

Timeline of Hearing Devices and Early Deaf Education

1551 ~ Girolama Cardano (1501-1576), an Italian physician, philosopher and mathematician, writes in *De Subtilitate* about bone conduction of sound: how sound may be transmitted to the ear by means of a rod or the shaft of a spear held between one's teeth.

ca. 1555 ~ Spanish monk, Pedro Ponce de Leon (1520-1584), uses oral education methods to teach the deaf children of some members of the nobility, in a convent of Valladolid.

1588 ~ Giovanni Battista Porta (1535-1615), an Italian physician, scientist and cryptographer, described some early hearing aids in *Magia Naturalis*. The hearing aids were made of wood and shaped like the ears of animals known to have acute hearing.

1616 ~ Giovanni Bonifacio (1547-1635) publishes a treatise discussing sign language, *Of the Art of Signs*.

1620 ~ The first book exclusively on the deaf, *Reduction de las letras y arte para enseñar a ablar los mudos* (*Simplification of the Letters of the Alphabet and Method of Teaching Deaf Mutes to Speak*), by Juan Pablo Bonet (1579-1633), is published in Spain. The book proposes that deaf pupils should be taught the one handed manual alphabet, followed by articulation and only then, speaking and eventually reading and writing.



1640 ~ Marcus Banzer reports the first known attempt to use an artificial substitute for the tympanic membrane in his book *De Auditione Laesa*, published in Wittenberg.

1650 ~ Athanasius Kircher (1602-1680), a German scholar, mathematician and philosopher, includes a detailed discussion of speaking trumpets in his *Musurgia Universalis*, printed in folio in Rome.



1657 ~ Wolfgang Hoefler, a professor of medicine in Germany, mentions ear trumpets in use in Spain in *Herculis Medici, Sive Locorum Medicorum*.

1670 ~ Sir Samuel Moreland invents a large speaking trumpet. The first trumpet was 2 feet, 8 inches long and made of glass. It was 2-1/4 inches in diameter at the speaking end and 11 inches in diameter at the other end. His next model was made of brass and was 4-1/2 feet long, with a bell diameter of 12 inches. His third model was made of copper and was 16 feet long.

1673 ~ Athanasius Kircher writes *Phonurgia nova sive conjugium mechanico-physicum artis & naturae paranymta phonosophia concinnatum*, a book in which several hearing instruments are illustrated. Kircher also claims in the book to have invented the speaking trumpet.



1755 ~ Abbé Charles Michel de l'Épée establishes the first public school for the deaf in Paris. Samuel Heinicke (his contemporary) establishes the first public school for the deaf in Germany; it is the first recognized by any government. De l'Épée favored signs as method of teaching the deaf. Heinicke favored "oralism," speech and speechreading.

1757 ~ Jorrison, an elderly German merchant, "rediscovers" bone conduction as a hearing aid. Jorrison was sitting next to a harpsichord, when the pipe in his mouth accidentally rested on the harpsichord. He discovered that he could hear the music distinctly. Jorrison soon learned, by means

of a piece of hard wood placed against his teeth and those of the speaker, to keep up a conversation. Jorrison's observations were the subject of an inaugural medical dissertation by his son, Joannes Jorrison, published at Halle in 1757.

1760 ~ Thomas Braidwood (1715-1806) opens the first school in Britain for deaf-mutes, in Edinburgh. The school in Edinburgh was eventually closed and Braidwood opened a new school in London in 1783. This school became known as Old Kent Road Asylum for the Deaf and Dumb.

1776 ~ Charles Michel A. de l'Épée publishes *Instruction of Deaf and Dumb by Means of Methodical Signs*.



1782 ~ Roch Ambroise Cucurran Sicard (1742-1822) opens a school for the deaf at Bordeaux; he later writes *Theorie Des Signes*, an elaborate dictionary of signs.



1784 ~ Abba Silvestri opens the first school for the deaf in Italy in Rome.

