WILSON GREATBATCH

Wilson Greatbatch orders a dessert of chocolate cake. When the waitress serves him, he quips: "I wish you'd flipped it over. Then I'd have negative calories!"

The waitress smiles, politely. Engineering is seldom far from Greatbatch's mind. He's a prodigious inventor and tinkerer. Among his projects are a solar-powered canoe, cloned African violets, engines that run on alcohol, and nuclear-powered batteries. In all he has over 140 U.S. and foreign patents, including the one for the implantable pacemaker.

In 1983, the National Society of Professional Engineers chose the pacemaker as one of the 10 greatest engineering contributions to society during the past 50 years. In 1988, Greatbatch was inducted into the National Inventors' Hall of Fame, in Akron, Ohio, for patent No. 3 057 356. He follows in the famous footsteps of Thomas Alva Edison, Alexander Graham Bell, and William George Armstrong.

Yet he is the consummate family man, too, with five children and six grandchildren after over 50 years of marriage. He lives not far from where he was born, in Buffalo, N.Y., and is active in his community. Every fall during the apple-picking season, he hosts a cider-making party. He once owned several Caterpillar bulldozers and occasionally did some earth-moving services for the townspeople. (The town returned the favor a few times by helping him with town zoning on some of his large-scale projects, such as building of factories or digging a 3-hectare lake.)

But first and foremost, Greatbatch is an old-style independent inventor. He has never accepted a government research grant. And whenever a company he helps to create becomes too big, he leaves to pursue his own ideas elsewhere.

JOHN A. ADAM
Senior Associate Editor

Wayward beginning

Intangible things—like music, religion, and radio waves—have fascinated him since his childhood.

An only child of parents who were "relatively poor," he evinced an interest in electricity and electronics early on. "I think it was the mystery of it," he said. "Something was happening that you couldn't see, or feel, or hear. You needed a meter or oscilloscope or at least a neon bulb to detect it and you had to interpret what the reading meant."

In his early teens he built a two-tube short-

The inventor of the implantable cardiac pacemaker—and holder of 140 other patents—lives modestly in upstate New York while he pursues AIDS research

wave receiver and listened to London on a coil he had wound himself. Around 16, he passed the test for an amateur radio license (W8QBD). An active Boy Scout, he joined the Sea Scout Radio Division, which had a station (W8QBU) near the New York State Naval Militia in Buffalo. The station received a Red Cross citation for staying on the air 26 hours straight during the 1938 New England hurricane, to relay messages to other ham stations in Ontario and Ohio.

The station generated social get-togethers, too. A group of girls who called themselves MAD (Men Are Dogs) hung around the Sea Scouts' radio shack and, to the boys' dismay, made curtains for it. "Most of the guys finally married most of the girls, as did I, eventually," Greatbatch said.

In 1939, Greatbatch and many of the other Sea Scouts joined the Naval Reserve unit nearby, all qualifying for a noncommissioned officer's grade because of their radio licenses. They practiced their radio drills while sailing to New York City and Guantanamo, Cuba.

Over the course of World War II, the Sea Scouts trained more than 50 radio operators. Greatbatch served five years. Among his duties were repairing electronics on a destroyer, serving as radioman on convoys to Iceland, teaching radar in Texas, and finally flying in the Pacific as a rear gunner off the USS *Monterey* aircraft carrier. In six months of combat, a third of the squadron crew was killed.

After the war, Greatbatch returned to Buffalo

▶ Greatbatch designed pacemaker circuits on manila folders and attached components opposite the sketch. Nowadays he uses such "working pacemakers" for classroom demonstrations. He hooks up a battery at one end, while a transistor radio amplifies the circuit's life-giving rhythm for all to hear.

