer Products abandons LANstep.
- Cyrix shipped the 33/66-MHz Cx486DRx2 processor.
- Number Nine Computer Corp. shipped the 1st PC video board using a 128-bit accelerator chip.
- Microsoft released FoxPro 2.6 for Unix.
- Iomega Corp. introduced its Zip drive and Zip disks, floppy disk sized removable storage in sizes of 25MB or 100MB.
- Novell halted all development of Novell DOS.
- MCI invested $1.3B in Nextel Communications, a wireless service provider.
- Hewlett Packard became a Taligent partner and purchased 15% of that company from Apple and IBM.
- Macintoshes using the PowerPC started shipping.
- Intel introduced the 486DX4 clock-tripling microprocessor

- Aldus and Adobe agreed to merge in a transaction worth $525M and would form a $0.5B+ software company.
- Novell said that it had agreed to acquire WordPerfect for $1,140,000,000 and Borland's Quattro Pro for $145,000,000.
- Apple entered the on-line service market by announcing eWorld.
- Apple Computer introduced the "Houdini" board, the DOS Compatibility Card for the Quadra 610, with a 25-MHz 486SX processor. The entire inventory of 25,000 boards sold out in a few months.
- Apple Computer released the Apple Color StyleWriter Pro 360dpi color inkjet printer.
- Apple Computer shipped Macintosh Application Environment 1.0 for the HP-UX operating system with the Motif interface, and the Solaris operating system with the OpenLook interface.
- The SCSI-2 standard was finalized as ANSI X3.131-1994.
- The 4X CD-ROM drive offered by NEC Technologies, called the NEC MultiSpin 4xPro, doubled throughput to 600 KBps. The price for a 4X drive was, initially, $1,000.

- Tim Berners-Lee moved his operation from Geneva, Switzerland's CERN headquarters to a separate entity, which he named W3C, the World Wide Web Consortium, headquartered at the Massachusetts Institute of Technology. At this point the number of Web clients on the Internet had grown from about 10 in 1991, to 100,000. WWW edged out telnet to become the 2d most popular service on the Net (trailing only ftp-data in terms of its percentage of packets and bytes traffic distribution on the NSFNET). Communities begin to wire up directly to the Internet, beginning with Lexington MA and Cambridge MA (not Concord MA, mired in its past glories). The percent of US public schools connected to the Internet was:

1994	**35%**
Fall 1996	**65%**

"I liked the idea that a piece of information is really defined only by what it's related to, and how it's related. There really is little else to meaning. The structure is everything.... The brain has no knowledge until connections are made between neurons. All that we know, all that we are, comes from the way our neurons are connected."

– Tim Berners-Lee, WEAVING THE WEB: THE ORIGINAL DESIGN AND ULTIMATE DESTINY OF THE WORLD WIDE WEB BY ITS INVENTOR (1999)

January: News items relating to the development of ELECTRIC WALDEN technology:

- Shipments of Apple Computer Macintosh computers hit 1 million for the previous four month period, for the 1st time.
- Newer Technology introduced the Quadra Overdrive at Macworld Expo. The clock-doubled accelerator boards fit in the 68040 socket of the Macintosh Quadra or Centris. Processor speeds of 40-MHz and 50-MHz were available, for US$1700.
- NEC Technologies shipped its quad-speed CD-ROM, priced at US$1000.
- Apple Computer announced that it would license its System 7.x operating system to other hardware companies.
- A Labyrinth application was started by Mark Pesce and Tony Parisi.

- Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

DATE	NODES
May 1969	4
October 1969	5
April 1971	23
June 1974	62
March 1977	111
August 1981	213
May 1982	235
August 1983	562
October 1984	1,024
October 1985	1,961
February 1986	2,308
November 1986	5,089
December 1987	28,174
July 1988	33,000
October 1988	56,000
January 1989	80,000
July 1989	130,000
October 1989	159,000
October 1990	313,000
January 1991	376,000
July 1991	535,000
October 1991	617,000
January 1992	727,000
April 1992	890,000
July 1992	992,000
October 1992	1,136,000
January 1993	1,313,000
April 1993	1,486,000
July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

February: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft released Microsoft Windows 3.11.
- Silicon Graphics founder and chairman James Clark resigned.
- Apple Computer introduced the Macintosh LC 575 and LC 550.
- Apple Computer introduced QuickTime 2.0, with interactive television, music and full-screen video support.
- IBM announced the shutdown its Ambra Europe company by the end of the quarter.
- A US District Court rules that Microsoft violated patents held by Stac Electronics, in data compression used in Microsoft's DoubleSpace in DOS 6. Microsoft was ordered to remove or replace the technology.
- Electronic Arts and Broderbund Software announced a proposed merger, in a stock swap valued at about US$408 million.
- Microsoft released MS-DOS 6.21, removing DoubleSpace disk compression.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer unveiled its 1st computers based on the PowerPC 601 processor, the Power Macintosh 6100/60, 7100/66, and 8100/80. Prices range from US$2000-4000 for completed systems.
- Apple Computer released System 7.1, the OS for the Mac.
- Cyrix began new shipments of the Cx486DX microprocessor, after fixing a flaw in the 32-bit floating-point code.
- Apple Computer introduced QuickTake 100, the 1st 24-bit color digital camera for under US$1000.
- Apple Computer announced the Newton MessagePad 110 and 100. The 110 comes with 1MB RAM, transfers data remotely at 38.5Kbps, and runs on four AA batteries.
- Apple Computer shipped the Macintosh Quadra 610 DOS Compatible. It features a 40-MHz Motorola 68LC040 chip and a 25-MHz Intel 486SX chips, for US$1580.
- Hewlett-Packard shipped the HP DeskWriter 560C color inkjet printer. It features 600x300dpi, at a list price of US$720.
- Hewlett-Packard shipped the HP DeskWriter 520 inkjet printer. List price was US$365.
- Intel shipped its clock-tripled IntelDX4 processors, at 25/75-MHz and 33/100-MHz.
- Intel shipped its 25/50-MHz IntelSX2 486 processor.
- Intel shipped the 90-MHz Pentium processor. The chip consumes 3.3 volts, and included two internal caches. Pricing was US$849 each in quantities of 1000.
- Intel shipped the 100-MHz Pentium processor. The chip consumes 3.3 volts, and included two internal caches. Pricing was US$995 each in quantities of 1000.
- Novell bought WordPerfect Corporation for US$850 million.
- Aldus and Adobe Systems announced plans to merge the two companies.
- IBM and Motorola announced the 100-MHz PowerPC 601 processor.

Spring: 9th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (3.1), on a Sony 256-Megabyte magneto-optical disk, re-editing and spell-checking the files plus adding the following new materials to the Thoreau contexture:

- a cumulative total of 5,000,000 hypertext link/anchor combinations
- an extensive chronology of events in the 12th century as they pertained to Henry Thoreau materials
- thumbnail biographies of 100 persons known to Thoreau, for a cumulative total of 200 such chronologized biographies

- full text of the first edition of Louisa May Alcott's LITTLE WOMEN, Volume I, followed by full text of the first edition of Volume II, richly linked into a life of the Alcott family
- full text of Nathaniel Hawthorne's FANSHAWE
- full text of Nathaniel Hawthorne's THE BLITHEDALE ROMANCE
- full text of Nathaniel Hawthorne's THE SCARLET LETTER
- full text of Nathaniel Hawthorne's MOSSES FROM AN OLD MANSE
- full text of Nathaniel Hawthorne's THE MARBLE FAUN
- full text of Nathaniel Hawthorne's various short stories
-

April: News items relating to the development of ELECTRIC WALDEN technology:

- A milestone in the history of spam: Canter and Siegel, an Arizona law firm, posted a message about green card lottery services to hundreds of Usenet discussion groups.
- Symantec and Central Point Software Incorporated agree to merge companies in a stock swap valued at about US$60 million.
- Broderbund Software calls off the proposed merger with Electronic Arts, due to a significant drop in the stock value of Electronic Arts.
- Motorola released small quantities of its 68060 microprocessor, operating at 50- and 66-MHz.
- IBM and Motorola announce the 100-MHz PowerPC 604 processor. The 604 had one floating-point unit, and three integer units. Two of the integer units perform single clock cycle instruction, while the other was used for integer multiplication and division. The processor used 3.6 million transistors.
- IBM released PC-DOS 6.3.
- Commodore International and Commodore Electronics, two of the main international components of Commodore Business Machines, declare bankruptcy, and file for voluntary liquidation.
- Mosaic Communications released Netscape Navigator 1.0, a world-wide web browser, and Netscape Communications Corporation was founded on April 4th. On April 5th, Microsoft executives held their 1st of a series of retreats in which they attempted to grapple with the Internet phenomenon and its significance for their company's future.
- The U.S. Patent and Trademark Office, after re-examining the patent application it granted to Compton's New Media in 1993, decides to reject all 41 of the application's claims.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

April 1, Friday: In regard to the Enola Gay exhibit, the Air Force Association published its 1st critique by John T. Correll, in Air Force Magazine.

WORLD WAR II

A news item relating to the development of ELECTRIC WALDEN technology: The term "VRML" was coined.

http://vrml.wired.com/concepts/raggett.html

May: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced the 500 series of PowerBook computers (520, 520c, 540, 540c), and the PowerBook Duo 280 and 280c. All use clock-doubled Motorola 68LC040 microprocessors, at speeds of 50/25-MHz or 66/33-MHz. Prices range from US$2270 to US$3760.
- Motorola shipped sample copies of the PowerPC 603 processor.
- Microsoft sends out the 1st official beta test version of what would be Windows 95.
- MIPS Technologies announced availability of samples of the 200-MHz 64-bit R4400 RISC microprocessor.