Late 1700s ~ Funnel or conical ear trumpets are common hearing devices, often available in collapsible versions. Popular models are the Townsend Trumpet, the Reynolds Trumpet (designed for British portrait painter Joshua Reynolds), and the Daubeney Trumpet.

1800 ~

Frederick C. Rein establishes F.C. Rein and Son in London. It is the earliest firm known to manufacture hearing aids on a commercial basis. Rein's early products are non-electric hearing aids, such as ear trumpets, acoustic urns, and speaking tubes for churches. F.C. Rein remains in business until 1963.



1802 ~

F.C. Rein produces a receptor vase or epergne for a table center, whereby the sounds received are collected among the roses and fruit and relayed by a tube. A pierced grille covers each of the apertures, which face all the corners of a room.



1808 ~

Johann Nepomuk Mälzel, the German inventor best known as the inventor of the metronome, begins making ear trumpets. Mälzel makes several for composer Ludwig van Beethoven. Beethoven shows his gratitude by composing a canon imitating the metronomic tick in honor of Mälzel.

1812 ~

Jean Marie Gaspard Itard (1773-1838), a French military surgeon turned otologist, develops a bone conduction hearing device. The speaker held the narrow end of a wooden rod between his teeth and the listener held the broader end against his teeth.



1817 ~

The American Asylum for the Education and Instruction of the Deaf and Dumb, the first permanent public school for the deaf in the U.S. is founded in Hartford, Connecticut. The chief impetus was given by a young divinity student, Thomas Hopkins Gallaudet. Gallaudet enlisted the services of Laurent Clerc, a French teacher of the deaf who was trained in the manual approach of De l'Épée. Clerc, who was deaf himself, came to Hartford at the urging of Gallaudet, becoming the first deaf teacher of the deaf in the U.S. The school, now known as the American School for the Deaf, continues to this day to provide

educational and vocational training for deaf and hard-of-hearing children, youth, adults, and their families.

1819 ~

F.C. Rein makes an acoustic throne for King Goa (John) of Portugal. The throne consists of hollowed armrests, carved into lion's heads at the front. The armrest cavities lead to a resonant box located in the seat of the throne, and the sound is then heard via a hearing tube connected to the resonator.



1819 ~

Johann Heinrich August Duncker (1767-1843), a German optics manufacturer, patents the first speaking tube. A short leather-covered tube was connected to a longer flexible tube, which could be between five to ten feet, and then to a large metal cup.

1821 ~

Traite des Maladies de l'oreille et de L'audition, by Jean Marie Gaspard Itard (1773-1838), is published in Paris. The book contains several illustrations of hearing devices, such as ear trumpets and Itard's bone conduction hearing device. Itard also invented a mechanical acuity meter, the sound source being a tuned copper ring.



1836 ~

First known British patent for a hearing aid is issued to Alphonsus William Webster for a curved earpiece worn behind the ear.

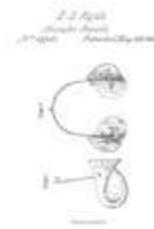
1837 ~

The first Catholic school for the deaf in the United States, St. Joseph's School for the Deaf, opens in St. Louis, Missouri.

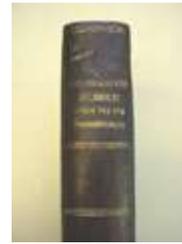
1853 ~

London surgeon Joseph Toynbee develops an artificial eardrum device consisting of a thin disk of vulcanized rubber affixed to a thin rod about 3 cm. long.

1855 ~ First patent in the United States for a hearing aid is issued to Edward G. Hyde of Camptown, New Jersey for earscoops.



1862 ~ Herman Ludwig Ferdinand von Helmholtz (1821-1894), who laid the foundation of the modern science of acoustics, publishes *On the Sensations of Tone*, in which he presents his theory of resonance, the ossicles responding to sound by movement.



1864 ~ The Columbia Institute for the Deaf is established in Washington, D.C. Now called Gallaudet University, it is still the only liberal arts college for the deaf in the world.