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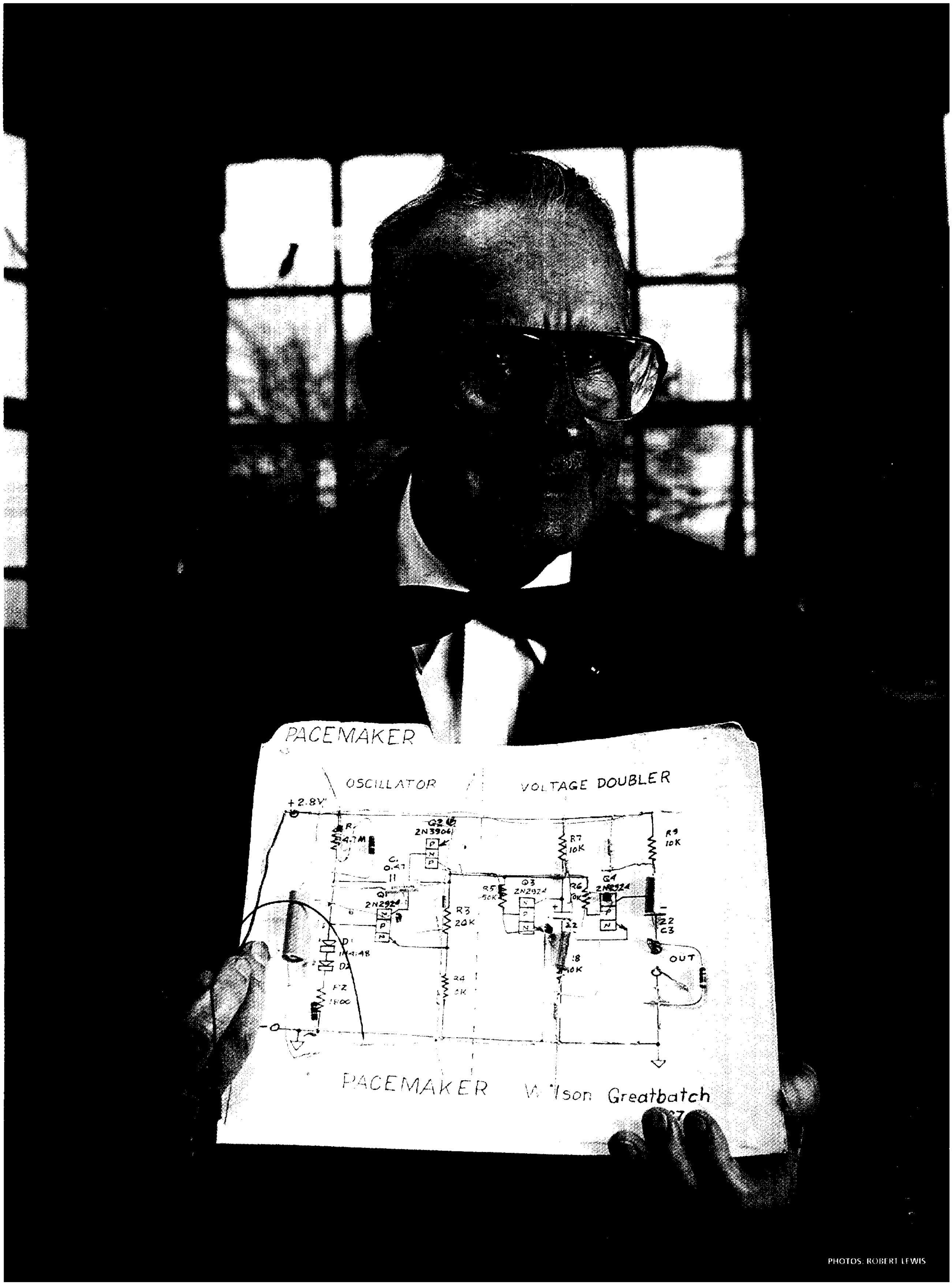