June: A news item relating to the development of ELECTRIC WALDEN technology:

ELECTRIC WALDEN

- Lou Montulli, a Netscape programmer, invented the "cookie" — without which the cookie monster would have been exceedingly unhappy, and without which it would have been exceedingly difficult to have created the Internet.
- The www-vrml mailing list was initiated by Brian Behlendorf and Mark Pesce.
- Austin Computer Systems changed its name to IPC Technologies Incorporated.
- Apple Computer launched eWorld, its new online community for the USA.
- Apple Computer unveiled its System 7.5 operating system.
- Apple Computer introduced new Macintosh 630 computers, plus the PowerBook 150.
- Microsoft and Stac Electronics settled their legal differences over data compression patents, with Microsoft agreeing to purchase US$40M worth of Stac stock and to pay to Stac a further US$43M in royalties.
- Microsoft released MS-DOS 6.22 bringing back disk compression under the name DriveSpace.
- Microsoft was granted a trademark to the name "Windows" for software products.
- Borland International sold its Quattro Pro spreadsheet to Novell for about US$140M.
- Dr. Thomas R. Nicely of Lynchburg College noted that the Pentium processor sometimes produces flawed floating-point results, yielding only 4-8 decimals of precision(!)

Summer: 10th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (3.2), on a Sony 256-Megabyte magneto-optical disk, adding the following materials to the Thoreau contexture and adding certain researches into the provenances of 19th-Century manuscripts:

- a cumulative total of 10,000,000 hypertext link/anchor combinations
- an extensive chronology of events in the 20th century as they pertain to Henry Thoreau materials
- thumbnail biographies of 300 persons known to Henry Thoreau, for a cumulative total of 300 such chronologized biographies
- full text of Henry Wadsworth Longfellow's "HIAWATHA"

- full text of Richard Henry Dana, Jr.'s TWO YEARS BEFORE THE MAST, richly linked into the dates and places of the events it recounted
- full text of Frederick Douglass's initial NARRATIVE OF THE LIFE OF FREDERICK DOUGLASS AN AMERICAN SLAVE offering of 1845
- full text of Herman Melville's MOBY DICK
- full text of Herman Melville's BENITO CERENO
- full text of Herman Melville's REDBURN
- full text of Herman Melville's TYPEE
- full text of Herman Melville's WHITE JACKET

July: News items relating to the development of ELECTRIC WALDEN technology:

- There would be a SIGGRAPH94 discussion group for selecting basis of VRML.
- IBM made available sample quantities of the PowerPC 603 processor. High quantity pricing was US$165 for the 66-MHz chip, and US$195 for the 80-MHz version.
- IBM shipped AIX 4.1 for the RS/6000, and AIX for the Power Macintosh.
- IBM reported that it had shipped 1 million PowerPC 601 processors in the 1st 10 months of production.
- Digital Equipment Corporation shipped its AXP 21064A 64-bit 275-MHz Alpha RISC processor in volume quantities, at US$1083 per chip pricing.
- IBM announced it would shut down the US operations of its Ambra subsidiary in October.
- Microsoft reached a settlement with the US Department of Justice regarding alleged monopolistic licensing practices. In the future, they pledged, they would allow computer manufacturers more liberty to install programs from other companies, such as allowing them to install the Netscape Navigator alongside Microsoft's Internet Explorer so that computer users would be able to make a choice between the two Internet browsers.
- U.S. Robotics shipped the Courier v.34 28.8Kbps modems. List price: US$329 internal, US$349 external.

August: A news item relating to the development of ELECTRIC WALDEN technology: IBM shut down its Ambra PC division.

September: News items relating to the development of ELECTRIC WALDEN technology:

- The International Telecommunications Union ratifies the 28.8Kbps V.34 modem standard.
- Advanced Micro Devices shipped its Am486DX2-80 40/80-MHz processor.
- Microsoft shipped its 1st keyboard, the Microsoft Natural Keyboard, announced the name of its upcoming Windows upgrade ("Windows 95"), and shipped its 1st Internet browser.
- U.S. Robotics shipped the Sportster v.34 28.8Kbps modems. List price: US$329 internal, US$349 external.
- NexGen introduced its Nx586 microprocessor.
- Alaris introduced the 1st PC with a NexGen Nx586 processor.
- Sun Microsystems unveiled the 64-bit UltraSPARC RISC processor.
- Digital Equipment Corporation formally introduced its next-generation Alpha AXP processors, including a 300-MHz version that could execute 1 billion instructions per second.
- IBM introduced the Aptiva line, to replace the PS/1 line, aimed at the home PC market.

Fall: 11th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (3.3), on a Sony 256-Megabyte magneto-optical disk, utilizing the techniques of Boolean search and extrapolations from these searches in the generation of sub-chronologies, plus adding the following materials to the Thoreau contexture:

- a cumulative total of 15,000,000 hypertext link/anchor combinations
- Apple approached Voyager about the possibility of purchasing copies of WHO BUILT AMERICA? to give to schools (K-12) buying certain Apple computers. Voyager and Apple agreed to terms.a survey of the chronologies of places visited by Thoreau, location by location and year by year, such as for instance Plymouth MA and St. Paul MN
- thumbnail biographies of 100 persons known to Henry Thoreau, for a cumulative total of 400 such chronologized biographies
- enough information on the various uses of kilns in Colonial America to serve as background for Henry Thoreau's discoveries of the ruins of kilns in the woods and fields around Concord
- reviews of a collection of significant journal articles of Thoreauviana, and of published studies of Thoreau, by various graduate students in Professor Donald Ross, Jr.'s seminars at the University of Minnesota in 1986, 1989, and 1992
- a fully hypertexted first edition of Bulfinch's MYTHOLOGY

October: A news item relating to the development of ELECTRIC WALDEN technology:

- Apple Computer expands its Macintosh Performa 6100 line with five new computers based on the PowerPC.
- Advanced Micro Designs unveiled the chip architecture of the K5 processor.
- Microsoft announced and shipped Windows NT Workstation 3.5 and Windows NT Server 3.5, made a bid to buy Intuit (maker of Quicken) for US$1.5 billion stock swap, and wrote the 1st code that eventually would become version 1.0 of the Internet Explorer.
- Dr. Nicely reports his discovery of the Pentium floating point bug to Intel, and his report was made public on CompuServe.
- Seagate Technologies announced the 1st disc drive and interface achieving a transfer rate of 100 MB per second.
- IBM formally launches OS/2 Warp version 3.
- IBM and Motorola announce and introduce the prototype of the PowerPC 620 processor, operating at 133-MHz.
- Motorola announced availability of the PowerPC 603 processor, at US$175 for the 66-MHz chip, and US$199 for the 80-MHz version.
- Motorola announced availability of the PowerPC 601 processor, at US$189 for the 66-MHz chip, and US$299 for the 80-MHz version.
- IBM introduced the 100-MHz PowerPC 601 processor.
- IBM introduced the 100-MHz PowerPC 604 processor.
- IBM introduced the 66-MHz and 80-MHz PowerPC 603 processors.
- IBM drops the PS/2, PS/1, Ambra, and ValuePoint lines, and XGA graphics, in favor of industry standards for its new PC line, the Series 300 and Series 700.
- MIPS Technologies announced the R10000 RISC microprocessor.
- Intel introduced the 75-MHz Pentium processor.
- Gateway 2000 Incorporated sold the 1st PC powered by Intel's 75-MHz Pentium.

- Apple Computer shipped System 7.5 for the Macintosh.

November: A "SuperMax" prison for dangerous male federal inmates opened near Florence, Colorado (this county in Colorado already boasted nine prisons; its economy was largely based upon its hospitality industry).

Here are some new developments in the technology for the ELECTRIC WALDEN project:

- Gavin Bell, Tony Parisi, and Mark Pesce prepared the 1.0 draft of the VRML.
- The NSFNet took the first in a series of steps that would essentially remove the backbone of the beast (the Internet) without killing it. Colleges and other institutions that have been using the NSFNet were advised to find alternate feeds (which have turned out to be primarily MCI, Sprintlink, and ANS, which actually ran the NSFNet backbone as a joint effort between MCI and IBM and then had most of its operations sold to AOL a few months ago).
- Digital Equipment launched the Starion line of home-targeted personal computer systems.
- Hayes Microcomputer Products filed for Chapter 11 bankruptcy protection.
- Apple Computer launched the Power Macintosh 8100/100, as the industry's fastest, most powerful PC.
- Apple Computer, Motorola, and IBM announced that they would create a computer platform to run all major operating systems, except the intel-based Microsoft Windows 3.1 and successors.
- Apple Computer declares its intention to openly license the Mac operating system.
- IBM shipped the 100-MHz PowerPC 601 processors and the 66-MHz and 80-MHz PowerPC 603 processors.
- Cyrix announced the M1 next-generation x86 processor.
- Sun Microsystems announced the Sparcstation 20 Model HS11, using a 100-MHz HyperSparc processor from Ross Technology.
- Digital Equipment introduced its AlphaStation computers, with 166-MHz and 233-MHz Alpha AXP 21064 processors. This line incorporated the PCI bus, and sold for US$7,000-$16,000.
- Apple Computer delivered QuickTime 2.0 for Windows.
- The intel Corporation acknowledged that about 2,000,000 Pentium chips had been shipped with a defective floating-point unit.

Winter: 12th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (3.4), on a Sony 256-Megabyte magneto-optical disk, continuing to incorporate the results of researches into the existing databases into subsidiary chronologies plus adding the following new materials to the Thoreau contexture:

ELECTRIC WALDEN

- a cumulative total of 20,000,000 hypertext link/anchor combinations
- thumbnail biographies of 100 persons known to Henry Thoreau, for a cumulative total of 500 such chronologized biographies
- a chronologized study of the New England ice industry as background for the harvesting of the ice on Walden Pond during Henry Thoreau residency there, and for Thoreau's previously unpublished observations on/of this harvesting
- the development of college-student clubs and how this related to Henry Thoreau's membership in The Institute of 1770, a predecessor of the present-day Hasty Pudding Club
- a study of the Irish potato famine as an ecological disaster and as a migration event, with particular consideration to its considerable impact upon Boston, upon Concord, and upon Walden Woods
- full text of Frederick Douglass's MY BONDAGE AND MY FREEDOM
- full text of Frederick Douglass's several articles in The Atlantic Monthly

December: News items relating to the development of ELECTRIC WALDEN technology:

- The California Supreme Court upholds a 1992 decision that awarded Advanced Micro Devices technology rights in its suit against Intel.
- IBM shipped the 100-MHz PowerPC 604 processors.
- Apple Computer demonstrated a PCI-based Power Macintosh using a 120-MHz PowerPC 604 processor.
- Intel shipped the 63-MHz P24T Pentium Overdrive chip.
- Intel President Andy Groves admits the company mishandled the Pentium processor division problem, and apologizes for the resulting situation.
- NexGen announced sample availability of its 133-MHz Nx586 microprocessor.
- Novell shipped UnixWare 2.0.
- Novell shipped PerfectOffice 3.0 for Windows.
- Microsoft bought software technology from Spyglass that would help it to quickly develop its new “Internet Explorer” browser for the Internet.