1867 ~ The first major oral school in the United States – the Clark School for the Deaf in Northampton, Massachusetts – opens.

1869 ~ T. Hawksley, Ltd. of London is established. The firm made several hearing devices that could be incorporated into everyday items or worn on the person, in order to conceal their purpose. Hawksley & Sons Ltd. is still in business as a supplier of medical and laboratory equipment.



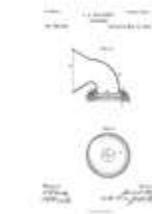
1873 ~ The company E. B. Meyrowitz is established in New York City as opticians. The company begins to manufacture hearing aids soon thereafter.

1883 ~ Franck-Valery Freres is established in Paris, manufacturer of hearing aids.

1885 ~ Enoch Henry Currier (1849-1917) invents a Duplex Ear-piece. Devised for instructing deaf students, the hearing device utilized two tubes, each ending in a bell, from one ear-piece. This enabled the user to hear the sound of his/her own voice as well as that of the teacher. Currier also devised another teaching aid – one bell into which the teacher spoke, from which led several tubes, one for each pupil. The Duplex Ear-piece was manufactured by Tiemann & Co.



1887 ~ Ear trumpet with a diaphragm earpiece is patented by James A. Maloney in the United States.



1892 ~ First United States patent for an electric hearing aid is issued to Alonzo E. Miltimore of Catskill, New York for a “magneto telephone for personal wear.” The device is never produced.



1898-99 ~ The Akouphone Company is established by Miller Reese Hutchison (1876-1944) and James H. Wilson in Mobile, Alabama. Hutchison invents and Akouphone manufactures what may be the first electric hearing device. Called the “Akoulallion” (from the Greek “to hear” and “to speak”), this table model instrument uses a carbon microphone and up to three pairs of earphones. A limited number are produced at a retail price of \$400.

1900 ~ The Akoulallion is redesigned in smaller dimensions and placed on sale as the “Akouphone.” It sells for \$60. However, neither the Akoulallion nor the Akouphone seem

to have sold well. The Akouphone Company went into receivership about 1901.

1902 ~ Charles W. Harper of Boston offers a carbon-type hearing aid, the Oriphone, for sale.

1903 ~ Miller Reese Hutchison and Willard S. Mears form the Hutchison Acoustic Co. The company introduces the Acousticon (a body worn hearing aid) and four other hearing devices in its first year.



1904 ~ Mears Radio-Hearing Device Corporation is started by Willard Mears, who had previously been associated with Miller Reese Hutchison.

1904 ~ Oticon is established in Denmark as a hearing aid distributor by Hans Demant (1855-1910). In 1940 Oticon begins manufacturing its own hearing devices.

1904 ~ John Ambrose Fleming (1849-1945), an English electrical engineer, invents the two-electrode radio rectifier, also known as the vacuum diode and Fleming valve. This device was the first electronic rectifier of radio waves, converting alternating-current radio signals into weak direct currents detectable by a telephone receiver. It is the ancestor of the triode and other multi-electrode vacuum tubes. Fleming later helps design a hearing aid for Ardenle Acoustic Laboratories.

1906 ~ Dr. Ferdinand Alt (1867-1923), an assistant at the Politzer Clinic in Vienna, demonstrates his electric hearing aid at the Austrian Otological Society. The hearing device used a magnetic earphone connected to a carbon granule microphone that was fastened on top of a small battery box. Alt noted that his instrument was of little use if the speaker was more than two feet away.



1906 ~ The triode vacuum tube is invented by Lee DeForest (1873-1961).

1907 ~ The Globe Ear-Phone Company opens in Boston.



1910 ~ Siemens, a German manufacturer established in 1847, begins manufacturing hearing aids.

1910 ~ Deutsche Akustik Gesellschaft, of Germany (established in 1905), begins hearing aid manufacture on a limited basis.



1911 ~ Franck-Valery Freres of Paris begins making carbon hearing aids.