PHOTOS: ROBERT LEWIS

Vital statistics

Name: Wilson Greatbatch
Born: Sept. 6, 1919, in Buffalo, N.Y.
Personal: married in 1945, five children, six grandchildren
Religion: Presbyterian Elder
Education: Cornell (BSEE, 1950) and Buffalo (MSEE, 1957) universities; also several honorary doctorates
First job: repairing radios in a Buffalo repair shop in 1938 for $12 a week
Interests: gardening, sailing
Languages: English, French, German, technical reading proficiency in Russian
Pet peeves: venture capitalists; the U.S. Food and Drug Administration (medical device–regulating agency)
Management credo: create a hands-on, personal relationship in the workplace, grow on profits, stay out of debt
Personal hero: Thomas Edison
Favorite authors: Herman Melville, James Michener
Favorite composers: Bach, Vivaldi, Copeland
Favorite award: National Inventor's Hall of Fame
Patents: over 140 internationally (including 41 U.S. patents, more than half in his name only)
Memberships: National Academy of Engineering, Fellow in the following: New York Academy of Sciences, American College of Cardiology, Royal Society of Health (UK), American Institute of Medical and Biological Engineers; American Society of Angiology; the IEEE, among others
Personal philosophy: "Don't fear failure, don't crave success. Just immerse yourself in the problem and work hard. The true reward is not in the results but in the doing."

with his bride, Eleanor, a home economics teacher, who would become his laboratory assistant and his maker of bow ties as well. He worked a year as a telephone repairman before enrolling at Cornell University in Ithaca, N.Y. "After all that time in the dive-bombers with the ack-ack [anti-aircraft fire] bursting all around, you appreciate the change," he told *IEEE Spectrum*. "I was so grateful. I have repeatedly and vainly tried to imbue my children with the kind of appreciation that I had, just for the opportunity to sit, and hear, and learn. I don't think I ever got this across to them."

He gives Cornell credit for its emphasis on a broad engineering education steeped in mathematics, physics, and chemistry. The breadth of his studies enabled him later to branch out into nuclear physics, electrochemical polarization of physiological electrodes, battery chemistry, the physics of welding, and more.

Soon, with several children to support, Greatbatch as a student needed to double his GI Bill income from the Federal government. He started as an electronics technician building receivers for what became the Cornell radio telescope at Arecibo, P.R. Eventually he inherited a job at the Psychology Department's animal behavior farm: doing instrumentation on around 100 sheep and goats (for blood pressure, heart rate, brain waves, and other measurements).

During 1951, Greatbatch used to share brown bag lunches on the farm with two New England surgeons, who were there on summer sabbatical. They described an ailment called heart block, which occurs when natural electrical impulses from the heart's upper chambers (atria) fail to reach the ventricles in adequate quantity. The result is irregular heartbeats that can cause shortness of breath and, in extreme cases, loss of consciousness and even death.

"When they described it, I knew I could fix it," Greatbatch recalled, "but not with the vacuum tubes and storage batteries we had then."

He did not know it at the time, but Paul Zoll in Boston made the first practical external pacemaker in 1952. About the size of a table radio, it could be plugged into household current. Though treatment was painful and damaged the skin, the device could save lives. Several years later, Earl Bakken, the founder of Medtronic Inc., developed a hand-held external pacemaker that was powered by batteries.

In the meantime, Greatbatch had returned to Buffalo to teach at the university as an assistant professor of electrical engineering. (Teaching was his original career goal.) He also did some work at the nearby Chronic Disease Research Institute. By then, around 1956, commercial silicon transistors had become available for US $90 each, and Greatbatch, qworking for a doctor, was making a 1-kHz marker oscillator with one transistor to aid in the recording of fast heart sounds.

The oscillator required a 10-kΩ resistor at the transistor's base. "I reached into my resistor box for one but misread the colors and got a brown-black-green [of 1 MΩ] instead of a brown-black-orange," he said. When he plugged in the resistor, the circuit started to "squeg" with a 1.8-millisecond pulse, followed by a 1-second interval, during which the transistor was cut off and drew practically no current. "I stared at the thing in disbelief," he said.

This, he at once realized, was exactly what was needed to drive a human heart. The circuit was self-starting and its output would remain constant despite drops in battery voltage. For the next five years, most pacemakers were to use a blocking oscillator with a United Transformer Co.'s DOT-1 transformer—all because he had grabbed the wrong resistor.

Barn exile

Buffalo was the site of the world's first local chapter of the Institute of Radio Engineers' Professional Group in Medical Electronics, which is now the IEEE Engineering in Medicine and Biology Society (EMBS). Greatbatch was a founding member. The group strove to attract equal numbers of doctors and engineers, and had a standing offer to send an engineering team to assist doctors on any instrumentation problem.