1995

Commissioner of Patents Henry L. Ellsworth, a government bureaucrat not all that different from others of his breed, had testified in 1843 before a committee of Congress, and in the process of seeking to consolidate and expand his empire had included in this testimony one gratuitous and unfortunate rhetorical flourish. He had ventured to suggest that the rate of innovation among us had become so rapid that it "taxes our credulity and seems to presage the arrival of that period when human improvement must end." Over the years this flourish has been taken literally, by the more gullible or more malicious among us, to the point at which it has become one of our persistent pieces of fakelore. In the current year this tale resurfaced again, in ghost-writing attributed to the richest man in the world, a bestselling 1995 book about the Internet titled THE ROAD AHEAD. Bill Gates, CEO of Microsoft Corporation, speaks with disdain on page xiii of a shitpot full of pretentious previous prognosticators whom the inventive genius of his company Microsoft had made "look silly," quote unquote, and offers as case in point "the commissioner of US patents who in 1899 [*sic*] asked that his office be abolished because 'everything that can be invented has been invented.'" Let us trust that The Bill is more greatly accurate in prediction than in postdiction.[74]

ELECTRIC WALDEN

Here's a news item relating to the development of ELECTRIC WALDEN technology:By this point the price of a CD-Recordable (CDR) drive, initially around $25,000 back in 1990, had dropped to around $2,000 — which was on the borderline of individually affordable.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

ELECTRIC WALDEN

News items relating to the development of ELECTRIC WALDEN technology:

- What had been originally defined in 1982 as an "internet" —a connected set of networks, specifically those using TCP/IP inside a corporate firewall as a secure channel of internal data exchange, and distinguished from an insecure "Internet" (capitalized) connecting TCP/IP internets from corporation to corporation— was redesignated at this point, to avoid confusion, by Brent Schlender, with the nonce term "intranet."
- The technologies of this year have been WWW and search engines and the emerging technologies have been mobile code (JAVA, JAVAscript), VRML virtual environments, and collaborative tools.
- NSFNET reverted back to a research network, the main US backbone traffic now being routed through free-market interconnected network providers.
- For news of the truly weird, Hong Kong police disconnected all but one of that colony's Internet providers while in search of a hacker, leaving 10,000 surfers temporarily without Net access. The first official Internet wiretap was successful in helping the Secret Service and the DEA Drug Enforcement Agency apprehend three individuals who were illegally manufacturing and selling cell phone cloning equipment and electronic devices. Richard White became the first man to be

74. It is to be noted that when somebody looked up the term "Internet" in Bill Gates's MICORSOFT ENCARTA ENCYCLOPEDIA, edition of this year — the term wasn't there.

declared a munition, under US arms export control laws, on the basis of an RSA file security encryption program tattooed on his arm.

- RealAudio, an audio streaming technology, let the Net hear in near real-time. Radio HK, the first 24-hour, Internet-only radio station started its broadcasting.
- Traditional online dial-up systems (Compuserve, American Online, Prodigy) begin to provide Internet access.
- Vatican City came online (http://www.vatican.va/), along with the Canadian government (http://canada.gc.ca/).
- Operation Home Front connected, for the first time, soldiers in the field with their families back home, via the Internet.
- Intel destroyed 1.5 million flawed Pentium chips, at a rough cost of US$475 million.
- Apple Computer shipped an updated "Houdini" board, the DOS Compatibility Card for the Power Macintosh. For US$740, it gave a 486DX2/66, sound, and 800x600 SVGA graphics.
- Microsoft released FoxPro 3.0 for Windows, with OLE support.
- By this point the price of a CD-Recordable (CDR) drive, initially around $25,000 back in 1990, had dropped to around $2,000, on the borderline of affordable.
- The 6X CD-ROM drive increased throughput to 900 KBps.

With 6X drives initially costing $600, they were about to be usurped by 8X drives.

"Historians of science have seen fit to ignore the history of the great discoveries in applied physics, engineering and computer science, where real scientific progress is nowadays to be found. Computer science in particular has changed and continues to change the face of the world more thoroughly and more drastically than did any of the great discoveries in theoretical physics."

— Nicholas Metropolis, "The Age of Computing: A Personal Memoir," DAEDALUS, Winter 1992: 119-30

A news item relating to the development of ELECTRIC WALDEN technology: Something was going on which eventually would mean that you could go to a cabin without becoming terminally deprived:

Host nodes on the Internet

DATE	NODES
May 1969	4
October 1969	5
April 1971	23
June 1974	62
March 1977	111
August 1981	213
May 1982	235
August 1983	562
October 1984	1,024

Host nodes on the Internet

DATE	NODES
October 1985	1,961
February 1986	2,308
November 1986	5,089
December 1987	28,174
July 1988	33,000
October 1988	56,000
January 1989	80,000
July 1989	130,000
October 1989	159,000
October 1990	313,000
January 1991	376,000
July 1991	535,000
October 1991	617,000
January 1992	727,000
April 1992	890,000
July 1992	992,000
October 1992	1,136,000
January 1993	1,313,000
April 1993	1,486,000
July 1993	1,776,000
October 1993	2,056,000
January 1994	2,217,000
1995 predicted	5,000,000 estimated

January: News items relating to the development of ELECTRIC WALDEN technology:

- The QvLib; the VRML parser was released by Paul Strauss & Gavin Bell.
- Apple called Voyager to say that it has received complaints about WHO BUILT AMERICA? because of the CD-ROM's discussion of homosexuality, abortion, and birth control at the turn of the century. Apple asks Voyager to make available a version with these subjects edited out. Voyager refused but offered to send schools that don't like WBA any CD-ROM from the Voyager catalog (school's choice). Voyager also proposed that WHO BUILT AMERICA? be bundled only with computers for high-schools, colleges, and libraries. Apple rejected both of these suggestions.
- Apple Computer shipped QuickTime VR, bringing virtual reality to Macintosh and Windows-based personal computers.
- Apple Computer shipped the one-millionth Power Macintosh.
- Apple Computer announced the Newton MessagePad 120.
- Microsoft unveiled Microsoft Bob, a "superapplication" for Windows consumer users, with a "social interface." The code name for the project was "Utopia".
- Radius Incorporated demonstrated the 1st Power Macintosh clone, using Apple Computer's licensed System 7 operating system.
- Borland International founder Philippe Kahn resigned as president and CEO.
- Advanced Micro Devices and Intel settle all outstanding processor related legal issues. Advanced Micro Devices paid Intel US$58 million in damages, and Intel paid US$18 million for breach of contract damages. Advanced Micro Devices retained full rights to microcode in Intel386 and Intel486 chips.
- Compaq Computer reached worldwide number one PC marketshare position.
- IBM announced that 1 million copies of OS/2 Warp had shipped.

February: News items relating to the development of ELECTRIC WALDEN technology:

- IBM announced PC DOS 7, with integrated data compression from Stac Electronics (Stacker).
- IBM and Motorola announced that test samples had been made of the PowerPC 603e (100-MHz) and PowerPC 602 (66MHz) microprocessors.
- Judge Sporkin rejected the settlement worked out between Microsoft and the Department of Justice.
- U.S. Robotics acquired Megahertz Holding Corporation.

March: News items relating to the development of ELECTRIC WALDEN technology:

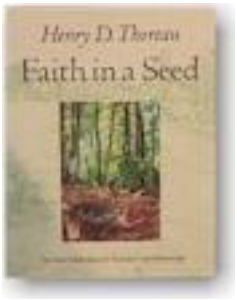
- Apple Computer launched QuickTime On-Line, an Internet World Wide Web server.
- An appeals court overturned the Lotus/Borland decision, allowing emulation of Lotus 1-2-3 commands in Quattro Pro. The reversal of the prior court ruling saves Borland International US$100 million that it might have been required to pay.
- Iomega began shipping its Zip drive.
- IBM released the ThinkPad 701C. It features an automatically expanding full-sized keyboard, dubbed the Butterfly. The laptop features a 10.4-inch thin-film transistor display, 50-MHz Intel 486DX2, 14.4K fax/modem, and weighs just 4.3 pounds.
- Intel introduced the 120-MHz Pentium processor. Pricing was US$935 each in quantities of 1000.
- Jim Cannavino resigned from IBM.
- Microsoft shipped Bob for Windows.

- On the basis of packet count (port 80), WWW surpassed ftp-data as the service with greatest traffic on NSFNet.

Spring: 3th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (4.1), on a Sony 256-Megabyte magneto-optical disk, continuing to incorporate the results of researches into the existing databases into subsidiary chronologies plus adding the following new materials to the Thoreau contexture:

ELECTRIC WALDEN

- Henry Thoreau's newly published "Faith in a Seed" notes, in full
- Bradley P. Dean's "Sound of a Flail" dissertation



April: News items relating to the development of ELECTRIC WALDEN technology:

- On the basis of byte count, WWW surpassed ftp-data as the service with greatest traffic on NSFNet.
- Apple Computer announced the Power Macintosh 5200/75 LC for the education market, using the 75-MHz PowerPC 603 processor.
- IBM released PC DOS 7.
- Apple Europe introduced the Power Mac 6200 series in Europe.
- The US Department of Justice filed a lawsuit to block the merger of Intuit and Microsoft.
- Lotus Development renames Ami Pro to Word Pro.
- Apple Computer introduced the new Apple CD 6003 quad-speed CD-ROM player.
- Apple Computer shipped the QuickTake 150 digital camera for the Macintosh, Power Macintosh, and Windows environments.
- At an auction in New York, ESCOM bought all rights, properties, and technologies of Commodore.
- RealAudio enabled realtime transmission of sound (and, later, pictures) over the internet.
- CNET was launched on television (it would come to the internet in June).
- The WWW3 Darmstadt
- Developer Mark Pesce gave VRML Equinox at Developer's day
- The National Sciences Foundation backbone was halted.
- SGI and TGS announced WebSpace, and 17 others endorsed VRML.

http://www.sgi.com/Headlines/1995/April/vrml-webspace.html

April 30, Sunday: US President William Jefferson Clinton suspended all trade with Iran due to its nuclear weapons programs and its support for terrorism.