1912 ~ First volume control for an electric hearing aid is introduced by the Globe Ear-Phone Company.

1912 ~ Gem Ear Phone Company, of New York City, is established.



- 1912** ~ Physiologist H. Zwaardemaker of the Netherlands is the first to comprehensively study the amplification characteristics of non-electric and early electric hearing aids, using sophisticated calibrated instrumentation.
- 1920** ~ Earl C. Hansen invents and patents the first vacuum tube hearing aid. Called the "Vactuphone," the instrument was battery-powered and employed a single triode. The Vactuphone was produced by the Western Electric Company and distributed by the Globe Ear-Phone Company beginning in October 1921. The instrument was larger than a box camera and was priced at \$135.
- 1923** ~ First electric bone conduction vibrator is constructed by Augustus G. Pohlmann and Frederick W. Kranz for use in some audiometers and a few table model hearing aids.
- 1923** ~ The Marconi Company of England and Western-Electric of the United States introduce vacuum tube hearing aids.
- 1924** ~ Edward A. Myers (1868-1963) establishes E. A. Myers & Sons; the name is soon changed to Radioear. Myers develops and sells Radioear's vacuum tube hearing aid, a table-sized model that used a moving coil microphone, which was superior to a carbon microphone because of its amplitude linearity and freedom from external noise. However, like the Marconi and Western Electric vacuum tube hearing devices, the Radioear model is large and cumbersome, and poses little competitive threat to the small, portable carbon instruments of the time.
- 1925** ~ Helmut Sell, of the German firm Siemens, invents the first carbon amplifier separate from the microphone placed in the hearing aid. This amplifier is a magnetic receiver coupled to a carbon microphone with a common diaphragm powered by the same battery supplying the current for amplification. Carbon amplifiers, or "boosters," were used widely in the 1930s.



1926 ~ Halsey A. Frederick (1887-1961) receives the first U.S. patent for a custom earmold. The patent is assigned to Western Electric Co.; the earmolds were made under license by the S. S. White Dental Manufacturing Company.

1929 ~ Hugo Lieber (1868-1936) establishes Sonotone in New York City. At first the company distributes Siemens hearing aids, but within a few years Sonotone is manufacturing its own hearing devices.



1931 ~ The pentode vacuum tube, which consists of a plate, a cathode, and three grids, is perfected. The pentode proves stable in performance, has a relatively long life, and readily permits amplifier stages to be coupled so as to obtain virtually as much increase in power as is desirable. The pentode vacuum tube leads the way in only a few years to the first wearable and popular vacuum tube hearing aids.

1932 ~ The first wearable bone conduction hearing aid is introduced by Sonotone Corporation.

1933 ~ E. H. Greibach of Sonotone files for a patent for a "reaction" type bone receiver. After long patent interference litigation with Acousticon, the patent is awarded to Greibach in 1939. The design, a major improvement over earlier bone conduction hearing aids, is still in use today.

1934-35 ~ The Thomson Houston Company and other firms in England begin to manufacture very small, battery-operated vacuum tubes. The Amplivox Company, MultiTone Company, and other English firms incorporate these small vacuum tubes into the first "wearable vacuum tube hearing aids."

1935 ~ The Selex-A-Phone, the first “master hearing aid,” is introduced by Radioear Corporation. The master hearing aid enables a hearing aid dispenser to test which combination of microphone and receiver provides the approximate gain and frequency response most useful for a given client. Then a hearing aid having those factors was made from the factory with which the seller had an exclusive contract.



1936 ~ The first hearing aid with AGC (automatic gain control) is produced by Multitone of London. The first is a table model; Multitone introduces a wearable hearing aid with AGC in 1948.

1936 ~ Maico Electronics is founded in Minneapolis and begins production of audiometers.



1936 ~ Charles B. Sawyer of the Brush Development Company in Cleveland, Ohio, introduces the salt crystal microphone, whose property was to produce an electrical current when it was bent or slightly inclined in certain directions. The current produced was proportional to the mechanical force; this 'piezo-electric' effect transformed the mechanical sound vibrations into electrical current.