Greatbatch was on one team that had been summoned by William C. Chardack, chief of surgery at Buffalo's Veteran's Administration Hospital, to deal with a blood oximeter. The engineers could not help with that problem, but the meeting for the inventor was momentous: finally, after many previous attempts, he had met a surgeon who was enthusiastic about prospects for an implantable pacemaker. The surgeon estimated such a device might save 10 000 lives a year.

Three weeks later, on May 7, 1958, the engineer brought what would become the world's first implantable cardiac pacemaker to the animal lab at Chardack's hospital. There Chardack and another surgeon, Andrew Gage, exposed the heart of a dog, to which Greatbatch touched the two pacemaker wires. The heart proceeded to beat in synchrony with the device, made with two Texas Instruments 910 transistors. Chardack looked at the oscilloscope, looked back at the animal, and said, "Well, I'll be damned."

In a lab book entry in 1959, Greatbatch reflected on that moment: "I seriously doubt if anything I ever do will ever give me the elation I felt that day when my own two cubic inch piece of electronic design controlled a living heart."

The threesome (called the bow-tie team because none of them ever wore dangling ties, a convention Greatbatch upholds to this day) later put anesthetized dogs into complete heart block. As there was no heart-lung machine, the operating team had to work fast. The team closed off the large vessels, opened the heart, occluded the atrioventricular bundle with the tied suture, closed the heart, and reopened the artery—all within about 90 seconds.

"We were pretty naive about early pacemaker designs," their inventor observed. "We thought that wrapping the module in electric tape would seal it." The team soon found that the slightest void in the wrapping would fill with fluid and short out the circuit. That first implant lasted 4 hours. Switching tactics, they began to cast the unit in a solid block of epoxy. Within a year, survival time rose to four months. It was time now, they felt, to look for a suitable human patient.

Greatbatch's then employer, Taber Instrument Corp., was loth to risk a million-dollar company on a perilous item like the pacemaker, so Greatbatch left. (But he did continue to work as an instrumentation consultant to the company, which was involved in some space shots of monkeys for the astronaut program.)

As with so many other inventions, an implantable pacemaker was the goal of several groups during the late '50s—from General Electric Co. to Swedish researchers. In Sweden, Ake Senning had attempted the first human implant late in 1958. The unit failed after 3 hours. A second unit worked for eight days before failing, and the patient had to wait for three years before receiving a satisfactory unit.

Perhaps Greatbatch owed his success to his demanding deadline. He had saved enough to feed his wife and three young children plus enough ($2000) to devote himself full-time to his task for just two years.

"I put it to the Lord in prayer and felt led to quit all my jobs," he said. He retreated to his workshop, a barn heated by a wood-burning stove. There he made some basic discoveries. One was that uninsulated wires bond better with epoxy. He would glue components together, hand-solder the circuit, and fit it into a pack of batteries. This packet was then encased in a block of epoxy and cured overnight at a 37 °C. Several silicone coatings were applied and the unit was then trimmed with a scalpel. Serial numbers were imprinted on the uncured silicone.

