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If It's for Sale, His Lines Sort It

By **MARGALIT FOX**

It was born on a beach six decades ago, the product of a pressing need, an intellectual spark and the sweep of a young man's fingers through the sand.

The result adorns almost every product of contemporary life, including groceries, wayward luggage and, if you are a traditionalist, the newspaper you are holding.

The man on the beach that day was a mechanical-engineer-in-training named N. Joseph Woodland. With that transformative stroke of his fingers — yielding a set of literal lines in the sand — Mr. Woodland, who died on Sunday at 91, conceived the modern bar code.

Mr. Woodland was a graduate student when he and a classmate, **Bernard Silver**, created a technology, based on a printed series of wide and narrow striations, that encoded consumer-product information for optical scanning.

Their idea, developed in the late 1940s and patented 60 years ago this fall, turned out to be ahead of its time, and the two men together made only \$15,000 from it. But the curious round symbol they devised would ultimately give rise to the universal product code, or U.P.C., as the staggeringly prevalent rectangular bar code (it graces tens of millions of different items) is officially known.

The bar code would never have developed as it did without a chain of events noteworthy even in the annals of invention etiology:

Had Mr. Woodland not been a Boy Scout, had he not logged hours on the beach, and had his father not been quite so afraid of organized crime, the code would very likely not have been invented in the form it was, if at all.

Norman Joseph Woodland was born in Atlantic City on Sept. 6, 1921. As a Boy Scout he learned Morse code, the spark that would ignite his invention.

After spending **World War II** on the Manhattan Project at Oak Ridge National Laboratory in Tennessee, Mr. Woodland resumed his studies at the Drexel Institute of Technology in Philadelphia (it is now Drexel University), earning a bachelor's degree in 1947.

As an undergraduate, Mr. Woodland perfected a system for delivering elevator music efficiently. His system, which recorded 15 simultaneous audio tracks on 35-millimeter film stock, was less cumbersome than existing methods, which relied on LPs and reel-to-reel tapes.

He planned to pursue the project commercially, but his father, who had come of age in “Boardwalk Empire”-era Atlantic City, forbade it: elevator music, he said, was controlled by the mob, and no son of his was going to come within spitting distance.

The younger Mr. Woodland returned to Drexel for a master’s degree. In 1948, a local supermarket executive visited the campus, where he implored a dean to develop an efficient means of encoding product data.

The dean demurred, but Mr. Silver, a fellow graduate student who overheard their conversation, was intrigued. He conscripted Mr. Woodland.

An early idea of theirs, which involved printing product information in fluorescent ink and reading it with ultraviolet light, proved unworkable.

But Mr. Woodland, convinced that a solution was close at hand, quit graduate school to devote himself to the problem. He holed up at his grandparents’ home in Miami Beach, where he spent the winter of 1948-49 in a chair in the sand, thinking.

To represent information visually, he realized, he would need a code. The only code he knew was the one he had learned in the Boy Scouts.

What would happen, Mr. Woodland wondered one day, if Morse code, with its elegant simplicity and limitless combinatorial potential, were adapted graphically? He began trailing his fingers idly through the sand.

“What I’m going to tell you sounds like a fairy tale,” Mr. Woodland told Smithsonian magazine in 1999. “I poked my four fingers into the sand and for whatever reason — I didn’t know — I pulled my hand toward me and drew four lines. I said: ‘Golly! Now I have four lines, and they could be wide lines and narrow lines instead of dots and dashes.’ ”

That consequential pass was merely the beginning. “Only seconds later,” Mr. Woodland continued, “I took my four fingers — they were still in the sand — and I swept them around into a full circle.”

Mr. Woodland favored the circular pattern for its omnidirectionality: a checkout clerk, he

reasoned, could scan a product without regard for its orientation.

On Oct. 7, 1952, Mr. Woodland and Mr. Silver were awarded [United States patent 2,612,994](#) for their invention — a variegated bull’s-eye of wide and narrow bands — on which they had bestowed the unromantic name “Classifying Apparatus and Method.”

But that method, which depended on an immense scanner equipped with a 500-watt light, was expensive and unwieldy, and it languished for years.

The two men eventually sold their patent to Philco for \$15,000 — all they ever made from their invention.

By the time the patent expired at the end of the 1960s, Mr. Woodland was on the staff of I.B.M., where he worked from 1951 until his retirement in 1987.

Over time, laser scanning technology and the advent of the microprocessor made the bar code viable. In the early 1970s, an I.B.M. colleague, George J. Laurer, designed the familiar black-and-white rectangle, based on the Woodland-Silver model and drawing on Mr. Woodland’s considerable input.

Thanks largely to the work of [Alan Haberman](#), a supermarket executive who helped select and popularize the rectangular bar code and who died in 2011, it was adopted as the industry standard in 1973.

Mr. Woodland, who earned a master’s in mechanical engineering from Syracuse University in the 1950s, received the [National Medal of Technology and Innovation](#) in 1992. Last year, he was inducted into the [National Inventors Hall of Fame](#). (Mr. Silver, who died in 1963, was inducted posthumously along with him.)

Mr. Woodland’s death, at his home in Edgewater, N.J., was confirmed by his daughter Susan Woodland. He is also survived by his wife, the former Jacqueline Blumberg, whom he married in 1951; another daughter, Betsy Karpenkopf; a brother, David; and a granddaughter.

Today, bar codes sort the world, encapsulating the particulars of modern material culture — the wide and the narrow of things — in banded black and white.

In retail establishments worldwide they are scanned at the rate of more than five billion a day. They keep track of books in libraries, patients in hospitals and nearly anything else, animate or in-, that will serve as an affixable surface.

All because a bright young man, his mind ablaze with dots and dashes, one day raked his fingers through the sand.