The magnetic stripe

An unassuming dark, metallic tape gave rise to the credit card industry

It's a technology that most people carry around all the time but often goes unnoticed — the magnetic stripe that is adhered to the back of credit cards, driver's licenses and loyalty cards. The thin strip of dark tape is made of tiny iron-based components whose magnetism can be modified and used to store information, which is then retrieved by swiping it through a reader.

Overview
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The first person to affix magnetic media to a plastic card for data storage was IBM engineer Forrest Parry, who began his career with the company in 1957. Parry helped develop the Universal Product Code (UPC), high-speed printing systems and an advanced optical character reader, but his pioneering work on the magnetic stripe would establish him as one of IBM's premier innovators.

In the early 1960s, Parry wanted to affix a stripe of magnetized tape to a plastic card to create a more secure identity card for CIA officials. At first, he had trouble finding a reliable way to attach the stripe to the card. Then his wife, who happened to be ironing clothing at the time, suggested that he use the iron to melt the stripe onto the card. It worked. IBM soon became a pioneer in magnetic stripe technology, which was quickly adopted by banking, retail and mass transportation.

History

From audio recording to data storage

Magnetic tape first showed its usefulness in the audio recording industry in the 1930s. IBM engineers experimented with magnetic-coated plastic tape in the 1940s for use in data storage and retrieval, and within a decade, magnetic tape dominated offline storage and data transfer for computers.

Commercial applications of the mag stripe soon followed. At the time, credit card commerce was more physical than digital. Each transaction was completed using essentially a tiny printing press to record raised letters and numbers from a card onto a form made of pressure-sensitive paper with carbon copies. The system was insecure, slow and prone to error. Airlines and banks, especially, were looking to make such transactions faster and more secure.

In 1969, IBM spearheaded the establishment of standards for magnetic stripe technology, led by IBM project manager Jerome Svigals. The mag stripe approach that IBM had helped develop was adopted as a US standard in 1969 and as an international standard two years later, enabling mag stripe cards to be used anywhere in the world. IBM did the work for free and didn't patent its machine-readable card. But the technology paid off for the company in other ways. By 1990, every dollar IBM had spent developing the stripe technology netted about USD 1,500 in computer sales.

1969

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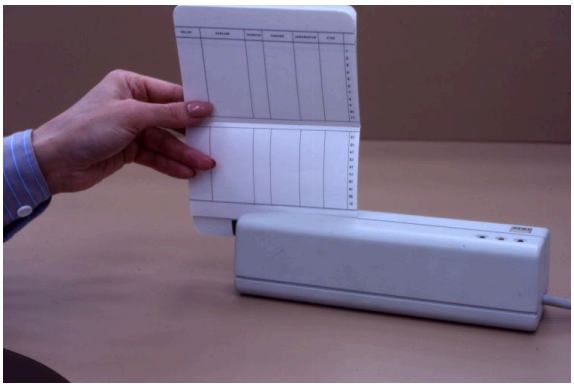
A manual-swipe magnetic tape reader in use



A magnetic tape reader scans a bankbook

Market impact

An innovation that almost didn't happen

Not everyone at IBM was sold on aggressively pursuing the magnetic stripe market. Svigals recalled making a presentation to IBM's board of directors during which chief executive Thomas J. Watson Jr. revealed that he wasn't totally comfortable with the strategy. The reason: "Mom doesn't like credit cards," he confided. IBM got into the business anyway and quickly became a leader.

In 1970, IBM teamed up with American Airlines and American Express on an experimental self-service ticketing system at Chicago's O'Hare Airport with which passengers could use magnetic stripe credit cards at kiosks to make reservations and purchases. Cardholders were given the choice to retrieve tickets and boarding passes from the kiosk or from a human agent. They flocked to the kiosks.

Banks were slower to embrace mag stripes because of the perceived high cost of adoption. It took several years to develop a machine that could lay down the magnetic stripes reliably at high speeds, and the per-card costs — about USD 2 — were high. Eventually, the cost of a mag stripe card dropped to less than 5 cents as production volumes increased.

When combined with point-of-sale devices, data networks and mainframe computers, the magnetic stripe became the catalyst for the global credit card industry. For more than three decades, mag stripe technology reigned as the dominant mechanism for authorizing card transactions and verifying identities. Only 16% of US families held a bank card in 1970, while more than two-thirds did in 1998. More than USD 7 trillion in credit- and debit-card transactions were processed in 2018. Cards are swiped through mag stripe readers more than 50 billion times a year to verify identities and conduct transactions.

In recent years, chip-enabled cards that encrypt cardholder data have begun to replace mag stripe cards, which carry static data directly in the magnetic stripe. However, demand for magnetic stripe cards remains strong because of their low cost, reliability and the huge, global installed base of card readers. And even though the job performed by magnetic stripes can now be done with chip cards and mobile phones, the global financial and transaction systems that thrive today are a legacy of the unassuming magnetic stripe.

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Use of an IBM 2730 Transaction Validation Terminal for a credit card transaction in 1971

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