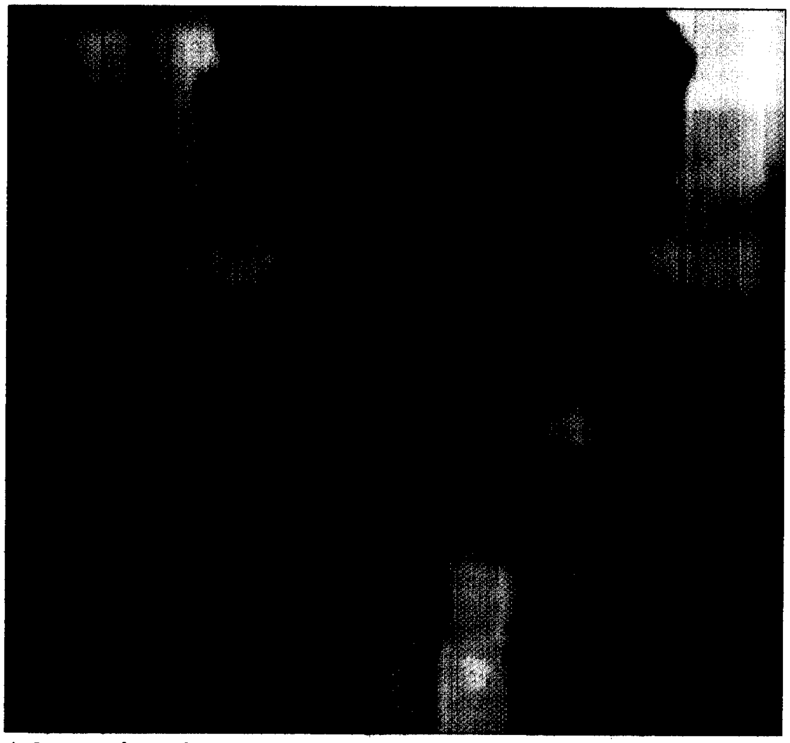
In two years, on his $2000 savings, he made 50 pacemakers by hand. Not all had the same design, and the number of batteries used ranged from three to 10. Forty of his units would go into animals as improvements were made. At the same time, he was developing reliability procedures.

During 1960, starting on April 15, Chardack and his associates implanted pacemakers in 10 patients, most over 60 years of age. Two were children. All had complete heart blocks, so that without pacemakers they had perhaps a 50-percent chance of living more than a year.

The first patient lived 18 months. Another of the initial group was a young man who had collapsed on his job at a local rubber factory. After receiving a pacemaker, he retrained as a hairdresser and has only recently died, after being paced for 30 years, much of this time with a plutonium-powered pacemaker.

Greatbatch's first pacemakers to be successfully implanted in human patients consisted of pulse-generating circuitry linking two transistors, four to 10 zinc-mercury batteries of 1.35 V, and leads attaching the unit to the ventricle. Its lifetime rhythm was a 2-millisecond pulse of 5–8 V into the heart every second.

This device stood in for failed natural pacing and allowed a normal rate of invigorating fresh blood to circulate to all parts of the body. One of the inventor's "most gratifying realizations of what a pacemaker could do" came from watching grandparents interact with grandchildren. "With the pacemaker," he said, "grandpa could be in the mainstream again."



▲ Cutaway of an early 1960s' pacemaker "explanted" from a patient shows the problematic zinc-mercury batteries and epoxy-encased circuitry. Improvements, many led by Greatbatch, have enabled today's pacemakers to frequently outlive millions of patients.

Medtronic man

In early 1961, at the Airways Hotel at the Buffalo Airport, Greatbatch signed a license for the implantable pacemaker with Medtronic Inc. Like Greatbatch, Medtronic's president Bakken was an EE who taught Sunday school. The struggling company operated out of a garage in Minneapolis and repaired TV sets when work was slow. As remuneration for his design, Greatbatch agreed to receive stock shares.

It was the beginning of Medtronic's Chardack-Greatbatch Pacemaker, which would dominate the field for the next decade, in spite of the innovations of many competitors. Greatbatch made monthly trips from Buffalo to attend meetings, sign off on drawings, and monitor production quality. He learned that a fingerprint on a transistor anode lead, for instance, would leave enough salt to corrode it.

Chardack "sold" the Medtronic device to the medical profession through his papers, case reports, and personal recommendations. Greatbatch credits him with much of the company's early success, but others credit Greatbatch, too. Said a competitor of the Buffalo engineer: "All salesman hustle their product, but he did his in an honest fashion."

Medtronic is still the world's top producer of theurapeutic implantable devices, with sales of $1.4 billion in 1994. Pacemakers accounted for 67 percent of that revenue.

But Chardack's job was no easy sell. At that time, it was anathema to most surgeons to leave anything in the body after surgery. But it turned out that the pacemaker was the ideal catalyst for the development of internal biomedical devices.

