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WALTER L. ROBB

1928–2020

Elected in 1982

"Applications of high technology to the health and medical needs of the world community."

BY LONNIE EDELHEIT

WALTER LEE ROBB died in Schenectady, New York, on March 23, 2020, at age 91 from complications of covid-19. He was former director of General Electric's Corporate Research and Development Center (1987–93) and head of GE Medical Systems (1973–87), where he led the development of 5-second, whole-body computed tomography and high-field magnetic resonance imaging.

He was a native of New Bloomfield, Pennsylvania, and graduated from Penn State in 1948 with a BS degree in chemical engineering. Walt always had warm memories of growing up in small-town Pennsylvania and was especially proud of being a Nittany Lion. He was an enthusiastic supporter and generous donor to his alma mater throughout his long life, frequently returning to campus to serve on boards, help raise funds for various causes, and speak to campus organizations. He and his wife endowed two scholarships as well as the chair of the Department of Chemical Engineering. He also provided support and an endowment to the Engineering Leadership Development program in the School of Engineering Design, Technology, and Professional Programs, focused on helping students develop leadership skills. And he played a major role in raising construction funds for the Hintz Family Alumni

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Memorial Tributes: Volume 23

Center; Robb Hall, an event venue in the center, is named in recognition of his efforts.

In 1987 Walt was honored with Penn State's Distinguished Alumni Award and, in 2014, the College of Engineering's Outstanding Engineering Alumni Award. He also received both the Alumni Achievement Award and the President's Medallion from the University of Illinois for his career accomplishments.

After receiving his bachelor's degree, Walt attended the University of Illinois at Urbana-Champaign, where he earned his MS (1950) and PhD degrees (1951), also in chemical engineering. During the spring of his final year he accepted an offer to join the Knolls Atomic Power Laboratory in Schenectady. The company was developing a nuclear reactor for Admiral Hyman Rickover's submarine fleet, among other exciting projects. Walt was assigned to the chemistry laboratory, where he took advantage of numerous opportunities to expand his knowledge and experience in such areas as nuclear reactor design, statistics, and a variety of bench projects.

One of the most promising projects sought to develop a process for coating a uranium fuel element with vapor-deposited zirconium. When enough progress had been made to transfer development to a pilot operation to scale up his work to deposit a zirconium coating on full-sized Hanford fuel elements, Walt launched a new research project to separate plutonium isotopes. That soon led to his appointment to head the design of a thermal diffusion plant for the Savannah River nuclear plant to produce tritium. He took on the challenge and, with a young software coder at his side, used just the second UNIVAC computer in existence to simulate the thermal diffusion columns to make up the cascade. A year or so later, when the final report on the plant simulation was completed and turned over to Savannah River, his special security clearance was terminated; years later he learned that the plant was built using the software program he created.

In 1956 Walt moved from the Knolls Lab half a mile north to join the GE Research Lab's Chemical Process Unit. His first project was to analyze a new process that promised to help the

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Memorial Tributes: Volume 23

lighting business manufacture tungsten wire more economically. His study results were highly unusual in that he recommended several ways to improve the existing process, rather than develop an entirely new method.

His next big project got his name in the headlines! Walt had been assigned the challenge of developing a new gas-separating membrane, a task that involved making plastic films and bombarding them with different types of radiation. The expectation was that the radiation "track" through the film would permeate different gases at different rates. But it didn't work.

However, his research disclosed that GE's silicone business, in nearby Waterford, NY, already made a polymer that was 20 times as permeable as normal plastics and had different permeability rates for different gases. After he solved several production issues, tests showed that the film allowed carbon dioxide to permeate 5 times as fast as oxygen, and oxygen to permeate twice as fast as nitrogen. These rates were not dissimilar to the permeation rate of human lung tissue and fish gills.

To demonstrate the process, a hamster was placed in a 1-cubic-foot box whose sides were covered with the silicone film. The structure was then completely submerged in a bath of circulating, aerated water. The expectation was that oxygen would penetrate from the water into the cage and carbon dioxide penetrate in the opposite direction. As it happened, the oxygen pressure in the cage stabilized at 16 percent of normal atmosphere (equivalent to about 12,000 feet) and the carbon dioxide at 1 percent (less than the US Navy's standard for submarines at the time).

When news of these results was made public, the story appeared in newspapers across the nation. In 1963 Walt's picture appeared on the cover of *Life* magazine, he was interviewed on Walter Cronkite's TV news program, and he was featured on a half-hour science program. Schools loved the project because students could see how human lungs and fish gills work. Walt got invitations from scientific conferences around the world to come share his results. He also received

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Memorial Tributes: Volume 23

12 patents dealing with permeable membranes and separation processes.