1937 ~ The small English vacuum tubes are imported to the United States. Arthur Wengel (1892-1952) of Madison, Wisconsin introduces the first wearable vacuum tube hearing aid in America. It is manufactured and marketed on a limited scale in 1937 and 1938 under the name Stanleyphone.

sound source, artificial ear and associated amplifiers and instruments, mounting of hearing aid receiver and transmitter, method of determining frequency response and acoustical gain, battery voltage variation, non-linear distortion, input-output characteristics, battery drain, and variations in gain with temperature and humidity.

1945 ~ Norton Canfield and Raymond Carhart “coin” the term audiology.

1947 ~ Beltone introduces the “Audio-Selectometer,” an electronic master hearing aid for fitting hearing devices.

1947 ~ The transistor is invented in December at Bell Telephone Laboratories by William Shockley, John Bardeen and Walter Brattain. The first transistors were the point-contact type and not useful in hearing aids. A refinement, the germanium junction transistor, soon appears and its first commercial use is in hearing aids.

1948 ~ The first hearing aid with a printed circuit, the Solo-Pak from Allen-Howe Electronics Corp., is introduced.



1948 ~ The International Hearing Aid Association is organized, which in 1952 becomes the Society of Hearing Aid Audiologists, and in 1965, the National Hearing Aid Society.

Early 1950s ~ Transistor hearing aids are introduced and begin replacing vacuum tube hearing aids. The smaller transistor size and lower battery voltage requirements permit a dramatic miniaturization in hearing devices. The transistor also permits other styles of hearing aids to be developed, such as the behind-the-ear model and the hearing aid built within eyeglass temples. Patents for these styles pre-date the transistor by many years – patents for eyeglass models



date back to 1931 – but these designs could not be made practical until the transistor was perfected.

1952 ~ A few hearing aid manufacturers begin using junction transistors in place of the output vacuum tube in hearing aids, which require a minimum of circuit change. These are the so-called hybrid transistor hearing aids.

1952 ~ KEMAR (Knowles Electronics Manikin for Acoustic Research) is developed. The KEMAR manikin simulates the head and torso of an average human adult. It made possible more realistic overall measurement of hearing aid performance by taking into account the acoustic effects of the body, head, pinna, and ear canal.



1953 ~ First all-transistor hearing aid is introduced by Microtone, in January. Manufacturers such as Maico, Unex and Radioear introduce their all-transistor models within months. Consumers are quick to embrace the changeover from vacuum tube to transistor hearing aids. According to American Hearing Aid Association data, in 1953 there were an estimated 225,000 hearing aids sold in the U.S. Of these, 100,000 were all-transistor, 75,000 were hybrid, and 50,000 were vacuum tube models. In 1954 there were 335,000 hearing aids sold, and 325,000 of these were all-transistor models.



1953 ~ André Djourno first develops the idea of cochlear prosthesis, stimulating the cochlear nerve in deaf patients.

1953 ~ Zeiss Optical Company introduces the first operating microscope specifically designed for otologic surgery.



1954 ~ The German company Akumed and the American company Otariion are the first to market electronic hearing aid eyeglasses. In Otariion's "The Listener" model, the components were built into the two eyeglass temples and connected by wiring across the fronts. The receiver, a rectangular balanced armature unit, was in the temple opposite that containing the microphone and had a sound outlet projecting toward the ear canal. A flexible plastic tube carried the sound to an earmold. Further miniaturization made it possible to put all the components in one temple. By 1959 hearing aid eyeglasses constitute about 50 percent of United States hearing aid sales.



1955 ~ Dahlberg, Inc. introduces the first so-called "in-the-ear" hearing aid, the D-10 Miracle-Ear for mild hearing loss. All the hearing aid components were concealed in a shell which was actually worn at the ear rather than in the ear. The shell snapped onto an earmold and weighed 1/2 ounce, including the single size 400 battery, a three-transistor amplifier, a microphone, and receiver. Dahlberg, Inc. grew to become Miracle-Ear.