First of all, the heart had a high profile with the general public. Also, the pacemaker was relatively low risk. If the device failed, the patient did not necessarily die. (For the vast majority of patients, the pacemaker was to be a life enhancer rather than a life saver. For the critical patients of the early days, almost anything was better than nothing.)

Circumstances were favorable biologically, too. Cardiac muscle is much easier to stimulate than, say, the smooth muscle of the bladder. Cardiac fibers are self-excitatory and interconnected in a latticework so that an impulse applied locally to an atrium or ventricle will spread over the whole heart spontaneously, causing the organ to contract. In contrast, an impulse on the corner of a bladder will contract only that corner. (Only recently have clinical tests of systems for electrical stimulation of bladder control begun.)

But, even with these advantages, the pioneers of implants had a tough time. The body itself—warm, wet, and saline—is not hospitable to electronics. Greatbatch calls it more demanding than the deep ocean or space environment. Implanted devices must be rugged enough to defend themselves against onslaught from the body, yet at the same time be neutral enough not to counterattack and harm the inhospitable host.

"Many judgments had to be made by the seat-of-our-pants because there just wasn't much data around on the long-term behavior of materials in the body," the veteran inventor said.

Pacing on demand

Fixed-rate pacing was fine for the critical patient. But most people required only stimulation on demand, initiating a heartbeat only when it was needed. Such a sensing capability would prolong battery life and had been described in the literature.

Greatbatch's lab notebook states that his first successful breadboard of the implantable inhibited-demand pacemaker was completed in January 1965, resulting in Medtronic Model 5841, the first on the market (although Cordis Corp., Miami Lakes, Fla., had put out another type of demand pacemaker earlier).

Parts that did make it into a Medtronic unit were rigorously tested. Early transistors—fromTexas Instruments, General Electric, and Transitron—had no consistent reliability. Greatbatch segregated them into beta (current gain) classes and put them through five cycles, from dry ice to heat soaking at 125 °C, for 500 hours.

In a shock test, any transistor that developed leakage or drifted more than one beta class was discarded. About 30 percent of the transistors were winnowed out, but none of the survivers was ever lost in a pacemaker.

In the early days, to bake transistors, Greatpatch set up two ovens in his bedroom. His wife, Eleanor, administered the shock test. "Many mornings," he said, "I would awake to the cadence of Eleanor 'tap, tap, tapping' the transistors" with a pencil. For some months, every transistor used in Medtronic pacemakers was tapped in the Greatbatch bedroom in Clarence, N.Y.

Despite the pains taken to ensure reliability of componentry, many patients during the early years of artificial pacemaking died. Others were inconvenienced by unanticipated reactions or by the repeated surgery needed to change pacing units.

Aside from initial corrosion problems with electrodes, all the early pacemakers required difficult surgery. The chest had to be opened and electrodes sewn directly onto the surface or the middle layer of the heart. Ten percent of these poor-risk patients died from the surgery alone.

Later Chardack refined an existing technique in which a lead with a spring coil was inserted through a vein into the interior of the heart. This procedure permitted pacemakers to be implanted under local anesthesia without opening the patient's chest.

GREATBATCH GEN-AID, LTD.

▲ **The first implantable pacemaker in 1958, used on a dog, was wrapped in tape in hopes of protecting it against body fluid. Epoxy encasement was soon found to work much better.**

Once the pacemakers were implanted, the body encased them in a collagenous sheath so tightly that when the units were taken out for new models or batteries, the Chardack-Greatbatch imprint and serial number were seen, backwards, on the collagenous growth. Said Greatbatch of the internal tattoo, "We felt this was really leaving our mark."

Heartbeat power

The great inventor admits that if he had not come up with the implantable pacemaker, someone else would have. "Most new developments are like that—not somebody getting a Eureka flash," he observed. What distinguishes him perhaps is his dedication to improving his invention.

This took several forms. One was giving advice freely. Recalled Walter Keller, who designed pacemakers in the 1960s for top rival Cordis Corp.: "We shared ideas. Since Bill was ahead of me, I got plenty of help from him."