Although GE ultimately opted not to take on the development and commercialization of an artificial lung for clinical use, it licensed the membrane technology to other companies that succeeded in bringing the artificial lung to market.

Walt went on to become manager of the Chemistry Engineering Section when Arthur Bueche left to take over the R&D center. At the same time, the Combustion and Fluid Dynamics section was combined with the chemistry department; suddenly, Walt was in charge of 25 employees, including 15 scientists. Several years later Dr. Bueche proposed Walt for the R&D manager position at Silicone Products in Waterford, setting him up for his first experience in an operating business.

Learning more about commercial matters sharpened Walt's appetite for greater challenges. When Reuben Gutoff, head of GE's Chemical and Metallurgical Division, asked if he would be interested in taking over a newly formed medical business incubator called Medical Development Operations, he agreed, thus launching the next stage of his remarkable career. Over the next several years he and his team examined—and sometimes discarded—opportunities in a variety of areas, from clinical lab testing to membrane applications.

At this juncture, it would be useful to recount an incident that was to have a profound impact on Walt's future. Around 1960 he had been asked to return to Urbana to assess the doctoral candidates in his old Department of Chemical Engineering. One of these was a bright, hard-charging student by the name of John F. Welch Jr. After interviewing him, Walt called GE and urged the company to sign up this guy at once. They took his advice, and Jack was launched on a fabulous career trajectory that led from chemical engineering to business management and, eventually, to his position as chair and chief executive officer of General Electric, a job he held from 1981 until he retired 20 years later.

By late 1971 Jack, who had followed Reuben Gutoff as head of the Chemical and Metallurgical Division, was GE's youngest division manager. One of his first acts was to dismiss the

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Memorial Tributes: Volume 23

general manager of Silicone Products and offer the job to Walt, who thus realized his dream of becoming a general manager with a product operation. Despite competitive pressures and a restless workforce, Walt turned the business around by increasing production and reinvigorating the sales and distribution network. When Reg Jones, GE's chair at the time, decided to split GE Plastics off into its own division, Walt was named to replace Jack, who was promoted to group executive. So in just 4 years Walt went from heading a business with $150,000 in sales to managing a $500 million operation!

But even more remarkable things were in store. In December 1973 Jack met with Walt to explain that the moribund x-ray business in Milwaukee, now named the Medical Systems Department, was continuing to disappoint and needed a change of leadership. Even though its roots extended far back in GE's history, Jack thought GE should sell it and asked Walt to go there for no more than a year to see if there were any good reasons for keeping it. Naturally, Walt agreed even though it meant uprooting his family and trading a $500 million business for one less than a quarter as large.

Walt arrived in Milwaukee at a pivotal moment for the diagnostic imaging industry. An upstart British company, best known for recording the Beatles, had just introduced a new type of x-ray head scanner that it claimed could visualize tumors in the brain in an entirely new way. The EMI computerized transaxial tomography (CTAT) scanner created quite a stir in the medical community, not to mention among the traditional imaging equipment manufacturers. (As it happened, EMI had previously approached GE to be its US distributor but couldn't reach a deal.)

Walt ordered a full-scale investigation of the new technology, including dispatching a small team to the Mayo Clinic where they "looked under the hood" of an EMI scanner that had been operating there for 9 months. The upshot was a recommendation that GE develop its own 2-minute scanner. Walt, disappointed by such a "me too" approach, asked what the GE R&D Center had recommended and was stunned to learn no one had contacted them. He called Art Bueche and set up a

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Memorial Tributes: Volume 23

meeting to discuss the problem and suggest a solution. Just 2 weeks later, the R&D Center proposal came back—a *5-second* scanner that would enable both brain and body scanning on the same machine.

The challenges were enormous: instead of 12 photomultiplier tube detectors, as in the EMI design, the 5-second scanner would require 300 or more detectors just 2 mm in width, plus the enormous data acquisition and computational capacity demanded by the fan beam design. And although EMI had taken several years to develop its first scanner, Walt told Art that he wanted the GE prototype ready in just 18 months. An entrepreneur at heart, Art agreed and the program was launched with Jack's blessing. After a great many challenges and long days, GE's fan beam, rotate-only whole-body scanner—the CT/T—was introduced to considerable acclaim at the 1975 meeting of the Radiological Society of North America in Chicago and enjoyed great market success.