A news item relating to the development of ELECTRIC WALDEN technology:
NSFNet was turned off for good and all. This marks a major leap: the Internet is now an all-commercial network. Even if you decide to count the government and education as non-commercial, their traffic is carried on backbones operated by commercial enterprises. The National Science Foundation is pumping about $4 million more per year into the commercial networks to support the transition, but that funding is to decrease and vanish by 1998. The bite is that the networks must agree to develop and "peer" (exchange packets) at NAPs. Currently, the major points are MAE-EAST (Metropolitan Area Ethernet East) in Washington, D.C., and the ATM/SMDS/Pac Bell hub in San Jose. Motion is underway by several major networks to start a non-ATM-flavored hub in the Bay Area; Network99 spearheaded a Chicago NAP; and apparently NAPs in Denver, Seattle, Dallas, and other major cities were also underway.

May: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft and Intuit announced the termination of their planned merger.
- ESCOM announced the creation of a subsidiary company, Amiga Technologies, in Germany.
- Apple Computer unveiled the next generation of its Mac OS at its Worldwide Developers Conference.
- Power Computing, the 1st company to license Apple Computer's Power Mac technology, began shipping its 1st Power Mac clones.
- Intel released the mobile version of the 90-MHz Pentium processor.
- IBM unveiled its new IBM PC 300 desktop systems, with 75-MHz and 90-MHz Pentium CPUs. Complete systems start at US$2000.
- Apple Computer shipped System 7.5.2 for the Macintosh, with PCI bus support.
- Intel introduced the P6 processor.
- Sun Microsystems announced sample availability of the 64-bit UltraSPARC microprocessor.
- Bill Gates sent a memo to his Microsoft executives, announcing that he had decided to make capture of the Internet his company's top priority.

June: News items relating to the development of ELECTRIC WALDEN technology:

- IBM bought Lotus Development for US$3.5 billion in cash.
- Intel announced the immediate availability of the 133-MHz Pentium processor. Price was US$935 each in quantities of 1000.
- Intel ceased shipments of the 60- and 66-MHz Pentium processors.
- The 1994 settlement between Microsoft and the US Department of Justice, which was thrown out in February, was reinstated.
- Apple Computer introduced its 1st color laser printer, the Color Laser Printer 12/600PS. The 600x600 dpi printer comes with 12 MB of RAM, used a Canon-based engine, and costs about US$7,000.
- Apple Computer introduced its 1st PowerMac system using Intel's PCI bus, the Power Macintosh 9500, available with a 120-MHz or 132-MHz PowerPC 604 CPU. The 9500/120 with a 1 GB hard drive costs US$5000. The 9500/132 with 2 GB drive costs US$5800.
- IBM and Motorola announce that test samples had been made of the PowerPC 604 microprocessor at 120-MHz and 133-MHz.

- IBM debuts the Power Series 830 workstations with the PowerPC 604 microprocessor (100-133 MHz), and the ThinkPad Power Series 850 with the PowerPC 603e, at the PC Expo in New York.
- Iomega introduced an internal version of its 100MB removable cartridge Zip drive.
- Iomega introduced the Jaz line of high-capacity removable cartridge drives. The cartridges hold 1 gigabyte, costing about US$100 each. Transfer rate of the drive was up to 5MBps.
- IBM added the 133-MHz Pentium to its IBM PC 700 line.
- Data General announced that future Aviion workstations would use Intel processors, not Motorola's 88000 chip.
- Boca Research signs a letter of intent to buy Hayes Microcomputer Products for US$72 million, choosing to use the Hayes name for the merged company.
- To this point, Apple Computer had sold 2 million Power Macs and upgrade cards since their initial release.
- Advanced Micro Devices announced sample availability of the clock-tripled 120-MHz Am486 DX4 processor.
- Compaq Computer introduced the 120-MHz Pentium-based Compaq Deskpro XL, starting at US$3950.
- Microsoft released Windows NT v3.5.1.
- Microsoft released Windows NT v3.5.1 for the PowerPC.
- CNET, launched on television in April, at this point was presented over the internet.

Summer: 14th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (4.2), on a Sony 256-Megabyte magneto-optical disk, continuing to incorporate the results of researches into the existing databases into subsidiary chronologies plus adding the following new materials to the Thoreau contexture:

ELECTRIC WALDEN

- the full text of Henry Thoreau's "A Yankee in Canada"
- the content of all back issues of the Thoreau Society Bulletin
- summary of correspondence 1837-1862 by date, with names and locations of correspondents

July: News items relating to the development of ELECTRIC WALDEN technology:

- Symantec bought Delrina.
- IBM completed its US$3.5 billion acquisition of Lotus Development Corporation, making it a wholly-owned subsidiary.
- U.S. Robotics began shipping enhanced Courier V.Everything modems capable of transmitting data at up to 33.6Kbps.
- Seagate Technologies shipped the one millionth Barracuda 5.25-inch hard drive, since the line was introduced in 1993.
- Seagate Technologies shipped the one millionth Elite 3.5-inch hard drive, since the line was introduced in November 1989.
- Hewlett-Packard unveiled the DeskJet 1600C and 1600CM, color ink-jet printers.

July 30, Sunday: Russian and Chechen officials reached a partial agreement in Grozny to end the fighting.

A news item relating to the development of ELECTRIC WALDEN technology:

- Thousands of Minneapolis/St. Paul surfers lost their Net access because transients, lighting a bonfire under a bridge at the University of Minnesota, caused the insulation of bundles of fiber-optic cables strung underneath the bridge to melt.

August: The U.S. announced a total ban on all U.S. nuclear weapon testing. Good news.

Here are some news items relating to the development of ELECTRIC WALDEN technology:

- The Software Publishers Association announced packaging guidelines for retail software, in an attempt to reduce packaging and use less environmentally harmful materials.
- Pinnacle Micro introduced the Apex 4.6, a 5.25-inch optical drive, storing 4.6GB on a single removable disc. Transfer rate was up to 6MBps, with a seek time of 17ms. Costs were US$200 for cartridges, and US$1700 for the drive. Software supports Windows, Macintosh, and various Unix platforms.
- Microsoft and the US Department of Justice signed a "consent decree," which would govern Microsoft's licensing practices of Windows for the next 6.5 years. The ruling came after 4 years of investigation of monopolistic licensing practices.
- Apple Computer expanded its line of PowerMac systems using Intel's PCI bus, with the Power Macintosh 8500, 7500, and 7200. The 8500 used a 120-MHz PowerPC 604 processor.
- Lotus Development shipped SmartSuite 4.0 for Windows 3.1, for US$400.
- Intel demonstrated a system using a 150-MHz P6 CPU, running Windows 95.
- Boca Research abandoned its plans to merge with Hayes Microcomputer Products.
- Microsoft released Windows 95. More than 20,000 retail stores offered copies for sale. Microsoft prepared for support calls, with 1600 people staffing tech support lines. 1 million copies of the new and upgrade versions were sold through retail channels within the 1st 4 days.
- Compaq Computer introduced nine new desktop models based on the 133-MHz Pentium processor.
- Compaq Computer and Fisher-Price teamed up to develop, manufacture, and market a new line of educational and entertainment-oriented products.
- Microsoft introduced Microsoft Office 95.
- Hewlett-Packard introduced the DeskJet 850C and 855C, color ink-jet printers. Prices: US$658 and US$663, respectively.

August 9, Wednesday: A news item relating to the development of ELECTRIC WALDEN technology: A number of Net related companies went public, with Netscape leading the pack and gaining the 3d largest ever to date NASDAQ IPO share value.

September: The Washington Post, in conjunction with The New York Times, published the UNABOM 35,000-word diatribe against technology "Industrial Society and its Future" (the author was identifying himself as "FC"). Here's a highlight:

> The system does not and cannot exist to satisfy human needs. Instead, it is human behavior that has to be modified to fit the needs of the system. When skilled workers are put out of a job by technical advances and have to undergo "retraining," no one asks whether it is humiliating for them to be pushed around in this way. It is simply taken for granted that everyone must bow to technical necessity and for good reason: If human needs were put before technical necessity there would be economic problems,

> unemployment, shortages or worse. The concept of "mental health" in our society is defined largely by the extent to which an individual behaves in accord with the needs of the system and does so without showing signs of stress.

(Uh, OK. Ted, are you sure you really needed to kill people in order to be able to say stuff like this?)

News items relating to the development of ELECTRIC WALDEN technology:

- Diamond Multimedia Systems acquires modem maker Supra, for cash and stock worth US$54 million.
- AT&T shuts down NCR, at a cost of US$1.2 billion.
- IBM introduced the Aptiva PC.
- Intel announced the official name for the P6 chip: Pentium Pro.
- Two groups of companies agree on a proposed high density compact disc format. The new format would allow up to 18.8 gigabytes total on a double-sided disc.
- One month after the release of Windows 95, an estimated 7 million copies had been sold to end-users.
- Six months after its release, 30,000 units of Microsoft' Bob had been sold.
- Intel introduced the 83-MHz Pentium OverDrive processor, for replacement in 33-MHz 486DX and 486DX2/66 systems. Price: US$300.
- Novell sold UnixWare and the rights to the UNIX operating system to Santa Cruz Operations for US$145 million.
- Intel announced the 80486SXSF and GXSF 486 microprocessors, designed for hand held computer products. The GX had a 16-bit bus, the SX a 32-bit bus. Both were 33-MHz, operating on 2.0-3.3 volts.
- AT&T spins off its computer subsidiary (formerly NCR) as AT&T Global Information Solutions.
- The 1st life radio broadcast over the internet, a sports program put out by Broadcast.com.

September 14, Thursday: Bosnian Serbs agreed to the NATO ultimatum of September 3d and the bombing stopped.

A news item relating to the development of ELECTRIC WALDEN technology: Registration of domain names was no longer free. A $50 annual fee was imposed, which up until this point had been subsidized by NSF (the NSF continues to pay for .edu registration, and on an interim basis for .gov registration).