1957 ~ André Djourno performs the first cochlear implantation in France. Djourno felt that scientific advances ought to remain totally within the public domain, and he refused to patent the device.



1958 ~ Jack Kilby of Texas Instruments builds the first integrated circuit using germanium. The following year, Jean Hoerni and Robert Noyce, both of the Fairchild Semiconductor, further refine the integrated circuit using silicon. The integrated circuit revolutionizes the electronics industry.

1959 ~ The first hearing aid dealer state licensing law in the United States is passed in Oregon.

1960 ~ Pilgrim Imaging starts open captioning for the deaf for the Caption Films for the Deaf Program, under the U.S. Department of Health, Education & Welfare.

1960 ~ The American Standards Association (later known as the American National Standards Institute – ANSI) publishes standards for the measurement of electro-acoustic characteristics of hearing aids.

1961 ~ The Hearing Aid Industry Conference (HAIC) adopts the “HAIC Standard Method of Expressing Hearing Aid Performance” – the standards are soon adopted by all the major and most of the smaller hearing aid manufacturers in the U.S.

1961 ~ Drs. William House and James Doyle, after learning of Djourno’s work in France, design a few implantable cochlear stimulating devices and test them in human patients. House and Doyle’s initial results indicate that implanted patients could perceive the rhythm of speech and music and were aware of a variety of environmental sounds. However, further work is stopped, again because of a disagreement over commercial applications.



1964 ~ The first BTE hearing aid with an integrated circuit, the “Arcadia ” model, is introduced by Zenith.

1969 ~ Willco, at the time a German affiliate of Maico Electronics, introduces the first hearing aid with a directional microphone.

Late 1960s ~ Robin Michelson and colleague Melvin Bartz construct a cochlear device with biocompatible materials that can be implanted in human patients. This system is implanted in 4 patients, and the report of the hearing results represent a watershed for clinically applicable cochlear implants.



- 1971** ~ The tiny electret/FET microphone is introduced. It is far less sensitive to mechanical vibration than either the magnetic or ceramic/FET microphone, which is of great importance in any type of hearing aid in which the microphone and receiver are in the same small case, such as behind-the-ear (BTE), in-the-ear (ITE), and in-the-canal aids.
- 1971** ~ The microprocessor is invented by Edward Hoff, enabling the miniaturization of logical functions in electronic equipment. Hearing aids utilizing microprocessors are produced at the end of the 1980s.
- 1972** ~ The first nationally broadcast open-captioned program is WGBH's *The French Chef, with Julia Child*, which airs on PBS on August 5, 1972.
- 1972** ~ Dr. William House restarts a single channel cochlear implant program with Jack Urban, an engineer. Parallel work takes place in California, Paris, Vienna, and Melbourne.
- 1973** ~ In June the first scientific gathering to discuss cochlear implants, the "First International Conference on Electrical Stimulation of the Acoustic Nerve as a Treatment for Profound Sensorineural Deafness in Man" is held at the University of California – San Francisco.
- 1973** ~ Dr. William House introduces the first widely applied clinical cochlear implant. This implant is a single-channel system that is later commercialized and manufactured by 3M. The 3M/House implant is implanted by many surgeons in hundreds of deaf adults and children throughout the world before 3M stops production.
- 1977** ~ The zinc-air battery is developed. This battery is mercury free and has a greater capacity than the mercury battery because of the greater volume of the anode. Along with smaller microphones and receivers, the smaller zinc-air

batteries propel development and sales of ITE (in-the-ear) hearing aids.

1977 ~ The NIH supports the first independent, multi-center study of cochlear implant devices. The study helps to dispel the skepticism and controversy surrounding cochlear implants, concluding that these devices are a definite aid in communication and are useful in voice modulation and recognition of environmental sounds. The study provides substantial scientific evidence for the benefits of cochlear implantation and gives credibility to the emerging technology.

