

News

Celebrating Inventor H. Joseph Gerber, the Man Behind the File Format

3 days ago by [Duane Benson](#)

Heinz Joseph Gerber escaped from a Nazi labor camp to become one of the most prolific U.S. inventors of the 20th century.

Heinz Joseph Gerber would have been 100 years old this year in 2024. In his 72 years, he survived a Nazi labor camp, immigrated to the United States, earned an education, and revolutionized drafting, mapping, apparel, electronics, and manufacturing.

Gerber is a familiar name to many in the electronics design and manufacturing industry. It is the name given to the manufacturing automation instruction files generated by printed circuit board (PCB) layout software. Gerber files contain the descriptive language of automated PCB fabrication and assembly systems.



Heinz Joseph Gerber: April 17, 1924 to August 8, 1996. Image used courtesy of [Plastics Hall of Fame](#)

Despite how crucial this technology is to so many, not many people know that the namesake, Joseph Gerber, was a brilliant inventor responsible for advancements in various fields. He is often considered one of the most important yet least-known innovators of the mid-20th century. His inventions led to the emergence of computer-aided design (CAD), automated drafting, and standardized electronics manufacturing. Gerber didn't just invent products. He rewrote entire industries.

An Early Start for a Curious Mind

Born in Vienna, Austria, on April 17, 1924, Heinz Joseph Gerber showed an inventive demeanor at a very early age. At the age of four, he devised a solution to repair a broken door handle. As a young child, he was determined to understand everything mechanical and electrical around him. To him, everything was a technical process, even preparing meals in the kitchen. He was given a violin for his sixth birthday, and, in a window into an entrepreneur's mind, he questioned why anyone would want to play a musical piece a second time. He then set to work on a mechanism to automate playing the violin.

“The essence of good management is the ability to make wise decisions without full knowledge of all of the facts.” —H. Joseph Gerber

Gerber grew up in a strict Orthodox Jewish home with few opportunities for socializing with other children. In his limited time outside the home, he struggled with schoolteachers who did not appreciate his curiosity. He created his own world at home, filled with wires, pulleys, gears, and vacuum tubes. Gerber was a curious soul and a skeptic of all things non-scientific.

By his early teen years in the late 1930s, Austria had become a very dangerous place for people of Jewish descent like Gerber and his family. He was imprisoned in a Nazi labor camp from 1938 to 1940. Shortly after his release, he was

arrested again but managed to jump from the train heading to Dachau. He and his mother escaped to Italy and then to the United States. His father did not survive the Holocaust in Europe.

After arriving in New York City and later Hartford, Connecticut, Gerber finished high school in two years and won a scholarship to study aeronautical engineering at Rensselaer Polytechnic Institute. His career as an inventor began before his graduation in 1946.

Gerber Scientific: Born of a Late Homework Assignment

Gerber developed his first major invention as a junior in college when faced with a tedious aeronautical engineering assignment to design a twin-engine aircraft. The design required many calculations for measuring curves, and Gerber was running past the due date. The arithmetic involved careful measurements of curves by dividing them into numerous small sections and performing complex slide-rule math on each part.



Prototypes and versions of the Gerber Variable Scale. Image used courtesy of the [National Museum of American History](#).

Observing his slide rule, Gerber noted that the active scale, of course, moved. He thought that if he had an instrument that acted similarly but with an active scale that stretched, he could directly measure the curves. He penned a scale on the removable elastic waistband from his pajama pants and created such a tool. His elastic prototype allowed him to complete the series of measurements the same night—something that would have otherwise taken days or weeks.

The next day, before meeting up with his professor, Gerber stopped by the department machine shop, fabricated a foot-long metal version, and presented it to his professor along with the completed homework. While Gerber was concerned that he might be accused of cheating, his professor, Paul Hemke, recognized the design as a revolutionary invention and signed his name to Gerber's sketches to acknowledge and document the date of the invention.

The device was later called the “[Gerber Variable Scale elastic ruler](#).” Gerber created his company, Gerber Scientific Instrument Company, later renamed Gerber Scientific. His pattern of observing problems and developing a creative way to automate the solution would follow him throughout his life and career.

Gerber's Impact on Manifold Industries

Joseph Gerber significantly contributed to several fields, from mechanical computing devices to the textile industry.

Scroll to continue with content

Mechanical Computing Devices

To follow up on his Variable Scale elastic ruler, Gerber expounded his work on mechanical computing devices with the Derivimeter and the Equameter, which are used to measure derivatives and the equation of a curve, respectively.

”Fix what’s wrong, keep what’s right, and move ahead.” —H. Joseph Gerber

Automated Drafting

Gerber invented the first computer photoplotter. His automated drafting and design systems revolutionized the automotive and aviation industries by making the design of massive projects, like the U.S. Air Force C5 transport, feasible and practical. Derivatives of the machine found applications in cartography, sign-making, printing, and a host of other formerly manual labor-intensive applications.

The Textile Industry

In 1966, prompted by a request from IBM, Gerber turned his attention to the [apparel industry](#), the world's largest non-automated industry at the time. IBM was branching out beyond accounting systems and was interested in the garment industry. The company asked Gerber if his photoplotters could be connected to their new model 1130 computer and if the plotter's pen could be replaced with a knife.



Joseph Gerber with his S-95 fabric cutter. Image used courtesy of the [Textile Network](#)

Gerber not only developed the product they requested but also created other innovations that accurately cut stacked cloth and automated sewing. Because of these inventions, historians today regard him as one of the founders of the modern textile industry.

Electronics Circuit Board Design

Some of the work that went into his photoplotters and computerized cloth alignment were folded into the first PCB photoplotter. The descriptive PCB manufacturing script language he invented for the plotter was published and became the industry standard electronics manufacturing file format well into the 21st century. Other formats, such as ODB++ and IPC-2581, are vying to be the replacement, but most electronics to date are still built with the help of a Gerber file set.

Innovations Almost Beyond Count

An example of Gerber's Variable Scale, along with the elastic he used in the original late-night prototype, is exhibited in the Smithsonian's National Museum of American History exhibit. Gerber's life was memorialized in the book "The Inventor's Dilemma, the Remarkable Life of H. Joseph Gerber," written by his son David J. Gerber and published in 2015.

"There is nothing more vulnerable than entrenched success." —H. Joseph Gerber

Gerber was granted more than 650 patents in his lifetime. Among his numerous awards was The National Medal of Technology, which was awarded in 1995. Heinz Joseph Gerber was a curious mind. He was an inventor, entrepreneur, activist for his Jewish community, and a man with a never-ending thirst to improve the world around him.

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