October: A letter to Penthouse, "The Unabomber Speaks" (pages 57-59).

News items relating to the development of ELECTRIC WALDEN technology:

- Digital Equipment announced its Alpha 21164 processor running at 333-MHz.
- Intel introduced a 120-MHz Pentium designed for mobile computers.
- NexGen announced the Nx686 processor. It integrates new multimedia instructions and a multimedia execution unit into the x86 architecture.
- Seagate Technologies and Conner Peripherals agree to a US$1.1 billion merger.
- Sun Microsystems shipped the 143-MHz and 167-MHz versions of the UltraSparc processor.
- Intel released the mobile version of the 120-MHz Pentium processor.

- Advanced Micro Devices and NexGen announce a planned merger, in which NexGen would become a subsidiary of Advanced Micro Devices. The cost to Advanced Micro Devices was US$861 million in stock.
- IBM celebrates the 1st anniversary of launching OS/2 Warp, with nearly 4 million copies sold.
- IBM released the ThinkPad 760CD, with the industry's 1st 12.1-inch thin-film transistor display on a laptop. The laptop used a 120-MHz Pentium processor.
- Motorola announced pricing and general availability of 100- and 120-MHz versions of its PowerPC 603e microprocessor. Prices were US$207 and US$260 each, respectively, in quantities of 1000.
- Jim Manzi announced his resignation as CEO of Lotus Development.
- Novell announced its decision to exit from the personal productivity applications business, to focus on networking software.
- Cyrix released the 100-MHz 6x86 microprocessor (formerly code-named M1). The chip was manufactured by IBM, and priced at US$450 each in quantities of 1000.
- Cyrix announced sample availability of the 120-MHz 5x86, available for US$160 each in quantities of 1000.
- Six weeks after its release 4 million copies of Windows 95 had been sold.
- Microsoft reports selling 7 million copies of Windows 95 in under two months of its release.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Power Computing began shipping the PowerWave 604 series of Macintosh-compatible PowerPC-based microcomputers. They use the 120- to 150-MHz PowerPC 604 processors. Prices start at US$3200.
- President of Amiga Technologies announced that the Power PC processor would be used in Amiga computers sometime in 1997.
- U.S. Robotics began shipping enhanced Sportster v.34 modems capable of transmitting data at up to 33.6Kbps.
- Intel released the Pentium Pro microprocessor, at speeds 150-200 MHz, available initially for US$974 to US$1682.
- SPARC Technology Business, a division of Sun Microsystems, Inc., announced the sampling of the 200-MHz 64-bit UltraSPARC-I microprocessor.
- Sun Microsystems introduced new Ultra 1 and Ultra 2 workstations, based on the 64-bit UltraSparc microprocessor. Initial speeds were 143-, 167-, and 200-MHz, with prices ranging from US$16,500 to US$60,000.
- NexGen announced the sampling of the 120-MHz Nx586 processor (US$303 each in quantities of 1000) and announced the sampling of the 133-MHz Nx586 processor (US$447 each in quantities of 1000).
- Advanced Micro Devices began shipping samples of its 133-MHz Am5x86 Pentium-class processor. Price was US$93 each in quantities of 1000.
- Mitsumi announced a 128-MB 3.5-inch flexible disk drive system, compatible with 720KB and 1.44MB diskettes.
- IBM, Apple Computer, and Hewlett-Packard dissolve Taligent Inc.
- IBM, Apple Computer, and Motorola release the PowerPC Platform specifications, called the Common Hardware Reference Platform (CHRP). It encompasses support for Macintosh System 7, Windows NT, AIX, Solaris, Netware, and OS/2. Windows 3.x and Windows 95 were excluded.
- Microsoft shipped the Internet Explorer, version 4.0.

Winter: 16th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (4.4), on a Sony 256-Megabyte magneto-optical disk, continuing to incorporate the results of researches into the existing databases into subsidiary chronologies plus adding the following new materials to the Thoreau contexture. At this point transfer began from the UNIX development platform used for initial work on this project to the eventual delivery platforms of choice, the Windows95 and Macintosh environments:

- full text of the seldom-considered Part II of John Bunyan's PILGRIM'S PROGRESS: "Christina's Progress," and its correlation with Louisa May Alcott's LITTLE WOMEN and LITTLE MEN
- full text of various documents of American history commented upon by Henry Thoreau

December: News items relating to the development of ELECTRIC WALDEN technology:

- IBM and Apple Computer dissolve Kaleida Labs.
- Apple Computer shipped the Newton 2.0 operating system.
- IBM shipped a record 1 million copies of OS/2 Warp in the month, bringing the installed base to 12.7 million.
- IBM completed work on OS/2 for the PowerPC.
- Microsoft made a public declaration of its strategy for seizing primacy in the Internet.

1996

News items relating to the development of ELECTRIC WALDEN technology:

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- The 8X CD-ROM drive was introduced, with throughput of 1,200 KBps, costing not more than $400. Soon there would be 10X and 12X CD-ROM drives with claimed throughput of up to 1,800 KBps, costing approximately $250. CD-R prices for compact disk-recordable drives dropped below $500. This technology let mainstream PC users create their own 650MB CD-ROMs for data archiving or distribution. The user could write to each blank disk only once.
- Micro Express shipped the MicroHex-686/100, the 1st computer using the Cyrix 6x86 microprocessor.
- Advanced Micro Designs discontinued the NexGen Nx586 processor.
- More personal computers were purchased in the US in this year than television sets. This "crossover point" is presumably irreversible, since PCs have been becoming obsolescent at a far greater rate than TVs, and since in all likelihood the next generation of PCs will be able to double as TV sets in their own right.
- The technologies of this year were Search engines, JAVA, and the Internet Phone, and the emerging technologies were VRML virtual environments, collaborative tools, and Internet appliances.
- The Internet 1996 World Exposition was the first World's Fair to take place on the Internet.
- Internet phones, a technology which had been around for years, caught the attention of the Luddites of the establishment US telecommunication companies, who promptly demanded that the US Congress prohibit all such new and innovative technology.

- The controversial US Communications Decency Act became law in the US in order to prohibit distribution of indecent materials over the Net but a few months later a three-judge panel would find this to be entirely unconstitutional and impose an injunction against enforcement.
- As a result of having neglected to pay over their requisite domain name fee, some more than 9,000 organizations found themselves suddenly and tragically unlisted — the InterNIC had arbitrarily discontinued their name service.
- American OnLine (AOL) suffered a 19 hour outage, bringing into question whether ISPs would be able to handle the growing number of users.
- Severe restrictions began on Internet use around the world: China began to require users and ISPs to register with the police, Germany cut off access to some newsgroups carried on Compuserve, Saudi Arabia confined Internet access to universities and hospitals, Singapore required political and religious content providers to register with the state, and New Zealand classified computer disks as "publications" that might be subject to censor and seizure. Meanwhile, Qatar (QA), Vientiane (LA), Djibouti (DJ), Niger (NE), Central African Republic (CF), Mauretania (MF), Oman (OM), Norfolk Island (NF), Tuvalu (TV), French Polynesia (PF), Syria (SY), Aruba (AW), and Cambodia (KH) were establishing connections to the NSFNET.
- Introduction of the first really affordable CD-Recordable (CDR) drives, at around $1,000. Within six years the price had dropped from $25,000 to $10,000 to $2,000 to $1,000, or, very roughly, being reduced in cost at an incredible rate of about half its cost per annum. Late in this year erasable and reusable disks are to be expected. Although it is anticipated that street prices will be halved again by this Christmas, to hover at around $500, further improvements to this device could be expected to occur primarily in the areas of format usefulness and storage density rather than in cost. That is, cost per megabyte of storage will continue to fall while device utility will improve, but the device price itself is expected to remain approximately steady.

- A new data storage technology was introduced, measuring changes in resistance to the flow of electricity rather than changes in magnetic flux (magneto-resistive memory technology superseding magneto-sensitive). Even though the size of the hard drive was being reduced from 3 1/2 inches to 2 1/2 inches in diameter, the disk storage capacity increased from 400,000,000 bits per square inch to 1,300,000,000 bits per square inch, so that these newer 2 1/2-inch hard drives would still store either one or two gigabytes. (This development achieved a 650,000-fold increase in storage density of computer hard drives over the 1st 40 years of development. Had aircraft, by way of contrast, achieved such a rate of improvement in the 1st 40 years of their development, by the end of World War II we would have been circling the globe at nearly the speed of light and coming down for refueling at only about every 400th orbit!)
- The percent of US public schools connected to the Internet was:

1994	**35%**
Fall 1996	**65%**

January: News items relating to the development of ELECTRIC WALDEN technology:

- Advanced Micro Devices and NexGen completed their merger, with AMD paying US$623 million for NexGen.
- Intel announced the immediate availability of the 60/150-MHz Pentium P55C processor and of the 66/166-MHz Pentium P55C processor. Pricing was US$547 each, and US$749 each, in quantities of 1000.
- NeXT ended development of its NextStep operating system.
- IBM released OS/2 for the PowerPC.
- Umax Data Systems bought Radius' Macintosh operating system license.
- Philippe Kahn resigned as chairman of Borland International.
- Compaq announced the Scanner Keyboard at US$350. This device incorporated a color page scanner into an otherwise ordinary keyboard.
- Silicon Graphics introduced new workstations based on the MIPS Technologies R10000 microprocessor.
- Corel purchased WordPerfect, Quattro Pro, and the PerfectOffice application suite from Novell for US$180,000,000 in cash, stock, and future licensing royalties.
- The DEC Digital Equipment Corporation announced it was exiting from the consumer desktop PC market, and discontinuing the Starion line of multimedia PCs.
- The US Supreme Court upholds a ruling that Borland International's Quattro Pro did not violate Lotus Development's Lotus 1-2-3 copyrights. The original suit was filed during July 1990.
- Intel renamed its P7 processor Merced.
- Apple Computer's board of directors fired CEO Michael Spindler, and demoted co-founder Mike Markkula from chairman to vice chairman.
- Advanced Micro Devices and Intel signed a five-year patent cross-license agreement.
- The US Supreme Court voted 4-4 on the Lotus/Borland "look-and-feel" issue, upholding the decision of appeal in March 1995.
- Apple Computer publicly showed the Macintosh operating system running on an IBM system (PowerPC-based) for the 1st time.