Another was going outside his original training to develop better batteries. In a 1959 paper, Greatbatch had predicted a five-year average life for a pacemaker. In 1970, however, pacemakers were lasting an average of only two years. The problem was the power supply. Around 80 percent of those removed (called explants) were traced to a failed zinc-mercury battery, which used technology developed during World War II, modified in 1958 for the electronic wristwatch market.

Besides a relatively short shelf life, mercury batteries produced gas and therefore could not be hermetically sealed. Encasement in semipermeable epoxy was required. This did the critical job of keeping corrosive salt ions from the body out, but the electronics essentially operated immersed in distilled water. "Circuits in pacing drew so little current that the slightest problem could cause shunting," Keller recollected. And any contamination on the wiring would cause corrosion.

In 1968, Greatbatch had set out on two paths for power sources: one used halide cathodes with lithium as an anode, and the other used nuclear batteries based on plutonium 238.

Collaborating with Hittman Corp. of Columbia, Md., Greatbatch and a Hittman team designed a clinically successful plutonium battery that would have lasted the lifetime of even the youngest patients. But problems due to factors such as radioactivity and toxicity made them undesirable. Even a microgram ingested can be fatal.

In the early '70s, after numerous experiments with a variety of lithium batteries, Greatbatch and his colleagues adapted a lithium iodine power source to the high-reliability demands of pacemakers. It had been recently invented by James Moser and Allan Schneider. Batteries are complex systems to design well. In fact, a bad battery design ultimately caused Cordis Corp. to abandon pacemaking. Keller called Greatbatch's adaptation superb. "That guy, he's not only good, he's lucky!"

Greatbatch's confidence in this lithium battery was so great that he created a company to manufacture them. Today, the $30 million company, which is run by his oldest son, Warren, still sells or licenses over 90 percent of the world's pacemaker batteries.

The lithium battery's advent has been called the most significant improvement for the pacemaker since its invention. Not only does the battery boast greater reliability and a higher power density than others, but it does not produce gas. Lithium batteries enabled pacemakers to be laser-welded in metal cannisters for a hermetic seal. At last circuitry and batteries could operate in a dry, moisture-free environment.

The battery innovation helped another top biomedical company. When Manny Villafana, a friend of Greatbatch's from Medtronic, was setting up Cardiac Pacemakers Inc. (CPI) in Minneapolis, Greatbatch advised him that lithium batteries were too new and too risky for a company just starting out. But Villafana said he needed "something completely new" to establish the company.

For over a year, Greatbatch's firm sold him the lithium batteries without billing CPI. It also supported CPI in selling the device and in straightening out some technical issues. The alliance proved mutually successful. Lithium batteries are still the main power source in pacemakers, extending their average life beyond 10 years.

Tempting questions

During his career, Greatbatch's curiosity has lured him into many projects that failed. That category included his work on bone growth stimulation, closed-loop control of drug delivery, electronic control of infection, and creating orange trees impervious to frost damage. But his need to search for answers has also led him to tackle such problems as energy supply and, most recently, AIDS.

It was the energy crisis of the early '70s that induced him to clone plants and trees as a biomass source of fuel. He figured that 50 000 people using two fields of 61 km^2 could become independent of other forms of energy. He cloned a hybrid poplar tree in the sterile laboratory environment that could produce up to seven tons of dry wood per acre per year and would regenerate after being cut to stump level.

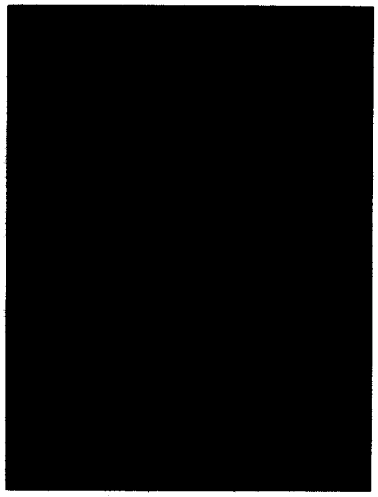
Greatbatch planted 40 000 of the trees, successfully composted two years of sewage sludge from a nearby town, and even modified his 1967 Dodge truck to run on wood alcohol. The goal was complete energy independence, but the end of the oil crisis and state environmental rulings put a damper on his efforts. He did, however, give cloned flowers to friends, including a miniature rose under 7 mm in diameter that was cultivated in a test tube; he named it "Rosemary Cloney."