1983 ~ In-the-canal (ITC) hearing aids are introduced. By 1989 ITC aids are a full 20% of the total ITE market.

1983 ~ The earliest wearable digital hearing aid is made in experimental form by Audiotone. It has a behind-the-ear portion that contains the analog-to-digital (A/D) converter, the digital signal processing (DSP), and the digital-to-analog (D/A) converter.

1984 ~ The US Food and Drug Administration approves the 3M/House single-channel cochlear implant.



1985 ~ The U.S. Food and Drug Administration approves the Australian-made Nucleus 22-channel cochlear implant for adults. The device is approved in 1990 for children.



1987 ~ The first digital hearing instrument, the Phoenix, is introduced by Nicolet. It is configured as a body-worn hearing aid with the microphone at ear level. The product does not go beyond the experimental stage.

- 1987-88** ~ The first models of digitally programmable hearing devices are introduced by Bernafon/Maico (1987) and Widex (1988). Using conventional analogue circuitry, they can be programmed electronically from a specially designed computer and software. The Widex Quattro system features a user-operated remote control which can also be used to program the instrument.
- 1988** ~ The Knowles Amplified Receiver is released. It contributes to the development of very tiny hearing aids, especially those that fit completely in the canal (CIC).
- 1989** ~ The K-AMP integrated circuit amplifier is produced. It features reduction in distortion of high level input signals. A programmable version becomes available in 1998.
- 1990** ~ Resound Corporation introduces a dynamic range multi-band compressor which allows for the separate treatment of low and high frequency sounds at different intensity levels.
- 1991** ~ Oticon in Denmark presents the first fully automatic hearing aid without a volume control. Called MultiFocus, it has two channel non-linear sound processing.
- 1992** ~ A second digital hearing instrument is produced. This device, developed by GN Danavox in Denmark, is not really a fully digital instrument but it is the first commercially available hearing aid to incorporate digital signal processing. The feedback suppression circuitry is fully digital, the rest of the hearing instrument is analog.
- 1993-94** ~ Starkey and Argosy introduce completely-in-the-ear (CIC) hearing devices.



- 1994** ~ Maico (U.S.) presents a programmable CIC aid called the RD301, with two programs and volume control. The RD301 is controlled by a remote control. Siemens introduces a programmable CIC in 1996.
- 1995** ~ The U.S. Food and Drug Administration approves the CLARION® Multi-Strategy™ Cochlear Implant for adults. The device is approved for children in 1997.
- 1995** ~ Oticon introduces the JUMP-1 digital hearing aid platform which is based on the Digital Audio Processor (DAP). JUMP-1 instruments are offered to 14 different audiological research centers worldwide, in order for them to use the digital platform in the development of innovative solutions for the hearing impaired.
- 1996** ~ Widex's Senso is the first fully digital hearing aid to be successfully commercialized.
- 1996** ~ Oticon launches DigiFocus – a 100% digital BTE hearing instrument. It is based on a new audiological rationale called Adaptive Speech Alignment, which splits sounds in seven tone bands and utilizes two different speech processors – one for vowels and one for consonants.
- 1997** ~ Siemens produces the first digital hearing instrument using dual microphone technology.
- 1997** ~ An open platform digital hearing aid is introduced by Philips. BTE or ITE units on each ear are operated by a remote controller using infrared signals. The user can select from any one of four different signal processing schemes (algorithms) in the hearing aid to meet his/her situational preferences.
- 1997** ~ Oticon introduces "The New Generation DigiFocus" which includes a fully automatic canal version of DigiFocus. The new chip-set allows for a 3-step acclimatization program,

advanced feedback management and in-situ assessment of the client's most comfortable listening range.