February: News items relating to the development of ELECTRIC WALDEN technology:

- Micron Electronics closed subsidiary company Zeos.
- Santa Cruz Operations released SCO UnixWare 2.1.
- Microsoft released the Windows 95 Service Pack 1 operating system update.
- Motorola shipped samples of the 64-bit PowerPC 620 processor.
- Seagate Technologies and Conner Peripherals completed their merger.
- Apple Computer's board of directors named Gilbert Amelio as new CEO, president, and chairman of the company.
- IBM announced it was abandoning plans to develop its Power Personal Series line of PowerPC-based desktop PCs.
- Cyrix announced volume availability of the 110-MHz P133+ 6x86 microprocessor, for US$326.
- Cyrix announced volume availability of the 60/120-MHz P150+ 6x86 microprocessor, for US$451.
- Cyrix announced limited availability of the 66/130-MHz P166+ 6x86 microprocessor, for US$621.
- IBM shipped OS/2 Warp Server.
- Apple Computer licensed the MacOS to Motorola.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft shipped the 30 millionth copy of Windows 95.
- Packard Bell Electronics received Zenith Data Systems, as part of a US$650 million deal with NEC and Groupe Bull.
- Computer-maker CompuAdd shut down operations.
- Silicon Graphics and Cray Research agreed to merge, at a cost of about US$764 million to Silicon Graphics.
- Compaq Computer introduced the 180-MHz Pentium Pro-based Prolinea.
- Intel released the 120-MHz OverDrive (Pentium) processor for 60-MHz systems, with the 133-MHz version for 66-MHz systems, and the 125-MHz version for 75-MHz systems. Price for any of the chips was US$400.
- Advanced Micro Devices began shipping the AMD5K86 microprocessor. Prices were US$75 each for the AMD5K86-P75, and US$99 each for the AMD5K86-P90, in quantities of 1000.
- Digital Equipment introduced the HiNote Ultra II, subnotebook. It features a 100/120/133-MHz Pentium, weighs 4 pounds, 10.4-inch color SVGA active matrix screen, removable memory/hard drive pack, removable CD-ROM/speaker pack, and removable external ports pack. Prices range from US$3000-6000.
- Iomega sold its 1-millionth Zip drive.
- Digital Equipment unveiled 366-MHz and 400-MHz versions of its Alpha microprocessor.

Spring: 17th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (5.1), continuing to incorporate the results of researches into the existing databases into subsidiary chronologies plus adding the following new materials to the Thoreau contexture:

ELECTRIC WALDEN

- elaborate extracts from John Evelyn's 17th-Century journal of court life in England, for comparison and contrast with Thoreau's journal
- full text of Eugene Ring's diary of his adventures to the California gold fields in 1848-1850, immerged in the chronology of his life and compared and contrasted with Henry Thoreau's various comments about the goldseeking fever

April: News items relating to the development of ELECTRIC WALDEN technology:

- Hewlett-Packard began shipping the HP LaserJet 5 line of laser printers.
- Silicon Graphics completed its purchase of Cray Research for US$764,000,000.
- Corel released Corel WordPerfect Suite 7, and Corel Office Professional Suite.
- Apple Computer introduced the Power Macintosh 9500/150, with a 150-MHz PowerPC 604 processor.

May: A news item relating to the development of ELECTRIC WALDEN technology: Microsoft shipped version 3.0 of the Internet Explorer.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— *Carl Sagan*

June: News items relating to the development of ELECTRIC WALDEN technology:

- Sony Information Technologies of America introduced Sony's new line of consumer-based PC systems, priced at US$2000-3000.
- Intel began shipping small quantities of the 200-MHz Pentium processor.
- IBM began shipping small quantities of its version of Cyrix' 150-MHz 6x86 processor.
- Cyrix introduced the 6x86-P200+ processor.
- SunSoft released Wabi 2.2.
- Nintendo announced the Nintendo 64, a 64-bit game system.
- Advanced Micro Devices began shipping the K5-PR100 microprocessor. It was a 100-MHz Pentium-compatible plug-in replacement. Price was US$84 each for 1000.

September: A news item relating to the development of ELECTRIC WALDEN technology: The internet became available by way of one's TV cable, through WebTV.

October: News items relating to the development of ELECTRIC WALDEN technology:

- USRobotics shattered modem speed barrier, delivering 56Kbps over standard telephone lines.
- Microsoft and Intel launch NetPC with industry leaders.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Samsung (the world's largest memory chip supplier, said it had developed a fully working prototype of a 1-gigabit DRAM chip.
- Gateway 2000's Destination Big Screen PC and NetTV's WorldVision 2900 were the 1st to start selling PCTV, but they're by no means alone. Zenith, Sony, Compaq, and Curtis Mathes all had plans to release PC TVs within the year.
- Sun Microsystems announced JAVA on a chip.

- Enorex Microsystems introduced the Enorex Ultra PC line of Digital Equipment Alpha processor-based workstations. The systems offer 366-MHz to 500-MHz speeds, and come with Microsoft Windows NT 4.0 Workstation. Prices start at US$3000.
- Compaq Computer shipped the PC Companion, a hand-held computer running Windows CE. Weight was under 1 pound. The unit measures 7 inches wide by 3.5 inches deep. It runs on AA batteries, lasting up to 20 hours. Prices range from US$499 (2MB RAM) to US$699 (6MB RAM).
- NEC Computer Systems shipped the MobilePro HPC, a hand-held computer running Windows CE.
- Hitachi Home Electronics shipped the Hitachi Handheld PC, running Windows CE.
- Casio Computer shipped the Cassiopeia, a hand-held computer running Windows CE.
- IBM showed a prototype Professional Workstation at Fall Comdex, with a 16.1-inch color active-matrix flat-panel LCD screen.
- Microsoft unveiled Microsoft Office 97 at Fall Comdex. Prices: standard edition US$499 (upgrade US$209), professional edition US$599 (upgrade US$309).
- IBM showed a 300-MHz version of the PowerPC processor at Fall Comdex in Las Vegas, Nevada.

Winter: 20th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (5.4), on a 560Meg dye substrate CD-R disk, continuing to incorporate the results of researches into the existing databases into subsidiary chronologies plus adding the following new materials to the Thoreau contexture:

ELECTRIC WALDEN

- incorporation of summaries of recent journal articles into the database
- beginnings of work on Thoreau's use of various animals as metaphors, to parallel the work already done on collecting his various use of birds and plants as metaphors
- incorporation of Henry Thoreau's and Frederick Douglass's lecture schedules
- an analysis of 19th-Century anarchism showing that it had no points of connection with Thoreau
- collection of Boston city maps from various periods
- 19th-Century ballooning and how it related to Thoreau's tropes
- Pinkster as a holiday
- America's first folk song and Thoreau's references to it

December: A news item relating to the development of ELECTRIC WALDEN technology: During this year we had seen the introduction of the first really affordable CD-Recordable (CDR) drives, at around $1,000. Within six years the price had dropped from $25,000 to $10,000 to $2,000 to $1,000, or, very roughly, had been being reduced in cost at an incredible rate of about half its cost per annum. Following the rule "Buy it when you need to use it," at that price level this "Kouroo" project bought one. At this point late in the year erasable and reusable disks were being introduced. By about Christmas, street prices were being halved again, to hover at around $500, and thus, further improvements to this device could be expected to occur primarily in the areas of format usefulness and storage density rather than in cost. That is, our expectation was that cost per megabyte of storage would continue to fall while device utility would improve, as the new disks are introduced which hold up to seven times as much data, but from this point forward the device price itself would be expected to remain approximately steady.

1997

A news item relating to the development of ELECTRIC WALDEN technology: Compact disk-rewritable (CD-RW, also called compact disk-erasable) drives and media let users overwrite files on CDs they have created. CD-RW disks were backward-compatible, letting any standard CD-ROM drive read them. The paradigm shift to DVD-ROM disks began. These read-only disks held 4.7GB of data, and the format was standard to both the PC and the consumer electronics markets. The drives could read legacy CD-ROM disks.

Data Storage

Year	Capacity	Cost per MB
1956	5 MB	$10,000.00
1991	145 MB	$5.23
1997	2.65 GB	$0.10

January: A news item relating to the development of ELECTRIC WALDEN technology: The intel Corporation's MMX was the biggest advance in PC processors since the 386. Not a new chip, but a new technology that would be applied across Intel's entire line of CPUs, MMX speeds up key multimedia and communications operations using a new set of 57 processors instructions. The Pentium MMX chip also had a 32K cache instead of the ordinary Pentium's 16K, delivering a substantial processing speed boost with any application. Six big names had started selling MMX system: Micron, Dell, Packard Bell, NEC, Toshiba, and Gateway 2000. These heavy hitters all had their own spin on next-generation multimedia hardware.

March: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer acquired NeXT Software, a Steve Jobs company, for $430,000,000 (the smartest investment out of its cash-heavy "war chest" it ever made).[75]
- Gateway acquired the assets of Amiga Technologies.
- Intel was shipping new samples of its MMX-capable Pentium II processor to vendors and system board manufacturers with some samples capable of running at 300 MHz.
- The 1st internet telephone-to-telephone service.

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

75. As of September 26, 2015 Apple's "war chest" of available cash and cash equivalents, short-term marketable securities, and long-term marketable securities amounted to more than $205,000,000,000 (a whole lot of this is stuck overseas because when Apple brings these earnings back into the USA it will be obliged to pay taxes on them).

April 2, Wednesday: The Polish Sejm approved a new constitution.

Phantasyplay for piano by George Perle was performed for the initial time, in New York.

News items relating to the development of ELECTRIC WALDEN technology:

- AMD announced 166-MHz, 200-MHz, and 233-MHz versions of its long-awaited K6 CPU, a competitor to Intel's forthcoming Pentium II and Pentium 233-MMX processors.
- Microsoft bought WebTV for US$425,000,000.