Self-sufficiency and "the idea of getting something for nothing" were the reasons behind Greatbatch's building of a 380-W solar-powered canoe, in which he cruised around the Finger Lakes on his 72nd birthday. He submitted results of his 230-km voyage to the *Guinness Book of World Records*, hoping that someday its editors would establish such a category for the book.

"I'm sure my record will be quickly surpassed, but that doesn't matter," he said. "The joy of accomplishment is not in the results, but in the doing. It was great fun. Now maybe I can grow old gracefully."

Greatbatch (not himself the user of a pacemaker) is certainly not taking it easy. For the last decade he has investigated the human immunodeficiency virus. With John Sanford of Cornell Universitiy, he was able

'He's just a learner. If something is new, it doesn't bother him a bit. Whenever he does anything, it's a total immersion.'
—Eleanor Greatbatch, Wilson's wife of 50 years



to inhibit a similar viral replication in cats. The two were recently awarded U.S. Patent No. 5 324 643 for this work. To help his studies, he has bought a computer and modem to access the Internet from his home.

In praise of principles

Greatbatch likes to point out that "profession" has religious origins, deriving from monasteries, which were considered the repository of knowledge and where one "professed" his faith. Ethics and values are central. Money is not.

It is interesting to note that during the first 16 years of pacemaker manufacturing, no Federal regulation covered the monitoring of safe practices and trials. Practitioners—like Greatbatch—tackled the job scrupulously and did well.

Strengthening the engineering profession has been one of the inventor's ongoing commitments. Early in his career, in the nascent field of biomedical engineering, he insisted that engineers receive top billing in their professional journals while doctors would receive the marquis spot in medical journals.

He believes that engineers should participate in projects at both local and national levels. Last summer, he lobbied on Capitol Hill for rules affecting international patents. At the state level, he feels biomedical engineers should be registered as professional engineers because they carry a social responsibility in helping to treat patients.

Always a booster of education, Greatbatch, friends note, has donated millions to schools, creating an engineering wing at local Houghton college, for example. Moreover, he has seen to it that his employees and their children seeking a university education have had their tuition and books paid for.

In spite of such great accomplishments, Greatbatch has no big ego. His children have a fancier life-style than he does. In person, he speaks softly, simply, and straightforwardly (like Gary Cooper, in a way). His wife Eleanor said, "He's just a learner. If something is new, it doesn't bother him a bit. Whenever he does anything it's a total immersion."

He learns mainly by talking to people, reading, and experimenting. Yet most of the time, she said, he works unhurriedly. Herb Mennen, an engineer and partner of Greatbatch's for more than 20 years, said, "He works a normal day. But geniuses do things differently."

To make an impact in engineering requires "complete immersion, a long time, maximal professionalism, and a subordination of those false values that the rest of the world deems so important," Greatbatch wrote in 1983. Citing the New Testament (First Corinthians 10:24), he said the other person's welfare should be more important than your own. "This is a shocking statement. American business doesn't run that way. But when a customer finds out you really mean it, most won't buy anywhere else."

Those themes are prominent in Greatbatch's favorite speech, which lasts about 2 minutes. He first delivered it in 1987 at a Clarkson University commencement in Potsdam, N.Y. Now he recites it by heart. Realizing that parts are preachy and that references to the Lord may fall upon unwilling ears, he nonetheless plans to continue giving the speech his way, he told *Spectrum* last November.

And so in fact he does that night at the IEEE/EMBS awards dinner, where both he and Bakken of Medtronic are being honored. Many in the audience, like the handful of students sitting at this writer's table, are not even sure who the elderly gentleman in the blazer and bow tie is.

But by the middle of the speech, no one is looking at the tines of the dessert forks. The speaker's sincerity has drawn everyone in. He urges the listeners, "Don't fear failure. Don't crave success," and reminds them that "the reward is not in the results, but rather in the doing." At least for a few minutes, an audience is spellbound. ◆