- 1997** ~ Widex introduces the Senso CIC, the first fully digital CIC hearing device.
- 1997** ~ Philips introduces a digital hearing device, the D72, which uses a remote control and SMART cards to store the instrument's different user programs.
- 1998** ~ According to a study published in the *Journal of the American Geriatrics Society*, only about one quarter of the population who could benefit from a hearing aid actually uses one.
- 2000** ~ The Vibrant Soundbridge is the first FDA-approved implantable middle ear hearing device to treat sensorineural hearing loss. It mechanically causes the ossicles to vibrate; the amplified vibrations are adjustable to optimally compensate for hearing loss.
- 2001** ~ Oticon utilizes the VoiceFinder speech processing system in its Adaption hearing device. VoiceFinder allows fully prescribed amplification when speech is present but a more comfortable processing mode when speech is not present.
- 2002** ~ Interference from background noise remains the greatest problem reported by hearing aid wearers in a study published in *The Hearing Review*.
- 2003** ~ SeboTek introduces the first receiver-in-the-ear hearing aid, the Post Auricular Canal (PAC) system, at the 2003 American Academy of Audiology convention.

2004 ~ The Oticon Synchro is among the earliest devices to use Artificial Intelligence for signal processing. It collects data about client use patterns, use of volume control, and use per day. It can also detect the difference between human speech and noise.



2005 ~ Phonak introduces the miniValeo – it is the first Phonak model to use thin tubing instead of the traditional earmold.

2005 ~ The first study to demonstrate cellular and functional repair in the organ of Corti in a deaf guinea pig is reported in [Nature Medicine](#).

2005 ~ Digital signal processing (DSP) technology has replaced analog technology in approximately 90 percent of hearing aid fittings.

2006 ~ The Phonak Eleva, featuring directional technology with no feedback and a program for telephone use, is introduced.

2006 ~ Oticon introduces its first Receiver-in-the-Ear (RITE) hearing device, the Delta.



2006 ~ The Cochlear Implant Hybrid model begins clinical trials in the United States. The CI Hybrid is a merger of electrical stimulation presented within the cochlea and acoustic stimulation presented through normal sound conduction means.

2006 ~ As of 2006, telephone manufacturers and carriers must offer at least two phone models that can be used with hearing aid telecoils.

2006 ~ The ELI is introduced by Starkey, enabling hearing aids to be compatible with Bluetooth-enabled mobile phones. The ELI is the world's smallest audio Bluetooth device and is named by *Time* magazine as one of the best inventions of 2005.

2006 ~ There are an estimated 560 million people in the world with a hearing loss.

2007 ~ Sun Kyung Sunwoo, of the Sydney University of Technology, introduces a new hearing aid design, [Wirear](#).



2007 ~ According to the Hearing Industries Association (HIA), 2,42 million hearing aid instruments were sold in the US in 2007 (HIA-reporting companies represent 90-95% of all hearing aids dispensed in the US). Behind-the-ear instruments accounted for 51.4% of all US hearing instrument sales compared to 18.8% in 1997.

2008 ~ A study reporting growth of hair cells in mice was published in [Nature](#).

2008 ~ InSound introduces [Lyric](#), the first completely invisible deep-canal hearing aid. Lyric can be worn 24 hours a day, seven days a week, for months at a time.

2009 ~ [Ginger Labs](#) introduces soundAMP, an assistive software application that transforms the iPhone into an interactive hearing device. It uses the built-in microphone or headset with mic to amplify nearby sound. You can adjust volume and tone, and even “repeat” a recent conversation.



2010 ~ [Ira J. Hirsh](#), one of the founders of the field of Audiology, passed away on January 12, 2010.

2011 ~ Siemens launches, [Aquaris](#), a waterproof, dustproof and shock-proof hearing aid.



2012 ~ Flutter, a garment utilizing textiles and robotics, was created by Halley Profita, Nicholas Farrow, and Nikolaus Correll at the University of Colorado, Boulder. This wearable system *“integrates function and fashion to relay information about the auditory environment for a holistic feedback system.”*

Flutter received First Prize for both Best in Show and Most Inclusive and Usable Design at The 2012 16th IEEE International Symposium on Wearable Computers (ISWC) held in Newcastle, England.



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