May: News items relating to the development of ELECTRIC WALDEN technology:

- Exponential Technologies, the maker of high-performance processors slated for Macintosh computers, was closing its PowerPC operations. Announcement that the company was laying off 25 percent of its workforce and only days after Apple Computer (AAPL) executives said they would not use Exponential's X704 processor in any systems for the foreseeable future.
- Digital Equipment filed a lawsuit against Intel, claiming infringement of 10 Digital Equipment patents in Intel's Pentium Pro and Pentium II processors.

May 7, Wednesday: The International Criminal Tribunal for the Former Yugoslavia in The Hague found Dusan Tadic guilty of 11 counts of war crimes and crimes against humanity (this would be its initial decision that would be contested).

A news item relating to the development of ELECTRIC WALDEN technology: Intel launched its new Pentium II processor.

June: News items relating to the development of ELECTRIC WALDEN technology:

- Netscape release internet communicator 4.0.
- Steve Jobs sold 1.5 million shares of Apple Computer stock, that he received in December as part of Apple Computer's purchase of his NeXT Software.
- Microsoft invests US$1 billion in ComCast, a venture to provide speedy web access via cable lines.
- Compaq Computer bought Tandem Computers for US$3 billion.
- NASA's Pathfinder pictures of Mars were made available over the internet.

July: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Computer introduced OS/8
- Gilbert Amelio resigned as president, CEO, and chairman of Apple Computers.

August: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft invested $150,000,000.00 US in Apple Computer Microsoft also agreed that when it made major software releases in the future, it would release both Windows and Macintosh versions of the products simultaneously. Microsoft also agreed by the end of this year to issue a Macintosh version of its Office 98 software and committed to release Macintosh versions of Office for the

next 5 years. In exchange, Apple would make Microsoft's Internet Explorer the default Internet browser on its computers.
- Motorola announced the StarMax 6000 Macintosh-compatible system.

September: News items relating to the development of ELECTRIC WALDEN technology:

- Microsoft Corp. released Internet Explorer 4.0 software.
- Next-Generation Internet. In a move that could cast shadows on the next-generation Internet 2, both houses of Congress voted to slash fiscal 1998 funding for the project (The House voted for $78 million and the Senate for only $35 million). Just as the current Internet once was, the Internet 2 was initially targeted to serve universities and research institutions that need a higher-speed, less trafficked, and more capable version of the Internet. As Internet usage had skyrocketed to include far more people than those at such organizations, the need for a smaller-scale, research-focused, private Internet had increased. Over 100 organizations and the U.S. government were financially backing the Internet 2's construction.
- Quote by Aberdeen Group Inc.'s research analyst Mark Peabody: "The only influence Netscape had is with the web heads who are coding at 2 o-clock in the morning with 10 Cokes in front of them.".
- Steve Jobs was named interim CEO of Apple Computer.

October: News items relating to the development of ELECTRIC WALDEN technology:

- Apple Power Mac 6500 was released. A 300-MHz 603e processor, a 50-MHz system bus, and 512 KB of L2 cache clocked at 50 MHz. It's 64 MB of RAM. For storage, it had 5-GB hard drive, a 12X SCSI CD-ROM drive, and a 100-MB Iomega Zip drive. A 33.6-Kbps modem. Video was ATI 3D Rage II+. All that for $3000.00 US.
- Motorola exited the Macintosh-compatible market.
- Intel and Digital Equipment settled their lawsuits with a ten-year patent license agreement, among other things.
- Microsoft shipped version 4.0 of the Internet Explorer. The US Department of Justice asked a federal court to hold Microsoft in contempt because, in violation of its consent degree, it appeared to be forcing PC makers to distribute the Internet Explorer as a condition of their selling Windows 95.
- Intel Corporation announced that the 1st member of its new family of 64-bit microprocessors, code named Merced™, was scheduled for production in 1999. The processor was to be produced on Intel's 0.18 micron process technology, which was currently under development. The Merced processor would extend the Intel Architecture with new levels of performance and features for servers and workstations. Merced processors would run all the software that currently operates on 32-bit Intel processor-based machines.

November: News items relating to the development of ELECTRIC WALDEN technology:

- Seagate Technology shipped its 100 millionth disc drive, a Seagate Medalist 2.5 GB 3.5-inch hard drive. The drive was presented to the Tech Museum of Innovation in California.
- Sun Microsystems took legal action against Microsoft for shipping Internet Explorer 4.0 with a non-standard implementation of Java.

November 10, Monday: A news item relating to the development of ELECTRIC WALDEN technology: IBM announced the world's highest capacity desktop PC disk drive with new breakthrough technology called Giant Magnetoresistive (GMR) heads. Pioneered by scientists at IBM Research, GMR heads would be used in IBM's new Deskstar 16GP, a 16.8-gigabyte drive that holds eight times more information than today's average desktop hard drive. The new drive could hold 8 hours of full-motion video (MPEG-2 quality video) or information that when printed fills more than 16 pickup trucks. No bigger than the head of a pin, the GMR head was a major advancement over the previous technology called a magnetoresistive head. The GMR head was the world's most sensitive sensor for reading computer data on hard drive products. With it, Deskstar 16GP brings high-powered workstation capacity and performance to the average desktop PC user.

MCI Communications, Inc. accepted a takeover bid from WorldCom, Inc. for $37,000,000,000. It is the largest corporate merger in United States history. The new company, MCI WorldCom, was the 2d largest telecommunications company in the United States.

Mir Aimal Kasi, a Pakistani national, was convicted of ten charges in the shooting deaths of 2 people outside the Central Intelligence Agency in 1993. One of the counts was capital murder. 3 other people were injured.

December: A news item relating to the development of ELECTRIC WALDEN technology: U.S. District Judge Thomas Penfield Jackson stunned the industry by issuing a temporary restraining order to the effect that software giant Microsoft must license its Windows 95 operating system to PC makers without requiring them to also take the Microsoft Internet Explorer browser.

1998

News items relating to the development of ELECTRIC WALDEN technology:

- Jimmy Wales, a Chicago options trader, had made enough money to quit his job and use his market gains to found an Internet portal.
- High-Capacity DVD-ROM was introduced. Subsequent iterations of the DVD format had increased capacities to 8.5GB for dual-layer designs; to 9.7GB for double-sided, single-layer implementations; and to 17GB for double-sided, dual-layer designs. DVD-RAM random access memory drives allowed users to create their own 2.6GB DVDs. The industry opinion was that it would likely skip the write-once format and go straight to designing rewritable disks (à la CD-RW technology).

Spring: 25th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (7.1), continuing to incorporate the results of researches into the existing databases into subsidiary chronologies plus adding the following new materials to the Kouroo Contexture:

- A "concepts" directory has been added, to lead the user directly from the filesystem browser into the contexts in which various concepts, such as "Transcendentalism," "emancipation," "sympathy," and "wildness," find their primary originative explanation.
- A study of the various islands along the northern Atlantic seaboard, such as Appledore, Nantucket, and Long, and in Boston harbor, such as Green, Spectacle, Clarks, and Deer, has been added to the database, indicating the role of each of these islands in the course of American history and whether and when Thoreau visited or sighted these islands.
- The full text of Mistress Mary Rowlandson's CAPTIVITY AND RESTAURATION OF MRS MARY ROWLANDSON has been integrated into the chronology in the manner in which the full text of Richard Henry Dana, Jr.'s TWO YEARS BEFORE THE MAST had previously been integrated.
- A chronology for Mrs. Hannah Emerson Duston's captivity and escape has been added to the master chronology for the 17th Century.
- The history of the Nipmuc Country has been chronologized.
- A directory of the 91 ministers known to Thoreau has been added.
-

June 24, Wednesday: AT&T announced it was purchasing Tele-Communications, Inc. for stock worth $37,300,000,000.

Ted Kaczynski, shopping a proud new anti-technology manifesto[76] among New York publishers, posted a handwritten 4-page pitch from his prison cell to Simon & Schuster in the hope they would be interested in selling his side of the mental-defect story, with all proceeds of course to go by law to his surviving victims and the families of the three who had not survived (after careful consideration, senior editor Bob Bender would decline this project).

76. Have I mentioned that this was the year in which the high-capacity DVD-ROM we all know and love was being introduced? Subsequent iterations of the DVD format had increased capacities to 8.5GB for dual-layer designs, to 9.7GB for double-sided, single-layer implementations, and to 17GB for double-sided, dual-layer designs. The new DVD-RAM random access memory drives would allow users to create their own 2.6GB DVDs. Industry opinion was that they would likely skip the write-once format and go straight to designing rewritable disks à la CD-RW technology. Gee whiz!

Summer: 26th issue of the new cumulative-rather-than-iterative series of The Thoreau Quarterly (7.2), continuing to incorporate the results of researches into the existing databases into subsidiary chronologies plus adding the following new materials to the Kouroo Contexture:

ELECTRIC WALDEN

- Remarks made in WALDEN about birds have been incorporated into the bird-sighting files which previously contained only the bird references in the JOURNAL, A WEEK ON THE CONCORD AND MERRIMACK RIVERS, THE MAINE WOODS, and CAPE COD.
- A day-planner calendar for the years between 1817 and 1862 has been incorporated, so that the user may directly check what day of the week is represented by each calendar date.
-

October: A news item relating to the development of ELECTRIC WALDEN technology: The beginning of digital HDTV broadcasting.