The lessons learned during these exciting CT development days were transferable several years later to the equally stunning success of the joint Corporate R&D Center/GE Medical Systems development of high-field magnetic resonance imaging. Walt was key to both wins—a scientist who was uniquely qualified to take a small, unexciting, marginally profitable x-ray business and turn it into a hugely successful medical imaging powerhouse with a worldwide reach.

President William J. Clinton awarded him the National Medal of Technology in 1993 in recognition of his many contributions to the advancement of medical imaging technology.

It was in the hectic early days of the program that I first met Walt during one of his many visits to the R&D Center to review progress. I was in charge of designing and constructing a prototype breast CT scanner using our proposed technology and getting it to the Mayo Clinic for clinical testing. I moved to Milwaukee and eventually set up the Advanced Science Lab that studied the next generation of CT, MRI, and many other technologies. Walt and Jack later asked me to take over the entire engineering organization so, over many years, I got to observe Walt as a scientist, a businessman, and a leader.

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Memorial Tributes: Volume 23

Walt retired from GE after 42 years of service. But that hardly marked the end of his business career or his public service involvement. He created Vantage Management to oversee his many investments in a variety of technology startups in need of financial and management expertise. According to his son Rich, its activities spanned an enormous range, from medical devices such as cancer testing and inhalers (VisionGate, Check Cap, Innurvation, Pneuma Respiratory) to recycling (Tire Conversion Technologies), fuel cells (meOH), pharmaceuticals (Celegene), and much more. He was especially proud of his involvement with Cree Lighting, a global leader in LED technology for commercial and residential applications. Vantage provided not only critical funding but also access to Walt's vast reservoir of business experience. Some reports suggest he may have invested as much as $20 million in startups in New York's capital region alone to "keep the local talent at home."

He also owned two minor league sports franchises—the Albany River Rats of the American Hockey League and the Albany Conquest of Arena Football 2 League—and served on the board of Double H Ranch, a retreat for developmentally disabled and terminally ill children. He also was on the board of Proctors, the downtown Schenectady arts venue, and was a trustee at Clarkson University.

While in Milwaukee he was vice chair of the Milwaukee Symphony Orchestra Board of Directors and was in line to become the chair when plans were interrupted by his reassignment to Schenectady. The previous year, he had arranged a generous grant from the GE Foundation to support the symphony's first European tour and personally hosted customers and prospects at each major concert location. According to his son Lindsey, Walt was always thrilled when he heard Brahms' First Symphony, the centerpiece of those concerts. As a parting gift, he and his family endowed the MSO's Walter L. Robb Family Trumpet Chair.

Amid all his interests and activities, Walt was devoted to his wife Anne and their three sons. As Lindsey told me, "He was a great dad, and Mom was amazingly supportive, which gave him the freedom to work so hard. He called it a 'joint venture,'

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Memorial Tributes: Volume 23

but 'team effort' would also be fitting." Rich recalled, "My dad was never flustered, never hyperactive, never late for meetings, and always included us in his passions, such as sailing, flying, and various other activities." Steve concurred, "It was one of his greatest joys to spend time with us. For instance, my brothers and I joined him in climbing Mt. Kilimanjaro in 1997, a shared experience he talked about the rest of his life." Lindsey added, "He was the most conscientious and thoughtful father one could hope for, constantly showing us how to get 'high' on sports and culture. He was at every single concert during my 8 years in school bands, somehow juggling his travel and meeting schedules to be there with his portable cassette recorder to tape the programs. And 'though a conservative throughout his adult life, he openly embraced one of his sons' being gay and joyously welcomed that son's husband into the family. He was just so delighted that his son had a companion in life."

While no son or granddaughter followed him into a technical profession, Walt celebrated each in their endeavors, whether business or personal, recognizing that they had their own passions to follow.

Throughout his career Walt was the perfect man for the job because his many attributes aligned perfectly with the challenges at hand. He persevered even when everyone else was discouraged and advising caution. He pushed his team to seek innovative solutions. He was intensely curious, always asking "why." He put customers first, listening and responding to their needs and encouraging his colleagues to do the same. And he was willing to take well-considered risks when the situation demanded doing the right thing, not merely the safe thing.

These attributes characterized Walt's career and life. He would contact me frequently to discuss some new company he was starting up or to ask my advice on some issue. Hardly 2 weeks before his death, he sent me an article about a new way to test for the coronavirus at home. That's the kind of guy he was—curious, engaged, enthusiastic, always looking for the next big thing.

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Memorial Tributes: Volume 23

He is survived by his wife of more than 66 years, Anne (née Gruver), sons Richard (Marjorie), Lindsey (Marin), and Steven (Kim), and five granddaughters.

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