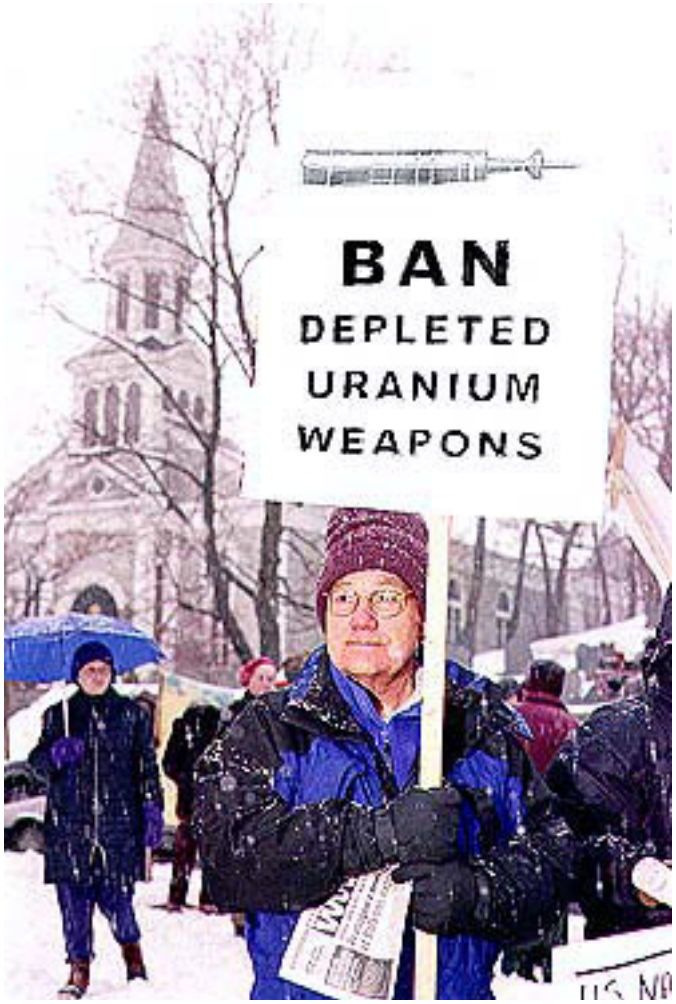
2001

A news item relating to the development of ELECTRIC WALDEN technology: At this point spam accounted for 8% of e-mail traffic. (At our present high point in 2003, up to 40% of the Internet e-mail messages arriving in people's inbaskets amount to unsolicited spams. Few of these spammers offer any actual product for sale. Virtually all of the penis-elongation devices, etc. being offered endlessly, simply do not exist in the sender's inventory. Spammers send such messages not to generate mail-order income directly, but to entice recipients to respond so that they can draw up huge lists of live e-mail addresses to then vend to other companies. Very often, the spam message will offer you a live link to click on, to signal that you do not desire to receive any more such spam e-mail — do not click on that live link, do not tell them that you desire no further such spam e-mails, because doing so will simply allow the spammers to add your e-mail address to the list of live addresses that they will be offering for sale.)

January 15, Monday: A news item relating to the development of ELECTRIC WALDEN technology: A couple of weeks before, Larry Sanger had been informed casually about the existence of a piece of software known as "wiki" that enabled collaborative writing and editing. Conceiving that such free collaboration might attract new contributors to Nupedia, an online encyclopedia project on which he and Jimmy Wales were laboring, they experimented with a wiki model in which each encyclopedia entry included a history page which preserved a record of all editing changes. It was Sanger who coined the term "Wikipedia." On this day the site went live.

In Concord's Monument Square, about fifty protesters, including several veterans of the military, protested mildly against the use of DU depleted uranium munitions in war, attempting to force a cleanup of the contaminated lot formerly occupied by Starmet Corporation in Concord. The Concord Board of Selectmen was

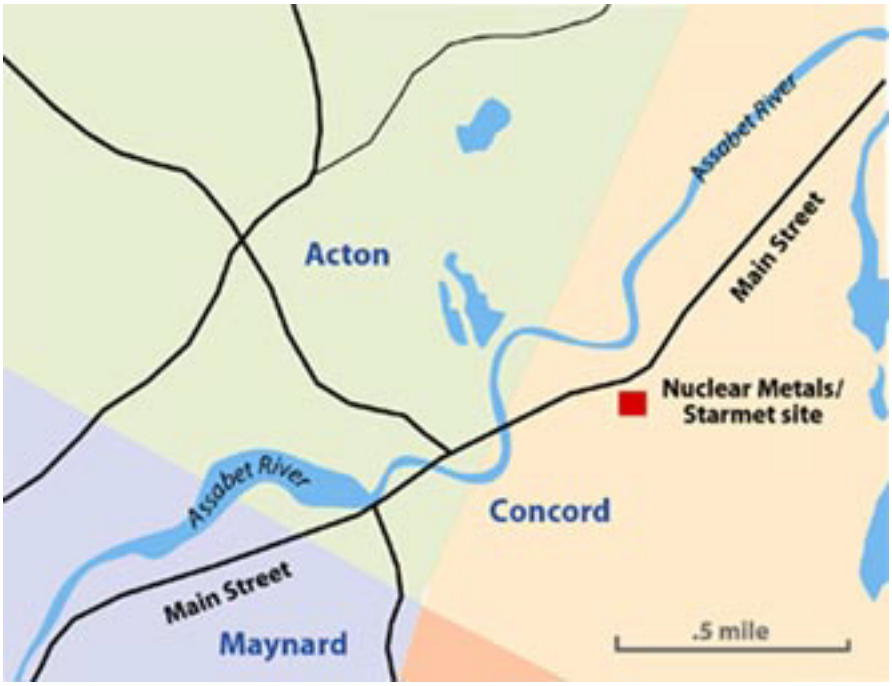
not hostile to this demonstration.



The United States has a 30mm Gatling-type General Electric gun that is capable of penetrating modern armor. Mounted on a Fairchild A-10 antitank airframe for ground use or installed in a gunship of the air, this weapon directs a stream of heavy tungsten or DU pellets upon its target.
The pellets release all their kinetic energy in the penetration of armor, as upon impact the heavy metal transforms into a powder. The DU aerosol isn't all that radioactive, but is chemically toxic and does cause nephritis. Starmet, formerly Nuclear Metals, Inc., got its start in the WWII Manhattan Project, and eventually came to manufacture DU rounds in Concord (2229 Main Street). Evidently it didn't handle its radioactive

materials all that carefully! Between 1958 and 1985 some 400,000 pounds of toxic waste (not just DU but also

beryllium and other random toxic agents) got dumped into an unlined holding basin at the rear of their property — and abandoned (there are rumors that there is also an "old dump site," as yet uninvestigated, which may contain waste materials from the WWII Manhattan Project to develop an atomic bomb). What appears to be the most contaminated area of the 46-acre plot is adjacent to Camp Thoreau, a summer camp for children ages three and up.



Despite this protest, in May the corporation would be cleaning up its Barnwell, South Carolina facility in preparation for selling the property, and in the process would illegally ship 1,700 barrels of depleted uranium greensalt from there to Concord. Soon the Concord site would be added to the Superfund National Priorities List, to attempt to prevent any more leaching of depleted uranium into the groundwater. Starmet Corporation would shift all such costs to the taxpayer through declaring bankruptcy. It has been estimated that this cleanup will require 10 years and cost at least some 50 millions of dollars.

January 17, Wednesday: A news item relating to the development of ELECTRIC WALDEN technology: Larry Sanger and Jimmy Wales sent e-mail to their Nupedia mailing list of about 2,000 people. “Wikipedia is up! Humor me. Go there and add a little article. It will take all of five or ten minutes.”

2005

A news item relating to the development of ELECTRIC WALDEN technology: Nature published a survey comparing 42 Wikipedia entries on scientific topics with parallel materials published by the *ENCYCLOPÆDIA BRITANNICA*. They found that Wikipedia had four errors for each three in the published *BRITANNICA* volumes. Predictably, *BRITANNICA* responded with a public statement repudiating this survey, and took out a half-page advertisement in the New York Times to protest that "We have a reputation not for unattainable perfection but for strong scholarship, sound judgment, and disciplined editorial review." Jimmy Wales, a founder of the Wikipedia, has said that he did not consider *BRITANNICA* a serious competitor. "I think they will be crushed out of existence within five years." Larry Sanger, another founder of the Wikipedia, has said that there is a fine distinction to be made "between knowledge that is useful and knowledge that is reliable, and there is no question that Wikipedia beats every other source when it comes to breadth, efficiency, and accessibility."

"If you wish to make an apple pie from scratch,
you must first invent the universe."
— Carl Sagan

2006

March 1, Wednesday: A news item relating to the development of ELECTRIC WALDEN technology: Wikipedia, the online interactive encyclopedia project launched in 2001, achieved 1,000,000 entries. By way of radical contrast, once upon a time the *EB* had merely 120,000 entries — and that was in the most comprehensive edition it ever published. There is even an entry for "Errors in the *ENCYCLOPÆDIA BRITANNICA* that have been corrected in Wikipedia." The Wikipedia Foundation, a nonprofit organization, has become the 17th-most-popular site on the Internet, receiving as many as 14,000 hits per second. All this is being managed by its founder, Jimmy Wales, and a staff of five employees in St. Petersburg, Florida, on small donations that collectively amount to a budget of about $750,000 per year.

"I liked the idea that a piece of information is really defined only by what it's related to, and how it's related. There really is little else to meaning. The structure is everything.... The brain has no knowledge until connections are made between neurons. All that we know, all that we are, comes from the way our neurons are connected."

– Tim Berners-Lee, WEAVING THE WEB: THE ORIGINAL DESIGN AND ULTIMATE DESTINY OF THE WORLD WIDE WEB BY ITS INVENTOR (1999)

ELECTRIC WALDEN

"It's all now you see. Yesterday won't be over until tomorrow and tomorrow began ten thousand years ago."

– Remark by character "Garin Stevens" in William Faulkner's INTRUDER IN THE DUST

Prepared: November 3, 2015

ARRGH AUTOMATED RESEARCH REPORT

GENERATION HOTLINE

This stuff presumably looks to you as if it were generated by a human. Such is not the case. Instead, someone has requested that we pull it out of the hat of a pirate who has grown out of the shoulder of our pet parrot "Laura" (as above). What these chronological lists are: they are research reports compiled by ARRGH algorithms out of a database of modules which we term the Kouroo Contexture (this is data mining). To respond to such a request for information we merely push a button.

Commonly, the first output of the algorithm has obvious deficiencies and we need to go back into the modules stored in the contexture and do a minor amount of tweaking, and then we need to punch that button again and recompile the chronology — but there is nothing here that remotely resembles the ordinary "writerly" process you know and love. As the contents of this originating contexture improve, and as the programming improves, and as funding becomes available (to date no funding whatever has been needed in the creation of this facility, the entire operation being run out of pocket change) we expect a diminished need to do such tweaking and recompiling, and we fully expect to achieve a simulation of a generous and untiring robotic research librarian. Onward and upward in this brave new world.

First come first serve. There is no charge.
Place requests with <Kouroo@kouroo.info>. Arrgh.